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### 01AP01-1

Discharge within 48 hours after laparoscopic colorectal surgery is feasible with fully implemented eras protocols

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Background and Goal of Study: Implementation of multidisciplinary approached ERAS programs results in a significant improvement of perioperative care. Due to this improvement, the length of hospital stay (LOS) can be reduced and is directly related to the adherence to ERAS protocols. The Median LOS in the Holland is 5d for colon surgery (CS) and 6d for rectal surgery (RS). Since 1 year our hospital is ERAS center of excellence and able to reduce complications by more than 40% and reduce LOS significantly. The objective of this retrospective analysis is to demonstrate that the LOS can be reduced to < 48h when the multidisciplinary approached ERAS programs are fully executed.

Materials and Methods: After approval of the Medical Ethical Committee, we searched for patients in our database system (June-December 2017) who could be discharged within 48 hours. Primary outcome measures were VAS and PONV-scores, opioid use (calculated in mg morphine equivalents) and compliance to the ERAS protocols. Secondary outcome measures were 30-day readmissions and reoperations.

Results and Discussion: Twenty-nine patients could be identified, 19 (M/F=8/11, ASA II/III=12/7, mean age 69.9y range 35-73y) and 10 (M/F=5/5, ASA II/III=7/3, mean age 61.6y range 50-78y) patients for CS and RS respectively. The VAS scores are shown in table 1. Opioid consumption is shown in table 2. The adherence to the ERAS protocol in both procedure types was > 70%. Only two patients, one in each group showed mild PONV. In the period analysed, more than 28% of the CS and RS patients could be discharged within 48h. There were no 30-days readmissions or re-operations reported.

**Conclusion(s)**: Implementation of the multidisciplinary approached ERAS programs resulted in a significant improvement of perioperative care and a reduction in LOS. When ERAS is fully executed, discharge is feasible within 48 hours.

#### 01AP01-2

# Evaluation of antithrombotic prophylaxis measures in post operated patients in a third level hospital

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Background and Goal of Study: Venous thromboembolism is one of the main causes of morbidity and mortality in hospitalized patients, causing approximately 10% of all hospital deaths. Surgical patients are a high-risk population to suffer venous thromboembolism. RIETE prospective registry data show 12% of patients presented symptomatic venous thromboembolism in the eight postoperative weeks. The highest incidence occurs in cancer, orthopedic and trauma surgery.

It's necessary to unify different prophylactic strategies according to the patient's thrombotic risk and type of surgery to minimized incidence. Our center does not have a unified antithrombotic protocol. Thus, we decided to study the daily perioperative practice.

Materials and Methods: A cross-sectional study was designed to analyze all patients undergoing all surgeries during one week in February 2017. Variables collected included: type of intervention, thrombotic risk (CAPRINI scale), use of intraoperative intermittent mechanical compression devices, hospital stay, and pharmacological prophylaxis for venous thromboembolism during hospital stay and discharge. Outpatients and urgent surgery were excluded. Descriptive statistical analysis was performed with the SPSS program, 24th version.

Results and Discussion: 191 patients were included. Patients intervened CAPRINI average was 5'6 (SD 3.5), and 46.9% were considered high risk patients (CAPRINI >5). Cardiac (50%), general (52%), traumatology (61%), vascular (80%) and thoracic surgery (100%) had the higher proportion of risk patients. 9% of patients used intraoperative pneumatic compression boots, vascular surgery used them more extensively (40%). This measure was used without risk discrimination, since there was no significant difference according to CAPRINI (7.8% vs 10.8%). Despite CAPRINI's average, 22% of the patients did not receive any prophylactic measure, and 67% of patients did not receive antithrombotic measure at discharge. No thromboembolic events were detected in any patient.

Conclusion: There is no uniformity between the different surgical services to define antithrombotic prophylaxis both pre and postoperatively. CAPRINI scale is not taken into account for the use of intermittent mechanical compression device, even assuming a significant economic expense. The need for the development of a protocol that unifies criteria and awards intermittent mechanical compression equipment to patients who have a higher thrombotic risk is evident.

#### General Anaesthesiology

### 01AP01-3

A comparative study of forced air vs conductive polymer warming device in arthroscopic shoulder surgery

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**Background:** Conductor polymer warming devices like Inditherm® have been recommended as an alternative to forced air warming devices¹ like Bair Hugger®. However, robust studies comparing the efficacy of these two devices are not available and hence this study.

**Methods:** North West Research Ethics Committee approved this study on 24/8/2012 (ref no 12/NW/0404). Power analysis with  $\alpha$  at 0.05, 1- $\beta$  at 0.8 and 0.6°C being the clinically significant temperature difference required atleast 90 patients for this randomized, prospective, two-treatment parallel design trial. Anaesthetic and surgical management were standardised. Temperature was measured by nasopharyngeal probe sited at induction for 90 minutes.

Results: Of the 102 patients who completed the study, 11 were excluded due to protocol violations leaving 47 in Bair Hugger (group 1) and 44 in Inditherm (group 2) for analysis. At time zero, the mean temperature was similar in both the groups. Though the temperature steadily declined in both groups for the first 30 minutes, in Group 1, it plateaued at 30-35 minutes. Beyond that, it steadily increased, reaching a mean of 36.13°C at 90 minutes. In Group 2, the decline did not plateau and continued steadily all through the 90 minutes as shown in the table. Statistically, the demographics and related data were similar between the groups. The mean temperature of Group 1 was statistically and clinically significantly higher than that of Inditherm at all times > 60 min.

p value	0.814	0.697	0.492	0.025	0.003	<0.001	<0.001
Inditherm Mean Temp °C (std dev)			35.79 (0.48)			35.67 (0.47)	35.64 (0.49)
Bair Hugger Mean Temp °C (std dev)			35.86 (0.53)			36.07 (0.5)	36.13 (0.5)
Time (Min)	0	20	40	60	70	80	90

**Discussion:** Our study shows that Bair Hugger® performed better than Inditherm®. Arthroscopic shoulder surgery risks significant intraoperative heat loss due to continuous joint irrigation, ultra clean laminar flow theatres, etc. Unfortunately, Inditherm failed to prevent hypothermia under these conditions.

#### eference:

1. www.nice.org.uk/guidance/mtg7 (accessed 6/12/2017)

# 01AP01-4

# Do pre-ejection periods simultaneously measured with plethysmography reflect invasive arterial line measurements?

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**Background and Goal of Study**: Pre-ejection period (PEP) is defined as the time from the R spike of the ECG to the beginning of the upstroke of the arterial pressure wave. The ventilation induced changes in PEP have been proposed as an alternative to Pulse Pressure Variation for the estimation of intravascular volume status. (1.2)

In a first step to investigate the ability to measure this parameter with plethysmography, we determined the correlation between individual PEP's measured with an invasive arterial line (PEPa) and with plethysmography (PEPpl).

Materials and Methods: After ethical approval and informed consent, patients scheduled to undergo general anesthesia and requiring full mechanical ventilation were included

Maesurements were made during a 60 seconds registration period with the ventilator set at a tidal volume of 8 ml/kg, and a mechanical ventilation rate of 12/min. ECG, invasive arterial waveforms and plethysmographic waveforms were recorded simultaneously. The individual PEP's were calculated offline using a MATLAB® script and were synchronized.

For the pooled data, the correlation between PEPa and PEPpl was determined using a linear regression model. This was repeated for the individual patients. The slope and the correlation coefficient of these patient specific models were reported median [Range] and compared.

Results and Discussion: 21 patients were included. Per patient, 56 [46, 88] beats were used. Median values of the measured PEP's per patient were 176 [147, 207] msec and 254 [108, 460] msec for PEPa and PEPpl respectively.

For the pooled data, a significant regression equation was found (F(1, 1240) =

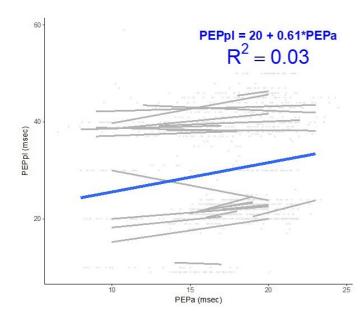
32.14, p < 0.05) with a  $R^2 = 0.03$ . (See figure, blue line)

The slopes and the R² of the individual patients were 0.31[-0.61, 0.88] and 0.07 [0, 0.35] respectively. (See figure, grey lines)

**Conclusion**: The correlation between PEPa and PEPp was weak. In some of the studied patients even inverse correlations were observed. The reason for this discrepancy is not clear and requires further investigation.

#### References:

- 1. Vistisen ST et al Acta Anaesthesiol Scand 2010; 54: 199-205
- 2. Feissel M et al Crit Care Med 2005; 33[Suppl.]: E2534



# 01AP01-6 Central venous-to-arterial carbon dioxide gradient usefullness during laparoscopic operations

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**Background and Goal of Study**: Some studies have shown that the venous-to-arterial carbon dioxide difference might be a useful and complementary tool to detect persistent tissue hypoperfusion during major abdominal and vascular surgery. However, the usefulness of the  $PCO_2$  gap during laparoscopic operations has not been studied.

Materials and Methods: The study includes 38 ASA III patients with curable colorectal cancer undergoing open (n = 15, group N $^{
m e}$ 1) or laparoscopic (n = 23, group No2) elective colorectal surgery. Arterial and central venous blood gas analyses and noninvasive hemodynamic monitoring were performed: before induction; after induction before pneumoperitoneum or incision; after 10 min, 30 min, 1 h and 2 h of pneumoperitoneum or from the start of operation; and 10 min after deflation or the end of an operation. Pneumoperitoneum was maintained at the 11-12 mm H2O. Mechanical ventilation maintained normocapnia in both groups Results and Discussion: Demographic and biological data were comparable between the two groups. ΔPCO₂ before surgery was 4.8±2.3 mmHg in group №1 and 5.1±2.2 mmHg (p = 0.75, Mann-Whitney U tests) and cardiac index was 3.1±0.4 and 3.2±0.5 l/min/m<sup>2</sup>, respectively. During anesthesia venous-to-arterial carbon dioxide difference was significantly higher in group №2 at all time points during operations (4.2±1.6 vs 5.7±2.2 mmHg, 4.5±1.8 vs 6.5±2.1 mmHg, 4.4±0.9 vs 7.3±2.8 mmHg 4.7±2.0 vs 7.4±2.9 mmHg at the 10 min, 30 min, 1 h, 2 h for group №1 and №2 respectively, p < 0.05, Mann-Whitney U tests). In group №2 we identified people with decreased cardiac index during pneumoperitoneum (subgroup A. n = 8, mean cardiac index 2.1±0.25 l/min/m<sup>2</sup>), and the carbon dioxide difference was significantly higher after 30 min, 1 h and 2 h in comparison with people with preserved cardiac index from group №2 and people from group №1 (7.2±1.9 vs 5.9±1.9 vs 4.5±1.8 mmHg, 8.2±2.1 vs 6.4±1.3 vs 4.4±0.9 mmHg, 8.2±2.6 vs. 6.6±2.9 vs 4.7±2.0 mmHg at the 30 min, 1 h and 2 h for group №2A, №2, №1, respectively, p < 0.05, Mann-Whitney U tests), ROC analyses have shown sensitivity 57.1% and specificity 81,2% for the cutoff value 8 mmHg for decreased cardiac index during laparoscopy. Conclusion: We speculate that  $\Delta PCO_2$  may be a marker of hypoperfusion due to insufficient cardiac output during elective laparoscopic operation. Further studies are needed to confirm our hypothesis.

## 01AP01-7

Ultrasound assessment of preoperative gastric emptying in elective colorectal enhanced recovery after surgery (ERAS) patients

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Background and Goal of Study: Pulmonary aspiration of gastric content is a rare but serious complication of general anesthesia. According to the Enhanced Recovery After Surgery (ERAS) guidelines, patients may receive a carbohydraterich drink up to 2 hours prior to planned surgery. However, it is unclear that the stomach is empty in these ERAS patients.

Materials and Methods: Sixty-eight consecutive ERAS colorectal patients that received 200 mL carbohydrate rich drink until 2 hours prior to abdominal scanning, were studied. Two hours after ingestion of the drink a sonography of the gastric antrum was performed and resting gastric volume was calculated.

Results and Discussion: Mean gastric volume was 0.56 mL/kg body weight. Only in 4 patients (5.9%) resting gastric volume exceeded safe cut-off value of 1.5 mL/kg. In no patient aspiration nor regurgitation occurred neither on induction nor on emergence of general anesthesia. The resting gastric volume showed significant negative correlation with age (r = -0.56, p<0.001); no correlation with body-mass index ASA physical status or time between drink and scan was found

Conclusion: The ingestion of a clear fluid like carbohydrate rich drink in elective surgical patients up to 2 hours preoperatively is safe in terms of aspiration of gastric content and should be encouraged. Moreover, it is probably more advantageous for a patient than an overnight fast as it decreases catabolic state and improve patient's sense of well-being.

## 01AP01-8

A capnodynamic method delivers continuous hemodynamic monitoring during abdominal surgery

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Background and Goal of Study: A capnodynamic method continuously calculates non-shunted pulmonary blood flow (COEPBF) using an automatic expiratory hold in three out of nine breaths during mechanical ventilation. In a porcine model, the method has performed well during different respiratory and circulatory challenges, although as expected, transiently affected during swift changes in mixed venous CO2 and at high shunt levels (>40%)¹-². Concordance during large CO changes has been preserved throughout the animal studies. The aim of the current study was to evaluate COEPBF clinically for the first time during abdominal surgery.

Materials and Methods: Effective pulmonary blood flow was calculated and compared to trans-pulmonary thermodilution (TPTD) in 25 patients undergoing elective open abdominal surgery. Three measurements were performed at baseline at five minutes interval and subsequently before and after changes in PEEP (5-15-5 cmH2O) and epidural activation with bolus mepivacaine 20mg/ml. Events such as hypovolemia and low cardiac output were captured during surgery and values before and after installation of treatment were recorded.

Results and Discussion: TPTD was 4.8L/min and COEPBF 4.4L/min (See fig 1 for eventline). Bias (levels of agreement) for all 233 paired values was -0.3 (-2.1 to 1.4) L/min and percentage error (PE) 37% in patients with a mean age 68 (9) years and weight 76 (16) kg (See fig.2). Bias improved from the measurements at baseline to the steps after PEEP 15 cmH2O by 0.25 L/min without changes in LoA span or PE. Concordance with a 15% exclusion zone (0.75L/min) was 78 and 95% after PEEP increase and decrease respectively, 92% after epidural activation and 87% after volume infusion.

**Conclusion**: COEPBF performed acceptably during open abdominal surgery tracking small but recognizable hemodynamic changes. Further clinical studies are warranted to establish its role as a continuous and simple alternative for monitoring and tracking changes in CO in the operating theatre. **References**:

1.Hällsjö-Sander C. J Clin Monit Comput. 2016 30(6): 761-69. Doi: 10.1007/s10877-015-9767-7

2.Sigmundsson, T.S. J Clin Monit Comput (2017). https://doi.org/10.1007/s10877-017-0021-3

Acknowledgements: The perioperative team at the functional area Open Abdominal Surgery, Karolinska University Hospital Solna

#### 01AP01-9

Effect of night surgery on postoperative complications and healthcare utilization: A Prospective Analysis from New England Hospitals

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**Background:** There is conflicting data on whether surgery at night increases patient harm. We hypothesized that night surgery was associated with increased readmission and postoperative complications. Our primary outcome was 30-day readmission, and exploratory outcomes included adverse discharge (in-hospital mortality, or discharge to a nursing facility), 30-day mortality, and postoperative complications (respiratory, cardiovascular, acute kidney injury, and stroke).

Materials and Methods: 170,022 adults underwent noncardiac surgery with endotracheal intubation at Massachusetts General Hospital and two affiliated hospitals between 2007 and 2015. After excluding missing covariates, our cohort size was 150,245 with 8,281 nighttime surgeries (starting 5pm to 7am). This group was matched to an equal-sized cohort undergoing daytime surgery via propensity scores for confounding covariates, which included patient factors (gender, age, BMI, ASA class, SPORC, CCI), surgical factors (admission booking, urgent or emergent surgery, surgical service, duration of surgery, surgery year, work RVU), and anesthetic factors (vasopressor dose, hypotension, long and short-acting opioids, NMBAs, neostigmine, fluids, PRBCs, dose of volatile agents, nitrous oxide, and propofol, neuraxial use, and S/F ratio). Logistic regression modeling with respect to exposure variable and covariates was used to calculate the odds ratio of outcomes. Results: Thirty-day readmission occurred in 13.7% of cases. Night surgery was not associated with higher odds of readmission (OR, 1.07, 95% CI 0.98-1.18, p=0.15). Adverse discharge and thirty-day mortality were not significantly different. Composite morbidity was not significantly increased (1.08, 0.99-1.18, p=0.08). However, night surgery was associated with significantly higher odds of respiratory complications and acute kidney injury (1.20, 1.08-1.33, p=0.001) and (1.30, 1.12-1.51, p=0.001), respectively.

Conclusions: We did not find that night surgery increases readmission. Though surgery at night cannot always be avoided, it is associated with increased pulmonary complications and acute kidney injury. This warrants further study and begs consideration when cases are booked to start during nighttime hours.

# 01AP02-2

# Paralysis of Nervus Hypoglossus Following a Surgery of a Lumbal Disc Hernia

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Background: Nervus hypoglossus (NH) is the 12th of the cranial nerves which is a pure motor nerve and innervates the intrinsic muscles of the tongue. It is sensitive to the pressure of airway devices' during it's crossing through the stylohyoid ligament and the big horn of hyoid bone on the level of the mandibular corner (1). Isolated NH paralysis (INHP) is a complication that can occur after airway management, accompanied by ipsilateral deviation of tongue, dysarthria, dysphagia and even dyspnea (2). In this case report, the hypoglossal nerve palsy seen in the patient who underwent lumbar disc surgery in prone position was discussed.

Case Report: A 50-year-old, male patient who was scheduled for lumbar disc herniation surgery was evaluated as ASA-I and mallampatia III.Following routine monitoring, induction with propofol, fentanyl, and rocuronium was performed. The patient intubated with 8.5-mm spiral endotracheal tube in the first trial without any complications. The patient positioned to knee-elbow position for the surgery. Surgery lasts for 160 min without any complications. After 2 hours of the patient's transference to the clinic, complaining of drowsiness, limitation of movement and speech disorder started. His tongue deviated to the right when he put his tongue out of his mouth. After physical and neurological examination, he diagnosed as INHP. It was thought that it could be attributed to airway management due to the fact that any other etiologic cause could not be detected, and the incident occurred postoperatively. The patient consulted by the department of ear, nose and throat, and methylprednisolone recommended for 1 week. The patient healed without any seckel in 1 month.

Discussion: INHP is a rare complication related to neuropraxia following an endotracheal intubation, bronchoscopy or usage of laryngeal mask airway (LMA). Laryngoscopy, endotracheal intubation, endotracheal tube malposition, overinflation of the cuff, LMA use, and poor patient position can be in the etiology (1). In generally a short time steroid treatment is curative and it heals without any sequels in 2-4 months (2). INHP should be kept in mind as a complication in patients who have undergone airway manipulation in some way.

#### References: 1.Shah AC et al. Anesth Analg. 2015; 120(1): 105–120.

2.Ulusoy H et al. Braz J Anesth 2014; 64 (2): 124-7.

**Learning points**:This is a rare and transient complication which can be seen after intubation. We discussed the causes and treatment options.

# 01AP02-3

# Cerebral Air Embolism Following ERCP: Case Report

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Introduction: Air embolism rarely occurs after endoscopic retrograde cholangiopancreatography (ERCP) which leads to cerebral infarction, a condition with high mortality and morbidity. In this presentation we aimed to share a case of cerebral air embolism who could not get consciousness after sedation for ERCP. Case: A 79-year-old female patient, who was diagnosed with known hypertension, diabetes, chronic lymphocytic leukemia and chronic renal failure, was planned to have ERCP procedure because of a choledochal stone measuring 15 mm. After monitoring the standard parameters, (heart rate, blood pressure, pulse oxymeter). the patient was sedated (Ramsay 4) with 0.03 mg/kg midazolam, 1 mcg/kg fentanyl, and 1 mg/kg propofol intravenously. Oxygen (3 lt/min) was given to patient through a nasal cannula on spontaneous breathing. Gastroenterology division performed sphincterotomy and removed the stone. A prophylactic stent in the duct of Wirsung was placed, and the process was completed smoothly. The cardiopulmonary condition of the patient was stable throughout the procedure, and she was taken to the recovery unit at the end of procedure. The patient did not get awake and did not respond to any stimuli even after 60 min. Anisocoria was observed in pupils in neurological examination. Cranial CT showed diffuse air embolism in the right frontoparietal main vascular structures (figure 1) and the patient was transferred to intensive care unit. The patient developed generalized tonic clonic seizure, and mechanical ventilation was started after oratracheal intubation. Acute infarct areas showing diffusion restriction on the right frontoparietal and cortical watershed areas on the left frontal surface were seen on MR imaging. TEE revealed neither intracardiac right to left shunt nor patent foramen ovale. The patient died after 6 days in spite of all supportive therapies.

**Conclusion:** It can be concluded that air embolism may be encountered after ERCP procedures, and anesthesiologist and endoscopist should be cautious of any signs or symptoms of cases with risk factors.

Figure 1.



#### 1AP02-4

# Use of rocuronium and sugammadex in patients with miastenia gravis: a case report

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Background: General anesthesia, and more specifically, the use of neuromuscular blocking agents in patients with myasthenia gravis is still controversial nowadays. However, in recent years, the appearance of sugammadex allows to use this type of drug in surgeries in a more safely way, especially surgeries which the use of neuromuscular relaxation is mandatory to be carried out, such as a thymectomy. 1 Case Report: We present a case of a 53-year-old male diagnosed with myasthenia gravis. He was added into Grade IIb according to Myasthenia Gravis Foundation of America Classification (MGFA). Symptoms were right ptosis and mild dysphagia. He was treated with pyridostigmine. In thoracoabdominal and pelvic CT, an antero-superior mediastinal tumor was observed, which may be compatible with thymoma, so video-assisted thoracoscopic resection was performed.

For intraoperative management, a thoracic epidural catheter was placed and then the induction was performed with Propofol 3 mg / kg, fentanyl 3 mcg / kg and rocuronium 0.6 mg / kg. Subsequent doses of rocuronium were administered according to train of four monitoring (TOFr). The surgery proceeded without issues and once completed we made the reversal of the neuromuscular blockade with sugammadex 2 mg / kg obtaining a TOFr> 0.9, so the patient was extubated without showing any residual block in the postoperative period.

**Discussion**: There are not many published data on the perioperative management of myasthenia gravis, so it is difficult to make recommendations with enough level of evidence. The final objective of these patients is to allow a quick recovery for the respiratory and bulbar muscles and to allow an early extubation, that's why we should avoid, whenever possible, the use of neuromuscular blocking agents, opioids or other drugs that prevent achieving this objective. If the intervention allows it, locoregional anesthesia would be preferable to general anesthesia. **References**:

1.ZerrinSungur, MertSentürk, Anesthesia for thymectomy in adult and juvenile myasthenic patients, Current Opinion in Anaesthesiology, 2016, 29, 1, 14

Learning points: The appearance of Sugammadex in clinical practice along with the quantitative monitoring of neuromuscular relaxation has enabled to safely perform surgeries such as performed in this patient, which previously represented a great challenge for the anesthesiologist.

#### 01AP02-5

# Ehler Danlos syndrome: anesthetic management of a rare type

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Background: Ehlers-Danlos syndrome (EDS) comprises a group of clinically and genetically heterogeneous heritable connective tissue disorders. Facial gestalt. extreme skin fragility and laxity, excessive bruising, and some major complications characterize the dermatosparaxis type.2This case presents the huge amount of difficulties for the perioperative management of a patient with dermatosparaxis type. Case Report: Female patient, 27 years old, ASA III, was proposed for surgical cleaning of an infected ulcer of the right thigh. By the impossibility of placing vascular accesses, surgical cancellation and conservative treatment were decided However, due to the extreme cutaneous fracility, there was an exacerbation of the lesion during mobilization, with need of urgent surgical debridement. The patient was positioned in dorsal decubitus, with protection of the bones prominences using soft pillows. A peripherical antecubital vascular access was obtained. Even though technically difficult, ASA monitoring standards were ensured. To minimize manipulation, the patient was intubated using video laryngoscopy, with a number 6 orotracheal tube. The patient was hemodynamically stable throughout the procedure. The positioning and transfer were carefully assured, avoiding lesion of the soft tissues

**Discussion**: The dermatosparaxis type of EDS is a rare but severe autosomal recessive heritable connective-tissue disorder. Careful patient positioning, as padding use, and mobilization are advised to decrease the risk of joint luxation as well as reduction of shear forces with regard to the skin fragility. Non-invasive monitoring should be tried although these patients are prone to bruising and hematoma formation. Avoid central vascular accesses due to the risk of dissection of vascular wall. Orotracheal intubation should be done carefully and use smaller endotracheal tubes to reduce the risk of bleeding and mucosal damage. References:

1.Wiesmann et al.(2014).Recommendations for anesthesia and perioperative management in patients with Ehlers-Danlos syndrome(s).Orphanet Journal of Rare Diseases.VAN DAMME,Tim, et al. (2016). Expanding the clinical and mutational spectrum of the Ehlers-Danlos syndrome, dermatosparaxis type.Genetics in Modicine.

**Learning points**: Due to its rare occurrence and lack of scientific evidence, EDS is challenging for the anesthetist. It's extremely important to registry all perioperative complications, as well as make realistic risk estimations.

# 01AP02-6

# "Perioperative Managementof temperature of Robot Assisted Laparoscopic Surgery patients in the ERAS setting"

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Background and Goal of Study: Robot assisted laparoscopic surgery is a widespread technique used more frequently in colorectal surgery. ERAS perioperative management have demonstrated better outcome of patients. Hypothermia during general anaesthesia has been correlated to many complication and this could compromise the outcome. Although many type of warming devices have been applied during surgery, the contest of Robotic surgery, we hypothesize, may be different due to ineffective warming methods linked to different operative setting.

Materials and Methods: We enrolled 20adults patients scheduled to undergo

to elective robot assisted laparoscopic major colorectal surgery. Perioperative management was conducted following ERAS protocol. General characteristics of patients (age, gender, comorbidity) were registered. ASA physical status were recorded before surgery. Patients were warmed with forced air system and fluid were warmed with set point fixed at 41°C. Temperature was monitored with Spoton System and data were collected every 30 minutes also in postsurgery period. Temperature of operating room was fixed on 23° C. Post-operative Bedside Shivering Assessment and patient temperature comfort were collected at 5, 15, and 30 minutes after surgery.

Results and Discussion: Demographical and ASA physical status of our group were homogeneous. Our patients showed a characteristic pattern of development of hypothermia during anaesthesia and continuous to be hypothermic (35,2 °C±0,5, p<0,05) in post-anaesthesia period with prolonged shivering. Particularly we noted high incidence (90%[n=18/20]; p<0,05) of postoperative discomfort ("severe" 40% [n=8/20]; "moderate" 50% [n=10/20]) 5 minutes after surgery and the same incidence remain at 15 minutes although fluid warming and the use of warmed forced air showing a not adequate control of body temperature. Moreover 60% (n=12/20; p<0,05) of patients showed "mild" shivering and 30% (n=6/20; p<0,05) presented "moderate" shivering.

Conclusion: Few data exist on ERAS perioperative management of temperature in Robotic Surgery. Our patients were hypothermic although multiple strategies were applied for preventing and control heat loss. This may be related to position and little surface body area exposed for active warming in robotic setting. These preliminary findings suggest the need of improving strategies for warming in robotic surgery.

### 01AP02-7

# Kounis Syndrome during general anesthesia for colecystectomy: a case report

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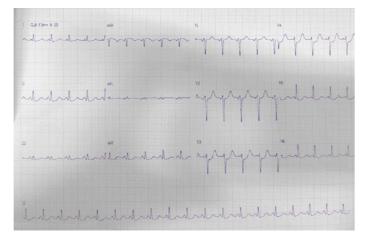
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**Background**: Kounis syndrome (KS), an acute coronary event triggered by anaphylaxis, is observed in 2%-3.4% of allergic reactions, affecting patients with preexisting arterial disease as well as healthy individuals. KS is associated with the release of inflammatory mediators such as histamine, neutral proteases, platelet activating factor, cytokines and chemokines, causing coronary vasospasm.

Case Report: A 57-year old woman with diabetes and arterial hypertension, but no history of allergy, was a candidate for colecystectomy. Normal test results for ECG, ergometrics, chest x-ray were provided by the patient. She was monitored for cardioscopy, SpO<sub>2</sub>, NIBP and BIS. General anesthesia was induced with sufentanil (50 g), propofol (180 mg) and cisatracurium (6 mg), followed by tracheal intubation and capnography. After antibiotic administration (2g cefazolin), the patient displayed progressive hypotension (50 x 22 mmHg), flattening of the capnography curve, and tachycardia (125 bpm). Ephedrine (total: 50 mg) was administered, with no result. Intense skin pallor set in, and after some minutes diffuse changes in ventricular repolarization were observed on cardioscopy. Hypotension was corrected with infusion of noradrenaline, and intense flushing and edema of the face and extremities occurred. Intubated, the patient was admitted to the ICU. The ECG changes persisted for almost 1 hour, but the troponin and CK-MB levels and coronary angiography findings were normal. After 18 hours of satisfactory improvement, the patient was extubated.

**Discussion**: ECG changes may be justified by myocardial ischemia from systemic hypotension, but in our patient the changes persisted despite successful treatment of hypotension. Epinephrine is the drug of choice in anaphylaxis, but in KS can worsen coronary vasospasm. **Learning points**: The early identification of KS and the choice of a treatment capable of controlling anaphylactic manifestations without aggravating coronary vasospasm are crucial to ensure favorable outcomes.

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#### 01AP02-8

# Anaesthetic management in the surgical treatment of cicatricial tracheal stenosis

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Background and Goal of Study: Anaesthetic management of surgeries in patients with recurrent cicatricial tracheal stenosis (CTS) has a number of significant features. This is due to the initial disturbances of respiratory function and to the necessity of providing mechanical lung ventilation with depressurized breathing circuit during the surgical intervention.

Materials and Methods: The study involved 54 patients, 40 men and 14 women, aged from 18 to 62 years. In the majority of cases CTS was caused by long-term presence of the endotracheal or tracheostomy tube (from 3 to 50 days) in the trachea after injury and trauma. Surgeries were preceded by repeated tracheal bougienages with the deployment of linear or T- shaped stents. All patients were operated on for CTS under total intravenous anaesthesia with the use of sibazon/midasolam, propofol or ketamine and arduan for myoplegia. At the stage of breathing circuit depressurization was implemented transcatheter high-frequency (f=90-100'; group 1 - n=24) and normal-frequency (f=20-30'; group 2 n=30) artificial lung ventilation with Monsoon (ACUTRONIC).

Results and Discussion: In the preoperative period in all patients were detected initial obstructive lung function and hemodynamic respiration sufficiency disturbances, corresponding to stages 1 or 2 of respiratory failure. At the intraoperative stage was registered a slight increase of central hemodynamics parameters in both groups (p>0.05). Gas exchange parameters differed apocryphally: in group 1 - PaO2 225±18 and PaCO2 41±12 mm Hg.; in group 2 - PaO2 215±12 and PaCO2 38±7 mm Hg. (p>0.05). In two patients with associated COPD at the beginning was implemented high-frequency ventilation, but because of the rise of PaCO2 up to 53 mm Hg., venous bypass increase up to 43% and the increase of general extravascular lung fluid up to 4.0 ml/kg, ventilation mode was changed to normal-frequency and that led to the return of registered parameters in the permissible limits.

**Conclusion**: In patients without associated lung diseases undergoing surgical intervention for CTS, both ventilation modes with the use of total intravenous anaesthesia equally provide stable parameters of respiration and hemodynamics. In patients with COPD it is advisable to give preference to normal-frequency ventilation mode, which does not allow the intrabronchial pressure to increase significantly and create the effect of "air traps" within a reasonable operational time.

### 01AP02-9

# Anaesthetic considerations for monitored anesthetic care in a dentatorubral-pallidoluysian atrophy patient

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Background: Dentatorubral–pallidoluysian atrophy (DRPLA) is an autosomal dominant degenerative disease of the dentatorubral and pallidoluysian systems of the central nervous system, caused by a mutation in the ATN1 gene and characterized by ataxia and dementia. Depending on the age of onset, these symptoms can be associated with choreoathetosis, myoclonus, epilepsy and psychiatric symptoms. There is scarce literature about the anaesthetic approach of spinocerebellar ataxia, including DRPLA.

Case Report: 58-year-old male, ASA III (DRPLA) proposed for percutaneous endoscopic gastrostomy (PEG) placement under monitored anaesthetic care. The onset of DRPLA was at the age of 30 with progressive ataxia, followed by dysphagia. He became wheelchair-dependent after innumerous falls and had recurrent aspiration pneumonias. He was undernourished (BMI=18kg/m2) and was medicated with diazepam, risperidone, clonazepam, sodium valproate, quetiapine and sertraline.

We provided a deep sedation and analgesia with small boluses of midazolam (2 mg total), fentanyl (20 mcg total) and propofol (55 mg total) after placing the patient in dorsal decubitus with left tilt to lower pulmonary aspiration risk. A nasal cannula was placed for oxygen inhalation and the patient was monitored according to ASA standards. The PEG placement lasted 20 minutes, was uneventful, and the patient maintained a deep sedation state with spontaneous breathing and haemodynamic stability throughout the procedure, after which he remained deeply sedated, so we administered flumazenil 0,2 mg, with successful recovery of consciousness. No adverse events occurred, like seizures or aspiration.

**Discussion:** To our knowledge, there are no reports of sedation techniques in DRLPA patients. One paper reported the occurrence of a postoperative seizure after the administration of naloxone and another reported an apparent effectiveness of propofol and benzodiazepines in seizure prevention in general anaesthesia. GABA neurotransmission in basal ganglia might be decreased in DRPLA and intravenous anaesthetics can have both pro and anticonvulsant activities. The safety of anaesthetic drugs is unknown in DRPLA. Also, sedation carries the risks of ventilatory depression and pulmonary aspiration.

**Learning Points:** In DRPLA patients, PEG can be safely performed under small doses of midazolam, fentanyl and propofol associated with oxygen supplementation. Several factors can lower seizure threshold during and after anaesthesia.

### 01AP02-11

# Anesthetic management in the patient with giant retroperitoneal liposarcoma: a case report

Background: Liposarcoma is a rare type of malignant tumor. It occurs most commonly in the extremities (52%), retroperitoneum (19%) and inguinal region (12%), in patients between 40-60 years of age and has a 1:1 ratio between genders [1]. Retroperitoneal liposarcoma is usually asymptomatic because they grow slowly and silently and may not become symptomatic until they became very large [2]. Patients with giant retroperitoneal liposarcoma (those over 20 kg) are considered at great risk of perioperative complications such as desaturation, massive blood loss, hypotension, cardiac arrhythmia [3].

Case Report: We present a case of 66-year-old woman with giant retroperitoneal liposarcoma (diameter 56x52x20 cm³ and weight 32,9 kg), diagnosed before operation as large ventral hernia. She underwent resection surgery under general anesthesia and we managed anesthesia procedures using invasive monitoring (central venous pressure and arterial blood pressure) and placing epidural catheter without major perioperative complications. Total blood loss was around 1500 ml and 700 ml of ascites were aspirated after they open the abdominal wall. The vital parameters remained stable all the time during the surgery.

**Discussion**: The giant retroperitoneal liposarcoma may increase abdominal pressure, may compress abdominal aorta and inferior vena cava, may compress the gastrointestinal tract leading anemia or malnutrition, the tumor may lift up the diaphragm and cause reduced respiratory compliance and respiratory distress [3]. **References**:

1.Kim I, Chae H. Giant dedifferentiated liposarcoma of the retroperitoneum. J Gastrointest Dig Syst 2017; 7: 487.

2.Ramani M, Purkayastha M, Jain M, Patel M. Anaesthetic management of large retroperitoneal liposarcoma resection in a patient with severe mitral stenosis. IJCPCR 2015; 6(1): 24-26.

3.Feng D, Xu F, Wang M, Gu X, Ma Z. Anesthetic management of a patient with giant retroperitoneal liposarcoma: case report with literature review. Int J Clin Exp Med 2015; 8: 19530-34.

Learning points: Anesthetic management for patients with giant retroperitoneal liposarcoma must be focused on: perioperative use of invasive monitoring (arterial blood pressure and central venous pressure), adequate fluid management, avoidance of compression on abdominal aorta and inferior vena cava, maintenance of adequate venous return, prevention of pain, hypoxaemia, hypercarbia, acidosis and temperature control.

# 01AP02-12 Anaesthesia for laparoscopic surgery in patient with CADASIL syndrome

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**Background:** Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) is a progressive and unusual syndrome. It is the most common genetic cause of ischemic strokes (1). Very little is known about perioperative implications of this syndrome.

Case Report: 42-year-old woman, ASA II, with history of dyslipidemia and asymptomatic CADASIL syndrome, anti-aggregated with clopidogrel (stopped 5 days before surgery), presented to elective laparoscopic oophorectomy. The procedure was performed under balanced general anaesthesia, using ASA standard monitoring and BIS®. Fentanyl (2ug/Kg), propofol (2mg/Kg) titled and rocuronium (0,6mg/Kg) were used for induction followed by tracheal intubation. Anaesthesia was maintained with desflurane and fentanyl. After insufflation of the pneumoperitoneum, the patient was placed in a 30° head-down position. Through the course of surgery, the patient was hemodynamically stable with Mean Arterial Pressure (MAP) 70-80 mmHg and end-tidal carbon dioxide around 35mmHg. Extubation went uneventfully. Postoperative analgesia included paracetamol (1g), tramadol (100mg) and morphine (4mg). The perioperative period was uneventful. Anti-aggregant therapy was reintroduced 24h after surgery and the patient was discharged at 4<sup>rd</sup> postoperative day.

**Discussion:** The anesthetic management of these patients should be based on protection from ischemia, and for that it is essential to keep normal levels of blood pressure, normocapnia and normovolemia (1,2). We opted for induction with propofol, once it doesn't change brain-self regulation and promotes neuroregulation. The slow administration of propofol prevented hypotension. For anesthetic maintenance, an inhalation agent was used as a component of balanced general anaesthesia, which allowed easier titration of the depth of anaesthesia with regard to MAP (2). We avoided the excessive head-down position, once obstructions to the cerebral venous return should be dodge (2).

#### References:

1. Chon JY, Lee JY. "Anesthetic management of a patient with CADASIL syndrome-A case report." Anesth Pain Med, 2012:7:59-62.

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**Learning points:** It is essential to maintain an adequate cerebral perfusion, key to avoid an increase in additional ischemic events in patients with CADASIL syndrome. Have attention for use of anti-aggregant therapy.

## 01AP03-1

# Anesthetic management of a patient with hereditary angioedema: a case report

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Background: Hereditary angioedema (HA) is a rare and potentially fatal dominant autosomal disorder characterized by abnormal levels, or malfunctioning, of the inhibitor of the first component of the complement cascade (C1-INH). Carriers experience recurrent episodes of edema involving the skin, mucosas, airway and gastrointestinal system. When an episode occurs perioperatively, the patient may present breathing difficulties and hemodynamic instability, requiring specific interventions to minimize morbidity. In this paper, we describe the anesthetic management of a patient with HAE.

Case report: A female patient (32 years; 82 kg) recently diagnosed with HAE was submitted to multiple tooth extractions. The condition was treated with danazol (100 mg.day) and tranexamic acid (500 mg.day), and the patient's overall condition was good: functional capacity >4 METS, quantitative C1-INH: 0.0514 g.L-1 (normal range: 0.21-0.39g.L-1), otherwise normal physical and laboratory findings. On the morning of the procedure, frozen fresh plasma (750 mL) and tranexamic acid (250 mg) were administered. Monitoring included SpO., cardioscopy, NIBP and BIS. and icatibant (a bradykinin receptor 2 antagonist) was available in the OR. Anesthesia was induced with sufentanil (40 mg), lidocaine (100 mg), propofol (100 mg) and cisatracurium (8 mg), followed by nasotracheal intubation. The anesthetic depth (BIS 40-60) was maintained with sevoflurane and remifentanil TCI. At this point, the patient was given dexametasone (10 mg) and tranexamic acid (500 mg). No edema, hemodynamic or respiratory events occurred during or after the procedure. Following extubation, the patient was transferred to the recovery room and discharged 24 hours later. **Discussion**: Perioperative management of patients with HA should include prophylaxis, efficient monitoring and the availability of drugs to control crises. In the present case, prophylaxis was successfully achieved with frozen fresh plasma, antifibrinolytics and attenuated androgen (danazol), which are known to reduce the risk of a crisis during surgery, and icantibant was available if needed to control severe respiratory distress. Reference:

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Learning points: The adequate perioperative management of patients with hereditary angioedema

# 01AP03-2

## Use of dexmedetomidine combined with local anesthesia for trepanation and evacuation of chronic subdural hematoma

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Background and Goal of Study: Chronic Subdural Hematoma (CSDH) is a very common clinical entity in neurosurgery among patients >80 y.o.,ASA grade III which requires high level of sedation, and is usually performed under monitored anesthesia care (MAC). Dexmedetomidine is a selective a2-agonist that provides sedation without respiratory depression and has analgesic properties.

The aim of our study was to investigate the effectiveness of dexmedetomidine as a sole sedative agent during evacuation of CSDH and to evaluate patients' comfort and surgeons' satisfaction.

Materials and Methods:T wenty patients received omeprazole 40 mg and dexamethasone 8mg (iv) prior to the procedure and a loading dose of dexmedetomidine 1 µg/kg over a period of 10min, followed by continuous infusion of 0,7-1,2µg/kg/h.By the end of the loading dose, 4-5 ml of a local anesthetic agent (Ropivacaine 0,5%) were infiltrated subcutaneously in the Burr Hole.Standard monitoring was recorded and supplemental O2 (4lt/min) through a face mask was

Results and Discussion: All the patients succeeded the discred level of sedation (RSS>3, responded only to verbal commands). All of the patients remained hemodynamically stable, no significant respiratory depression was remarked and no supplemental medication was required. Recovery was easy, safe and recovery time was reduced compared to general anesthesia.

Conclusion: Dexmedetomidine proved to be a good choice for the management of patients undergoing CSDH under local anesthesia and an ideal sedative agent, providing high level of MAC.

## 01AP03-3

# A patient with May-Hegglin Anomaly who underwent cervical laminectomy and laminoplasty

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Background and Goal of Study: The May-Hegglin anomaly (MHA), an autosomal dominant disorder with MYH9 mutations, is characterized by a triad of thrombocytopenia, giant platelets, and granulocyte inclusion bodies. MHA may be complicated by Alport syndrome-like symptoms (deafness, nephropathy, and cataracts). We report the anesthetic management of a MHA patient with Alport syndrome-like symptoms.

Case: A 58-year-old woman with an exacerbation of numbness and skilled movement of the upper limbs was referred to our hospital with a diagnosis of cervical spondylotic myelopathy. She had been receiving hemodialysis for chronic renal failure due to nephrotic syndrome for 43 years and had undergone left nephrectomy and splenectomy. Blood tests revealed a marked decrease in platelet count of 0.6x104/mL. Based on Alport syndrome-like symptoms, presence of giant platelets on peripheral blood smear testing, and thrombocytopenia with intact platelet function. a thorough hematological examination was performed, resulting in a high index of suspicion for MHA. After confirming the diagnosis of MHA by a genetic test, she was scheduled for laminoplasty and foraminotomy on three cervical vertebrae in the prone position. Since active and intractable bleeding was noted from subcutaneous and soft tissues and the epidural venous plexus soon after the start of the operation, we decided to limit foraminotomy on only one vertebra. Estimated blood loss was 300 ml and no blood transfusion was required. Previous reports have shown that most MHA patients with thrombocytopenia have an intact hemostatic function with near-normal clot retraction and platelet aggregation, and bleeding time being within the reference range. To the best of our knowledge, no hemorrhagic complications during perioperative period have been reported in MHA patient previously. Some reports have described that prophylactic platelet transfusion is unnecessary. In our patient with renal failure, however, the planned procedures could not be performed due to intractable bleeding.

Conclusion: It is important to consider the possibility of intractable bleeding during the spinal surgery in MHA patients on hemodialysis.

#### 01AP03-4

# Persistent intraoperative hypotension as a symptom of accidental hypoglycemia

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Background: Hypoglycemia is well known to be a severe condition. Patients may experience a loss of consciousness, seizures, and ultimately death as hypoglycemia progresses. (1) Hypoglycemia is also associated with life-threatening ventricular arrhythmia. (2) However, there are few reports of intraoperative hypoglycemia because most of the symptoms are masked by general anesthesia.

Case report: We present the case of a 79-year-old woman who was admitted for supracondylar humerus fracture surgery. She had a history of type 2 diabetes mellitus and was classified as ASA 2. With the exception of her blood glucose level (276 mg/dl), the results of preoperative laboratory studies were normal. One hour before the induction of anesthesia, the patient's blood glucose level reached 410 mg/dl and regular insulin (8 units) was administered subcutaneously. The patient's vital signs were stable immediately before the induction of anesthesia. After the induction of anesthesia, her systolic blood pressure (SBP) gradually decreased to 70 mmHg. The administration of dopamine and ephedrine and fluid replacement were ineffective. Ventricular premature contraction (VPC) occurred and monofocal VPC became multifocal ventricular extrasystole. A laboratory examination revealed that her blood glucose level was 35 mg/dl. After the injection of 50% glucose, her SBP increased to over 100 mmHg within 15 minutes and her VPC disappeared. The operation was uneventful. The patient had no neurological complications and was discharged to return home on postoperative day seven.

Discussion: The neurological symptoms of hypoglycemia are masked by general anesthesia. Symptoms such as hypotension, tachycardia and perspiration may occur as symptoms of surgery and anesthesia: thus, the early detection of hypoglycemia is difficult. For its early detection, it is important to be aware that hypoglycemia is a cause of hypotension and arrhythmia

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- 2. Tsujimoto T, Yamamoto-Honda R, Kajio H, Kishimoto M, Noto H, Hachiva R. et al. Vital signs, QT prolongation, and newly diagnosed cardiovascular disease during severe hypoglycemia in type 1 and type 2 diabetic patients. Diabetes Care.

Learning points: Intraoperative hypoglycemia is masked by anesthesia and its early diagnosis is difficult. Anesthesiologists need to be aware that hypoglycemia is one of the causes of heart failure.

#### 01AP03-5

# Erythematous rash suspect red man syndrome following vancomycin loaded in bone cement: a case report

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Background: Vancomycin loaded with bone cement for joint replacement is a common treatment to prevent osteomyelitis. Red Man Syndrome (RMS) is the most common allergic reaction to vancomycin and occurs mostly during rapid infusion of vancomycin. Only few case reported as a result of local vancomycin (1). We hereby reported a case where RMS was developed after insertion of vancomycin bone cement for total knee replacement (TKR).

Case Report: A 74-year-old woman was admitted for left TKR due to osteoarthritis. There were no abnormalities noticed after preoperative assessment. We performed spinal anesthesia for her. Total operation time was 80 minutes and tourniquet time was 55 minutes. The patient had received knee prosthesis with bone cement loaded with vancomycin 1000mg during implantation. There were no subjective complaints noticed and vital signs remained stable throughout the process. Tourniquet of the knee was then released. Erythematous rash on face, trunk and extremities (figure 1.2) were noticed 4.5 minutes after released of tourniquet. She also complained of general discomfort and itchiness. She remained clear conscious and fine saturation around SpO2 97%. Unfortunately, hypotension to 47/34 mmHg preceded. Under the tentative diagnosis of vancomycin induced RMS, we treated patient with 30 mg of Diphenhydramine, 100mg of Hydrocortisone associated with fluid challenge, and Ephedrine. Patient's blood pressure was back to around 95/55 mmHg 15 minutes after and remained stable with 1-hour of close monitoring. She was transferred to a general ward. Erythematous rash and itching condition had improved one hour later. She was discharged as scheduled.

Discussion: RMS is an anaphylactoid reaction due to histamine release from mast cells and basophils. It is the most common adverse reaction to vancomycin but rarely life-threatening. The adverse effect of RMS can be relieved by antihistamine(2). Another vancomycin hypersensitivity is an anaphylactic reaction, which is IgEmediated. It is rare but more lethal

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Learning points: Vancomycin-induced RMS may occur despite administering through the insertion of vancomycin bone cement for TKR.

# 01AP03-6

# Reversion of neuromuscular block with sugammadex in Charcot-Marie-Tooth disease: clinical case

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Background: Charcot-Marie-Tooth disease (CMTd) is a hereditary demyelinating peripheral neuropathy characterized by progressive muscular atrophy and sensory motor abnormalities. The major anesthetic consideration in CMTd is increased sensitivity to non-depolarizing muscle relaxants (NDMR)

Case Report: A 17-year old male patient, ASA III, diagnosed with CMTd was admitted for laparoscopic appendectomy. In the pre-anesthetic evaluation the sensory-motor deficits were more evident in the lower limbs (Fig.1). We performed a Balanced General Anesthesia (BGA) using ASA standard monitoring. Neuromuscular relaxation was assessed through nerve stimulation of the ulnar nerve with a train-of-four (TOF) stimulus sequence and subsequent quantification of the thumb adductor response. The supramaximal neuromuscular response was measured and recorded using the Organon TOF-Watch SX monitor and rocuronium (0.6mg/kg) was administered. The TOF stimulation was repeated every 5' with a frequency of 2Hz and an intensity of 70mA. Orotracheal intubation was performed 3'30" after NDMR administration, when the 4 responses to TOF disappeared. During the procedure, neuromuscular blockade monitoring revealed 2 to 3 responses on the TOF-Watch SX monitor. The surgery lasted 90 minutes without complications. For reversion of the residual neuromuscular block, sugammadex (2mg/kg) was used and after 2' a TOF-ratio of 100% was obtained (TOF-ratio of 70% at 1'20", and 90% after 1'45"). The postoperative period was uneventful and the neurological and musculoskeletal examination did not present any new deficits.

Discussion: The main features of CMTd are muscle atrophy and motor-sensory disorders. The response to NDMR is variable in CMTd and its effects may be prolonged. Due to the chronic demyelination present, the use of succinylcholine can trigger a hyperkalaemic response (1). There are no references to the use of sugammadex in CMTd.

### References:

1.Ohshita N. Anesthetic Management of a Patient With Charcot-Marie-Tooth Disease. 2016;63(2):80-3.

Learning points: In this clinical case we report the absence of adverse events in the intraoperative and postoperative periods of a laparoscopic appendectomy under BGA using a NDMR in a patient with CMTd. We describe, for the first time, the use of Sugammadex for the reversal of neuromuscular blockade in a patient with CMTd which occurred successfully and without adverse events.

# 01AP03-7 Bradycardia during direct laryngoscopy: a case report

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Background: The hemodynamic response to endotracheal intubation through direct laryngoscopy usually results in stimulation of sympathetic activity with an increased heart rate (HR), blood pressure (BP) and cardiac arrhythmia, but there are a few reports of severe bradycardia and assystole with direct laryngoscopy. We report a case of a severe bradycardia with direct laryngoscopy for endotracheal

Case report: A 54 years old female with a history of hypertension medicated with nifedipine/atenolol, admitted for a laryngectomy and cervical ganglionar dissection with reconstruction. Before induction, HR was 70 beats/min and BP of 128/90mmHg. Anesthetic induction was made with remifentanyl 2mcg/kg and propofol 2mg/kg, no muscle relaxant was administered; HR dropped to 60/min and BP remained stable. Using a MacIntosh blade, direct laryngoscopy was performed exposing the peri-epiglottic area and a large mass that covered the vocal cords was observed; immediately after HR and BP started to fall (<30/min and 70/42mmHg), the laryngoscope was removed after trying to intubate. HR and BP started to recover to previous values; another attempt was made with the same hemodynamic result. Desaturation never occurred (StO2>95%). Before the third attempt, atropine 0,5 mg was administered and intubation was successfully achieved with a minimal fall in HR. The surgery was uneventful and the patient was admitted to ICU after surgery. Discussion: Bradycardia with larvngoscopy in adults is a rare complication. There are two possible mechanisms described: hypoxic-induced bradycardia (excluded in this case) and direct vagal stimulation of receptors in larynx with the laryngoscope blade. Relatively high doses of remifentanyl with propofol at the induction may have contributed to reduce sympathetic tone and predispose to bradycardia; Additionally, in this case, the displacement of the tumor with laryngoscopy and stimulation of carotid sinus with a vagal reflex may have provoked a vagal reflex.

Learning points: Bradycardia is a rare but potentially serious event during laryngoscopy which we must be aware. Administration of anticholinergic drug may prevent/attenuate this response. In this case, the reason of the bradycardia is unknown, but the location and size of the tumor appears to have some contribution to the event

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1.Redmann A. et al. Assystole from direct laryngoscopy: a case report and literature review. Anesth Prog 63:197-200 2016

## 01AP03-8

# Unilateral hypoglossal nerve palsy after the use of a novel supraglottic airway device

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**Background**: The LMA® Protector™ Airway is a new single-use supraglottic airway device (SAD) with Cuff Pilot™ Technology that enables visual monitoring of intra-cuff pressure, in order to reduce the risk of complications from an overinflated device. We present a case of unilateral hypoglossal nerve injury despite its use. Case Report: A 39-year old female (ASA I, 52kg) presented for elective left knee arthroscopy. A size 3 LMA Protector™ was inserted on first pass after induction of GA and the cuff inflated. The indicator was monitored intra-operatively and remained within the green zone throughout the hour-long operation, with the patient breathing spontaneously.

She had no complaints at the recovery unit, but experienced sore throat and dysarthria on the first postoperative day (POD). There was tongue deviation to the right on active protrusion, but no dysgeusia or other neurological signs. A provisional diagnosis of right hypoglossal nerve injury secondary to the SAD was made. By POD7, she reported symptomatic improvement, with normal clinical and nasoendoscopic findings. There was complete resolution of symptoms 3 weeks

Discussion: Hypoglossal nerve injury is a rare but distressing complication of LMA use. The greater horn of the hyoid bone is a potential site of injury as the cuff of the LMA may compress the nerve against bone.1 In our patient, possible contributing factors included cuff overinflation with/without failure of the Cuff Pilot™ Technology, inappropriate sizing and inappropriate placement of an unfamiliar device. Fortuitously, injury is often neuropraxia with complete recovery in 6 months following conservative management.

# References:

1. Aalap C. Shah. Hypoglossal Nerve Palsy After Airway Management for General Anaesthesia: An Analysis of 69 Patients. Anesth Analg. 2015 Jan; 120(1):105-120 2. Ban Leong Sng et al. A preliminary assessment of the LMA Protector™ in non-

paralysed patients. BMC Anesthesiol. 2017; 17:26

Learning points: In our knowledge, this is the first reported case of unilateral hypoglossal nerve injury after LMA® Protector™ use. Consideration should be given to down-sizing the device for Asian patients who tend to have smaller jaws for their weight range.² We caution that whilst the green zone of the Cuff Pilot™ corresponds to 40-60cmH2O cuff pressure, it may be more than the "just-seal" pressure required and the cuff may still be overinflated relative to the size of the patient's airway.

## 01AP03-9

# Anesthetic management of an adult patient with cystic fibrosis for acute abdominal surgery (A case report)

<u>Cuesta González-Tascón C.</u><sup>1</sup>, Tapia Salinas B.<sup>2</sup>, Herreras Gutiérrez J. L.<sup>2</sup>, Brogly N.<sup>2</sup>, Gilsanz Rodríguez F.<sup>2</sup>

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**Introduction:** Cystic fibrosis (CF) implicates a serious pulmonary compromise which makes patients very complicated to ventilate and a high risk of complications when scheduled for urgent abdominal surgery under general anaesthesia.

Case report: This 48-years old male patient (Weight: 85kg Height: 175cm) with CF. presented a severe lung affectation (FEV1 17%; VCF 45,5%; FEV1/VCF 30%. Thorax CT Scan: TLC 6142 ml3 (9,6% emphysema)) and was on lung transplantation list for 10 months. He developed an acute respiratory failure that indicated his admission in the ICU, and required mechanical ventilation and tracheostomy. Two weeks after he was diagnosed of a subphrenic abcess due to an intestinal perforation and was scheduled for right colectomy. The patient was transferred sedated and ventilated from the ICU to the OR, after administrating inhaled salbutamol. Fentanyl, propofol and rocuronium were used to deepen anaesthesia. Maintenance was ensured with sevoflurane, fentanyl and cisatracurium. Mechanical ventilation required high IFO2 (80%), with a protective ventilation (TV 400mL, RR 20/min but no PEEP to avoid traumatic rupture of bullae) with good clinical tolerance. The persistence of high ventilator pressure (38mmHg) justified the placement of a temporary VAC, which was removed after 1 week to avoid an increase of ventilatory pressure associated with high intra-abdominal pressure. Patient returned to the ICU at the end of surgery with no further problems. On day 20, due to a difficult weaning from mechanical ventilation, he was transferred under mechanical ventilation on his tracheostomy (PSV + CPAP) to the pneumology service, and discharged from hospital after 3

**Discussion:** In patients with CF, emergent surgery increases highly the morbidity. Intraoperative management is the key to good results. Mechanical ventilation should limit pulmonary pressure (larger tidal volume and lower respiratory frequency are tolerated better than PEEP). The surgical team should as well take into account the risk of high intra-abdominal pressure, which limits lung expansion. Coagulation should be closely monitored, since it can be altered secondary to malabsorption and liver disease, which can increase bleeding.

**Conclussion:** CF is increasing among adults scheduled for surgery. Anesthetic management should protect the already sick lung, and this involves a perfect knowledge of all factors that alter lung compliance and treatments to avoid respiratory complications.

## 01AP03-9

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**Conclussion:** CF is increasing among adults scheduled for surgery. Anesthetic management should protect the already sick lung, and this involves a perfect knowledge of all factors that alter lung compliance and treatments to avoid respiratory complications.

#### 01AP03-10

# Epinephrine infusion during urgent appendicectomy in a 39 years old patient with aggresive systemic mastocytosis: a case report

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**Background**: Systemic mastocytosis (SMCD) is a rare disorder, with symptoms and signs related to mast cell (MC) degranulation such as urticaria, flushing, pruritus, dyspnea and anaphylaxis. Symptoms can be triggered by drugs, mechanical stimuli and stress or even induced spontaneously!

Case Report: A 39 years old female was presented for urgent laparotomy because of ruptured appendix and peri-appendicular abscess, shown at CT scan. She had a history of SMCD and reported multiple anaphylactic episodes per year treated with epinephrine. Preoperatively, H1 and H2 antagonists (dimethindene 0.1 mg/kg and ranitidine 50 mg, respectively), hydrocortisone 500 mg and midazolam 2 mg have been administered. After induction of anaesthesia with fentanyl 3μg/kg, propofol 2.5 mg/kg and cis-atracurium 0.2 mg/kg and successful intubation, rash at the site of injection and the thorax was noticed, followed by hypotension, tachycardia and bronchospasm. Anaphylaxis protocol was followed. A bolus IV dose of epinephrine 1μg/kg was administrated, followed by continuous infusion of epinephrine 0.04 μg/kg/min to maintain arterial pressure within normal range³. After the patient was stabilized, the team proceeded with the operation under sevoflurane and remifentanil infusion. At the end of the operation, the patient was extubated uneventfully and transferred to ICU.

Discussion: Prophylactic premedication decreases the possibility of suffering perioperative MC degranulation symptoms, particularly when H1/H2 antihistamines and benzodiazepines are included¹². Complete allergic work-up and serum tryptase levels are mandatory but cannot be determined on urgent basis. Recommendations on intraoperative management of anaphylaxis consist of IM doses of epinephrine² or continuous infusion (0.05–0.1 μg/kg/min), if repetitive doses are needed³. In this case, after the initial dose, an early epinephrine infusion tailored to patient's needs was decided, in order to preserve cardiovascular stability.

# References:

1.Matito et al. Management of anesth in adult and ped mastocytosis. Int Arch Allergy Immunol 2015;167:47e56

2.Hermans et al. Management invasive procedures in mastocytosis. An Allergy Asthma Immun 2017 Oct;119(4):304-309

3.Kroigaard et al. Scand Guidelines on anaphylaxis during anaesth. Acta Anaesth Scand 2007; 51:655–70

**Learning points**: Anaphylaxis can be seen in a patient with SMCD even after prophylactic premedication. In any case, treatment should start early and should be individualized.

#### 01AP03-11

# Successful anesthetic management of partial lung resection for left pneumothorax with severe, post-right upper middle lobectomy chronic obstructive pulmonary disease

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**Background:** Anesthetic management of thoracic surgery in patients with severe chronic obstructive pulmonary disease (COPD) who have undergone a lobectomy of opposite lung can be challenging, and only a few case have thus far been reported. We experienced a case of a patient who had undergone an urgent left partial lung resection for pneumothorax using video-assisted thoracic surgery (VATS) under general anesthesia.

Case report: A 69-year-old man suddenly experienced dyspnea due to left pneumothorax. He had a history of a right lung middle lower lobectomy at 62 years old, and COPD on home oxygen therapy at 66 years old. Conservative therapy

failed to repair, the persistent air leak, and subcutaneous emphysema extended throughout his body. A partial resection of the left lung with VATS was planned. Because of his poor respiratory function (PRF), oxygen saturation was between 80% and 90% under nasal high-flow therapy with a gas flow rate of 40 liters per minute and an FiO2 of 0.5 but decreased to around 75% while speaking. The risks of the procedure were therefore weighed carefully. Total intravenous anesthesia was chosen for general anesthesia. As one-lung ventilation was challenging, both lungs were ventilated. Ventilation was stopped during resection. Fentanyl 0.3mg and a local anesthetic were used for postoperative analgesia. He was extubated in the operating room after full reversal of the neuromuscular block. The anesthesia time was 157 min. and the operation time was 41 min. He was discharged 12 days after the operation with no complications.

**Discussion:** The risk of postoperative pulmonary complications (PPC) is substantially higher in patients with COPD, especially if they are end-stage patients. Pulmonary factors alone cannot predict PPC, but can do so in combination with nonpulmonary factors. However, the criteria for evaluating respiratory function in a patient in poor physical condition are unclear. Therefore, decision-making in planning treatment only based on a preoperative evaluation is difficult. In the present case, we performed the operation after considering all of the factors involved and judging that the benefit outweighed the risks.

#### References:

1. David HW et al. Anesth Analg 1995

2. Ahsan M et al. Ann surg 2000

**Learning points:** Anesthetic management of PRF with COPD has a high risk of PPC, and anesthesiologists often expieriance difficultiy with the intraoperative respiratory management.

### 01AP03-12

# Use of cerebrospinal fluid drainage and monitorization in the perioperative period to reverse paraplegia due an aortic dissection

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Background: The lower two thirds of the spinal cord are supplied by the artery of Adamkiewicz which arises from left posterior intercostal artery T9 to T12. Aortic disease may affect the perfusion of corticospinal tract leading to paraplegia Case Report: A 67 years old man ex-smoker with hypertension suffers abrupt paraplegia in context of a type B aortic dissection from the rise of subclavian artery to the aortic bifurcation. A spinal catheter was placed in L4 and leaved at 15 cm to monitor cerebrospinal fluid pressure (between 10-15 cm H2O) and provide drainage in the peri-operative period. A 15 cm endovascular stent graft was placed under general anaesthesia. Patient was extubated without incidences and leaved in post-operative care unit. In the next 48 hours he recovered sensibility and force in both lower limbs. The catheter was retired at 72 hours without complications after having drained 180ml. Discussion: Low cerebrospinal fluid pressure reduce the resistance to the flow in the spinal arteries and increase spinal cord perfusion reducing the risk of ischemic injury. Coselli (2) reported in a randomized trial benefits of this technique versus control groups in protection against spinal cord dysfunction. Mayor complications had been reported such as intra-cerebral and subdural hemorrhage (1'3%) as well as meningitis (1%). The mayor risk factor for bleeding appear to be the drainage of larger volumes of LCR and maintaining very low intra-cranial pressures (below 7mmHq) (3). References:

1.Coselli JS et al. Cerebrospinal fluid drainage reduces paraplegia after thoracoabdominal aortic aneurysm repair: result of a randomized clinical trial. J Vasc Surg 2002;35:631–39

2.Sugiura J et al. The efficacy and risk of cerebrospinal fluid drainage for thoracoabdominal aortic aneurysm repair: a retrospective observational comparison between drainage and non-drainage dagger. Interactive cardiovascular and thoracic surgery. Interactive CardioVascular and Thoracic Surgery 2017;24:609–14.

**Learning points:** Studies suggest benefits in reducing risk of ischemic injury but due to its potential severe complications it has to be individualized for each patient until more studies are done.

# 01AP04-1

# Comparison of the Tof-Cuff® with the Tof Watch SX® in patients undergoing surgery. An observational Study

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**Background and goal of Study:** The TOF-Cuff® is a medical device that combines blood pressure cuff and neuromuscular monitoring. It has never been validated using acceleromyography. We compared recovery parameters of a neuromuscular block between the TOF-Cuff® and the TOF Watch SX® (reference).

**Methods:** Nineteen patients, ASA I to II, aged 18-65 years, undergoing elective surgery, were included in this single centre study. The TOF-Cuff® was installed on one upper arm and the TOF Watch SX® on the opposite wrist. A single IV

dose of rocuronium 0.6 mg kg-1 was administered for intubation. Anaesthesia was maintained with a continuous propofol infusion. After calibration of both devices, continuous TOF stimulation was started. Primary outcome was the total recovery time (time in minutes from injection of rocuronium to a normalised TOF ratio of 90%). Bias and limits of agreement between the two monitors were calculated as proposed by Bland and Altman.

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Results: There were two monitoring failures in the TOF Watch SX® group. In three patients, neuromuscular block had to be antagonised at the end of surgery. In 14 patients, the primary outcome could be analysed for both monitors. With the TOF-Cuff®, total recovery time was 20 ± 23 min shorter compared with the TOF Watch SX®. The difference was increasing with increasing total recovery time, suggesting that the bias of the TOF-Cuff® was not systematic.

Conclusion: The TOF-Cuff® overestimates recovery of a neuromuscular block compared with the TOF Watch SX®. Patients who are extubated based on TOF-Cuff® values are at risk of residual neuromuscular block.

#### 01AP04-2

# TOF-Cuff® vs TOF-Scan® for relaxometry during general anaesthesia

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**Background and Goal of Study:** Relaxometry assesses the effect of neuromuscular blocking drugs. The current clinical standard is accelerometry (e.g. TOF-Scan). TOF-Cuff is a new relaxometry device stimulating the brachial plexus at upper arm level and recording evoked changes in arterial pressure.1 Goal of this study was to compare time to complete neuromuscular block and to recovery thereof as assessed by TOF-Cuff vs TOF-Scan.

Materials and Methods: With approval of the suitable Ethics Committee (EKOS; St. Gallen, Switzerland), and after registration with the German register of clinical studies and obtaining patients' consent, the study was prospectively conducted. In patients undergoing Propofol based general anaesthesia requiring neuromuscular block for tracheal intubation (Atracurium IV), accelerometry (train of four-mode (TOF); TOF-Scan) was applied by monitoring M. adductor pollicis after stimulating the N. ulnaris at the wrist (TOF, 60mA). On the contra-lateral arm TOF-Cuff was applied simultaneously (TOF, 40mA). No patients with neuromuscular diseases or pregnant patients were studied. TOF was assessed every 12 to 15s until complete neuromuscular block and every 5min thereafter. Time from injection of Atracurium to complete neuromuscular block (TOF=0) was recorded ( $T_0$ ), as was time to recovery to TOF=2 ( $T_2$ ) and to complete recovery (TOF≥90%;  $T_{90}$ ). Technical problems were recorded. Data are mean±SD; results were compared by paired t-test (p<0.05 as level of significance).

Results and Discussion: Fifty-six adult ASA II to III patients were included (35 female, 51±19 yrs).  $T_0$  was recorded in all patients, T2 and T90 in 19 patients. Patients received a single dose of  $0.5\pm0.1$  mg/kg Atracurium IV after anaesthesia induction. In 14 patients at least one TOF-Cuff measurement revealed a technical problem, compared to 7 patients for TOF-Scan. Time to  $T_0$  was 139±50s with TOF-Cuff and 149±47s with TOF-Scan. Time to  $T_2$  and  $T_{90}$  using TOF-Cuff was 49±14min and 73±12min, and using TOF-Scan 54±13min and 79±10min, respectively. The differences for  $T_0$  and  $T_{90}$  were statistically significant.

**Conclusion:** Results for relaxometry during general anaesthesia using TOF-Cuff and TOF-Scan simultaneously differed statistically but not necessarily clinically. Larger numbers of patients have to be studied to further assess the utility of TOF-Cuff in general and for different patient groups and clinical situations.

#### Reference:

1.Veiga Ruiz et al. Rev Esp Anestesiol Reanim 2017

# 01AP04-3

# The effect of chronic exposure to dexamethasone on rocuronium-induced neuromuscular blockade and sugammadex reversal in in vivo study of rats

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Background and Goal of Study: Resistance to the actions of non-depolarizing neuromuscular blocking agents (NMBAs) are commonly associated with chronic exposure to glucocorticoid. It is known that chronic dexamethasone treatment induces alteration in immature subunits of nicotinic acetylcholine receptor (nAChR) and upregulation of nAChR. Furthermore, upregulation and spreading of acetylcholine receptors also induces the resistance to NMBAs. For this reason, we can assume that sugammadex-induced recovery in subjects with long term

treatment of dexamethasone is faster than in subjects without dexamethasone exposure. The goal of this study is to evaluate the recovery profile of the rocuronium-induced neuromuscular blockade after sugammadex administration.

Materials and Methods: Thirty adult male SpragueDawley rats (180220 g) were randomized into three groups (n=10 per group). The Dexa group received a daily IP injection of dexamethasone (500 µg/kg) suspended in 0.9% normal saline for 15 days. The Control group received an equivalent volume of 0.9% normal saline daily for 15 days. The same amount of food consumed by the Dexa group was provided daily to the Pair-fed group. Rats were anesthesized with AlfaxanTM and then tracheostomy and internal jugular catheterization were done. Both sciatic nerves were exposed and stimulated for twitch tension of the tibialis anterior muscle. Trainof-four (TOF) stimulations were applied every 12 seconds. After administering rocuronium of 3.5 mg/kg, the time to T2 (The second twitch of TOF) recovery was recorded. When T2 appeared, sugammadex of 0.5 mg/kg was administered, then the recovery time of TOF ratio to 0.9 was recorded.

**Results and Discussion**: The time to T2 recovery was significantly shortened in the Dexa group compared with the Control group and the Pair-fed group (2.9 min [95% confidence intervals, 2.2-3.6 min] vs. 5.0 [4.2-5.8] and 5.1 [4.1-6.1], P = 0.001, respectively) while no significant difference was observed between the Control group and the Pair-fed group (P = 0.996). There were no significant differences in the recovery time to TOF ratio to 0.9 among groups (3.1 min [1.8-4.4 min], 4.3 [2.6-5.9], and 4.0 [1.9-6.1], P = 0.531).

**Conclusion**: As previous studies reported, resistance to rocuronium was observed in rats with chronic exposure to dexamethasone. However, the neuromuscular recovery time after the use of sugammadex was not significantly different among the groups.

#### 01AP04-4

# Measurement of recovery from succinylcholine-induced neuromuscular block using an improved train-of-four ratio (TOF)

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Background and Goal of Study: Due to its rapid onset and short duration, succinylcholine is still widely used in clinical practice. However, duration of succinylcholine induced neuromuscular block is highly variable, due in part to genetic variation in the enzymatic activity of butinylcholinesterase. Prolonged block, in excess of 10 min are observed in 16% of patients.(1) Current guidelines recommend the systemic use of neuromuscular monitoring in order to assess recovery from succinylcholine.(2) Anesthesiolgists are mostly familiar with TOF, but as TOF ratio is based on fade, and no fade occurs after succinylcholine. TOF is of no use in this situation. The recently introduced TofScan (Imed, France) offers an improved way to assess TOF ratio (iTOF), where the TOF ratio is not based on the ratio of the 4th and 1th response, but rather on the ratio between the 4th response and a reference obtained before administration of a neuromuscular blocker. This reference is the mean value of the 4 responses to a TOF stimulation. We hypothetized that the iTOF measured as T4/Treference could be used to assess recovery from succinylcholine induced neuromuscular block.

Materials and Methods: After ethics committee approval, we included 40 patients receiving a single dose of succinylcholine for tracheal intubation. Each patient was monitored with a calibrated (cal 2) TOFWatchSx (Organon, France) on one hand and a TofScan on the other hand. Attribution to the dominant hand was done according to a randomisation list. We measured at 1 minute interval single twitch (ST) recovery on the TOFWatchSx and iTOF on the TofScan. Overall concordance was assessed by the intraclass correlation coefficient (ICC) and we compared the value of each device when the other reached a recovery of 0.9 and 1.0.

Results and Discussion: Overall concordance between ST and iTOF was good with an ICC of 0.84 (95% confidence interval (CI) 0.82-0.87). At the moment the iTOF reached a recovery of 0.9, the value of the ST was 0.93 (95% CI 0.88-0.97) and when the iTOF reached 1.0, the ST was 0.94 (95% CI 0.90-0.97). When the ST reached a recovery of 0.9, the corresponding value of the iTOF was 1.06 (95% CI 0.97-1.14), and when the ST was at 1.0, the iTOF was at 1.09 (95% CI 0.96-1.19) Conclusion:

Overall agreement between the iTOF and ST recovery was good. iTOF could be a new way to measure recovery after succinylcholine induced neuromuscular block. References:

- 1. EJA 2015,32: 687-96
- 2. BJA 2015,115: i78-i88

### 01AP04-5

Deep neuromuscular block failed to produce a greater improvement in the surgical conditions in a laparoscopic gastrectomy than moderate neuromuscular block: a randomized controlled study

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Background and Goal of Study: Deep neuromuscular block is used in laparoscopic hysterectomies, cholecystectomies, and colorectal and urologic surgery to improve the surgical conditions. However, this evidence has not been tested for laparoscopic gastrectomies. We aimed to compare the surgical conditions in a laparoscopic gastrectomy under deep and moderate neuromuscular block.

Materials and Methods: This study was a prospective, assessor-blinded, randomized study. In total 34 patients undergoing laparoscopic gastrectomy were randomized to either the deep neuromuscular block group (target range: post-tetanic count 1-2) or the moderate neuromuscular block group (target range: train-of-four count 1-2). During the laparoscopy, the surgeon rated the surgical space conditions using a 5-point surgical rating scale (SRS: 5-optimal, 4-good, 3-acceptable, 2-poor, 1-extremely poor) every 15 minutes. When the laparoscopy was done, the surgeon rated the overall surgical space conditions using the same scale. The primary outcome was the proportion of patients with an SRS score of 5 for the overall surgical space conditions per group. The secondary outcomes were the proportion of change in abdominal circumference before and after pneumoperitoneum and the frequency of shoulder pain.

Results: Thirty-six patients were enrolled and randomly assigned. The proportion of patients with an SRS score of 5 was 56.25% (nine of 16 patients) in the deep neuromuscular block group and 64.70% (11 of 17 patients) in the moderate neuromuscular block group (p= 0.728). The percentage of change in width abdominal circumference before and after pneumoperitoneum did not differ significantly between groups (p=0.1345) while vertical did (p=0.0297). The frequency of shoulder pain did not differ significantly between groups (p=1.00).

**Conclusion**: Deep neuromuscular block did not produce a greater improvement in surgical conditions in a laparoscopic gastrectomy than moderate neuromuscular block

#### Pafarancas ·

1.Br J Anaesth. 2017 Sep 1;119(3):435-442, 2. Anesth Analg. 2015 Jan;120(1):51-

# 01AP04-6

# Tumescent anesthesia: pushing the limits of local anesthetic doses

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Background and Goal of Study: Tumescent Local Anaesthesia (TLA) is a technique consisting of subcutaneous infiltration of large volumes of a dilute local anaesthetic solution, usually lidocaine with epinephrine, producing surgical area tumescence (swelling and firmness). It permits surgical procedures to be performed with less pain and less blood loss. TLA was described in 1987 by Klein for liposuction. Since then, TLA has been widely used in several surgical fields. TLA is a concern for anesthesiologists, as the recommended maximum doses of local anaesthetic are largely surpassed by the surgeon, reaching doses of 55 mg/kg of lidocaine, exceeding the defined limit of 7 mg/kg.¹ The anaesthesiology literature on this topic is scarce. This review study aims to assess the safety evidence of TLA regarding local anaesthetic dosage. Materials and Methods: A literature review was conducted using PubMed database, with no publications date restrictions, using the keywords tumescence, lidocaine and dosage.

Results and Discussion: 13 articles were identified, 4 published in the last 5 years. TLA advantages include performance of the procedure without general anaesthesia, reduction in blood loss and efficacious and extended postoperative analgesia. Overall, maximum safe doses of lidocaine are not consensual, varying from 28 to 55 mg/Kg, according to the solution used, addition of epinephrine and possible association with liposuction. Since lidocaine absorption is very slow in this technique it is rarely associated with neurologic or cardiac toxicity. However, the peak of absorption of the anaesthetic solution occurs after 4 to 12 hours of infiltration, and the absorption continues beyond 24 hours, requiring rigorous vigilance of the patient in the immediate postoperative period. In addition, epinephrine toxicity can also occur. <sup>1-3</sup>

**Conclusion:** In conclusion, TLA can be considered a safe alternative or combined technique of anaesthesia and analgesia in certain procedures. To maximize safety, all anesthesiologists should be aware of the pharmacokinetics and toxicity of tumescent lidocaine, in order to recognize and treat potential complications.<sup>3</sup>

- References:

  1. Klein JA, Jeske DR. Estimated Maximal Safe Dosages of Tumescent Lidocaine.

  Anesth Analg 2016;122(5):1350-9
- 2. Conroy PH, O'Rourke J. Tumescent anaesthesia. Surgeon 2013;11(4):210-21
- Khater A, et al. Tumescent mastectomy: the current indications and operative tips and tricks. Breast Cancer 2017;30(9):237-43

## 01AP04-7

## Anaphylaxis and neuromuscular blocking agents

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**Background**: Anaphylaxis is a severe life-threatening allergic reaction that can occur during anesthesia. It has an incidence of 0,05-2%, in which 60-70% of cases are secondary to neuromuscular blocking agents with either rocuronium or succinylcholine being most commonly implicated(1). An early recognition and a fast management are fundamental, as the investigation with immunoallergology tests.

Case Report: A 64 year-old woman, ASA II,CMI normal, scheduled for an urgent laparotomy due to an intestinal occlusion. Patient with a history of perioperative anaphylactic reaction, in 2007,in France, after administration of propofol, fentanyl suxamenthonium and cisatracurium (information brought in card). Before anesthetic induction was given hydrocortisone. Shortly after administration of fentanyl thiopental and rocuronium and intubation patient became profoundly hypotensive. tachycardic and developed a diffuse rash. Further, fluidotherapy, sympathomimetic, hydrocortisone and clemastine were given. At the end of the surgery, was hemodynamically stable and regression of the rash was observed. Three hours later was awakened, extubated and transferred to the PACU, where remained without complications. Subsequently, immunoallergology collaboration was requested, and tests were performed 6 weeks after the reaction (53 days). Immunoallergology tests (with muscle relaxants present in our hospital) were positive for suxamethonium, rocuronium and cisatracurium and negative to vecuronium. Meanwhile she underwent laparotomy for lysis of abdominal adhesions, under general anesthesia with fentanyl, propofol and ketamine, this time without incident.

**Discussion**: During anesthesia, serious allergic reactions are rare, but can quickly evolve into life-threatening situations that must be readily recognized and managed. This case shows not only the importance of report adverse reactions, but also the investigation with test allergies for all muscle relaxants. If those allergic tests had been performed before, the anaphylactic reaction could have been avoided. The result of these allergic tests implies important decisions for the anesthesiologist and a reserve creation of vecuronium in our hospital.

#### References:

1.Peroni DG1,et all,Muscle relaxants allergy,Int J Immunopathol Pharmacol.2011 Jul-Sep;24(3 Suppl):S35-46 (PubMed).

**Learning points:** Pontos de aprendizagem: In a patient with a history of neuromuscular relaxants allergy, it is important to perform tests on all the others.

## 01AP04-8

# Use of objective neuromuscular monitoring in 6 Danish anesthesia departments - a register study using routinely collected anaesthesia data

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**Background**: Residual neuromuscular block may be avoided by timely application of objective neuromuscular monitoring. In a Danish survey, 86% of anaesthetists confirmed the use of such equipment in at least 75% of cases [1]. We aimed to assess the actual frequency of use of objective neuromuscular monitoring and the last recorded train-of-four (TOF) ratio before extubation.

Methods: Ethics approval was waived. The study was pre-registered at www. clinicaltrials.gov (NCT02914119). We extracted data from all patients receiving general anaesthesia 1 Nov. 2014 to 20 Nov. 2016 in the Zealand Region of Denmark, where all operating rooms have objective acceleromyographic neuromuscular monitoring. Patients receiving anaesthesia on multiple occasions were included with a case per procedure. Monitoring data was recorded automatically in the anaesthesia information management system Metavision, once per minute. The primary outcome was use of neuromuscular monitoring in patients receiving a neuromuscular blocking agent, split in non-depolarizing (with or without succinylcholine) and succinylcholine only, as these agents are typically used in different clinical situations.

Results: In the dataset, 53,511 patients were intubated, of which 30,430 (55%) received a muscle relaxant: a non-depolarizing agent in 16,525 (54%) cases and succinylcholine in 13,905 (46%) cases. Neuromuscular monitoring was used in 14,463 (88%) and 4,224 (30%) of patients receiving a non-depolarizing agent and succinylcholine only, respectively. Use of neuromuscular monitoring at the individual departments varied from 58 to 99.6% (non-depolarizing) and 3 to 79% (succinvlcholine). The median last recorded TOF ratio in patients receiving a nondepolarizing relaxant was 0.97 (interquartile range 0.9 – 1.06). Of 14,375 patients receiving a non-depolarizing agent, the last recorded TOF ratio was 0.9 or more in 10,591 patients (74%). In 2,376 patients with a last recorded TOF value within 5 minutes before extubation, 103 (4%) had a TOF count of 0-4 without a TOF ratio. Conclusion: Neuromuscular monitoring was used almost consistently in cases involving non-depolarizing agents, but despite monitoring, a TOF ratio of at least 0.9 was not always ensured. Monitoring was used in less than 1 in 3 of cases involving succinylcholine only and thus, training programs should emphasize the importance of also monitoring depolarizing neuromuscular block.

# 1. Acta Anaesth Scand (2017) 61; 619–26

## 01AP04-9

Effect of pre-treatment with magnesium sulphate on the duration of deep and intense neuromuscular blockade with rocuronium: a randomized, double-blind clinical study

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Background and Goal of Study: Deep and intense neuromuscular blockade benefits surgical procedures as robotic and video surgeries. Magnesium sulphate increases the duration of neuromuscular blockade, but its effect on each phase of neuromuscular blockade is not described

To determine the duration of deep and intense neuromuscular blockade following a single dose of rocuronium with pre-treatment with intravenous infusion of magnesium sulphate.

**Materials and Methods**: Clinical, prospective, comparative, randomised and double-blind study.

Sixty patients participated in the study. All were submitted to elective otorhinolaryngological surgeries under general anesthesia. The Stockholm revision protocol was adopted. Before anesthesic induction, patients were pre-treated with intravenous infusion of 100 ml of saline (control group) or intravenous infusion of 60 mg.kg-1 of magnesium sulphate diluted in 100 ml of saline(sulphate group). A rocuronium bolus (0.6mg.Kg-1) was administered after loss of consciousness. The neuromuscular function was evaluated by accelerometer of the thumb adductor with the TOF Watch SX monitor. The duration of deep neuromuscular blockade was defined as the time period from the reappearance of the first response to PTC stimulation until the reappearance of the first response to TOF stimulation. The duration of intense neuromuscular blockade was defined as the time period where there is no response to PTC stimulation. The data were analyzed using the Mann-Whitney test

Results and Discussion: The mean duration in minutes of the deep neuromuscular blockade in the magnesium sulphate group was 22.77 (95% CI: 18.71;30.83) and in the control group it was 18.06 (95%CI = 14.13, 22.03) p value 0.1241.The mean duration of intense neuromuscular blockade in sulphate group was 18.89 (95%CI = 12.32; 25.46) and control group was 8.526 (95%CI = 4.609; 12.44) p value 0.0091 Conclusion(s): Magnesium sulphate increases the duration of intense neuromuscular blockade allowing a mean increase of 10 min in the duration. There was no statistical difference between the studied groups with deep neuromuscular blockade.

# References

1.Fuchs-Buder T, Claudius C, Skovgaard et al. Good Clinical research practice in pharmacodynamic studies of neuromuscular blocking agents II: the Stockholm revision. Acta Anaesthesiologica Scand 2007;51(7):789-808

Acknowledgements: Clinical trials NCT02989272

# 01AP04-10

# Electroencephalogram 3 hours after general anaesthesia (GA) is still not back to normal for all the patients

Recovery, postoperative, Brain, electroence phalography, Anaesthesia.general

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**Background and Goal of Study**: Recovery from GA was perceived as a passive pharmacokinetic process but it may not be so simple¹. We tested the hypothesis that 3 hours after an uneventful GA for inguinal hernia repair, frontal EEG is not back to normal in all the patients.

Materials and Methods: Anaesthesia was induced by sufentanil, ketamine, propofol and cisatracurium and maintained by sevoflurane. During the surgery, patients were continuously monitored and a 2-channel EEG was added (channels F4 & C4, 100 Hz each). Three hours after the GA, a new EEG was performed at the bedside. The three-hour delay was chosen based on the pharmocokinetic of the sevoflurane (half-life of 50 minutes). The Wilcoxon-Mann-Whitney test was used and P values less than 0.05 were deemed significant. All data processing was performed off-line using a commercial software package MATLAB®. A clustering was made using the K-Means algorithm in order to extract relevant group from the data. After, a logistic regression was performed to construct a classification task.

Results and Discussion: From March to May 2017, 20 patients have been

Results and Discussion: From March to May 2017, 20 patients have been included. Several EEG parameters were compared before and after GA. Individual analysis of the Power Spectral Density (using the Welch's method), are presented

in the Figure 1. Individual analysis of the results revealed a higher power in the 8-12 Hz for 6 patients (see figure 1, panel B) representing one third of the sample. Using an unsupervised algorithm (K-means clustering analysis), we identified the following risk factors for sustained alpha power: man, high blood pressure (HBP), significant post-operative pain, non-smoker, who underwent an anaesthesia longer than 90 minutes.

**Conclusion**: one third of the out-patients operated for inguinal hernia repair presented a sustained increase in power in the  $\alpha$  band 3 hours after a GA. Attention on patient who presents the typical profile of HPAW (man with HBP, post-operative pain, non-smoker, who went through a longer anaesthesia) should be reinforced as the clinical impact is still unknown. **Reference**:

1.Brown EN, Lydic R, Schiff ND: General anesthesia, sleep, and coma. N Engl J Med 2010: 363:2638–2650

#### 01AP04-11

# Simultaneous register with BIS and State Entropy. Comparative in the induction with propofol

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Background - goal of study: Verify the concordance and correlation between the values of spectral BIS and State Entropy(SE) achieved in the anesthetic induction performed with propofol. Simultaneously determine the hypnotic depth expressed in BIS and SE values achieved after the administration of propofol. Verify if this hypnotic depth is maintained the time necessary to achieve optimal intubation conditions.

**Materials and methods:** The study population consisted of 47 patients undergoing general or urological surgery at the Hospital Clínico San Carlos-Madrid between January '12 and December 13. The main variable refers to the anesthetic depth during induction with propofol obtained by the non-dimensional analogue recording of the BIS and SE values from the beginning of the infusion of propofol until signs suggestive of excessive superficialisation were observed. Other variables that were registered where BP, HR and SpO2.

**Results and Discussion:** In 38% of cases, the registration was suspended due to an increase in SE over 60; 60% by simultaneous rise of BIS + SE above 50. One was suspended due to HD alterations. In the comparative study, the final numbers of SE were higher than those of BIS, with a mean of 56.1 vs 49.6. A discrepancy appeared in the analysis of the evolution of SE and BIS registers since the minimum values of SE (min = 6) were also lower than those of BIS (min = 11) and were more distant in time, reaching earlier. As a result, the ascending slope of the state entropy was steeper than de BIS one. It was also analyzed the relationship between BIS and SE minimum values in time and in numbers. The coincidence of the minimum values of BIS and SE, adding +/- 10 units as a reference, was 34,04%.

Conclusions: Both BIS and SE provided a reliable guide to assess the adequacy of the hypnotic depth achieved. The degree of depth achieved with the initial bolus, according to the records, is maintained long enough for adequate endotracheal intubation conditions. However, SE can be a parameter that provides greater safety since it ascends earlier than BIS. It has shown to be more sensitive to variations in hypnotic depth and better predictor than BIS in the anesthetic stage emergence. It may be less reliable in assessing the exact degree of hypnotic depth when the level of consciousness is very low. Both BIS and SE should be considered useful to predict the tendency related to different depth hypnotic levels, despite they aren't exact in every moment.

## 01AP04-12

# Efficacy of low doses of rocuronium administered less than one hour following the use of sugammadex in a child undergoing deep brain stimulation surgery

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**Background:** When following sugammadex one needs to provide muscle paralysis, rocuronion (ROC) use is challenging¹.In adults, one should wait at least 4 hours for a normal rouronium dose of 0,6 mg/kg to be efficient,or use a high dose of 1,2 mg kg in an emergency².In children there are no recommendations. We report the efficacy of ROC following sugammadex in a child.

Case report: A 9-years old of 17 kg with Hallervorden-Spatz was subjected to general anesthesia for deep brain stimulation (DBS) surgery.Anesthesia was propofol and remifentanil (average infusion rates 3,6mg/kg/h and 0,12mcg/kg/min). Tracheal intubation followed 1,2 mg/kg ROC and a TOF=0 in 1,5 min. Monitoring was with NMT Datex-ElectroSensor and ulnar nerve TOF stimulation. The procedure requires light anesthesia for electrical brain activity recording, and no NMB for the phase when movements resulting from DBS need to be assessed. When DBS was to start, a TOF count of 1 was present, so sugammadex (50 mg) was given.TOF increased above 90% in 3 min. Once DBS was completed the patient needed to be paralyzed again for the second recording phase. This was

30 min after sugammadex, and since installing NMB was required only for better quality recoring, 0,2 mg/kg ROC was administered with a minimum T1% of 18% occurring 2,5 min later. Recovery to a TOF 0,9 occurred 18min after ROC. Ten min later, 58min after sugammadex and 28min after ROC, again the same dose of ROC was administered, this time resulting in a T1% of 0% achieved after 3 min. Recovery to a TOF 0,9 occurrred 20 min after ROC's second dose. The anesthetic technique allowed both deep brain activity monitoring and movement assessment.

**Discussion:** In the present case, a ROC dose 0,2 mg/kg, lower than its ED95 and given only 30 min after sugammadex, depressed the T1 significantly and the same dose repeated 58min after sugammadex abolished TOF responses. NMB following sugammadex was achieved with ROC at a dose lower than reported<sup>1,3</sup>. It is not known if the safety margin for ROC following sugammadex is higher in children, since there are no studies or reports. That the the same dose had more marked effects at 58min instead of 30min after sugammadex, illustrates the effect of time on sugammadex kinetics.

#### References:

1.Bri Jour Anaesth(2010)105(4):487 2.Glob Anesth Perioper Med (2015)1(4):118

3.Can J Anesth(2011)58:769

**Learning points:** Low rocuronium doses were effective to provide muscle paralysis less then one hour following sugammadex in a child.

### 01AP05-1

# Medical Fashion Victims? Do Nail Polishes and Acrylic Nails affect digital pulse oximetry and patient management in the clinical setting?

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Background and Goal of Study: Digital Pulse Oximetry (DPO) is ubiquitous in monitoring patients' oxygen saturation (SpO<sub>2</sub>) levels. Concerns prevail that nail treatments such as acrylic nails or nail polishes affect these readings, but published data is inconsistent. As changes in SpO<sub>2</sub> levels affect the levels of interventions and impact patient monitoring in critical care and anaesthesia, discerning if nail treatments adversely affect DPO is crucial.

1: Survey healthcare staff attitudes and approaches to this issue

2: Experimentally assess effects of specific nail treatments on SpO<sub>2</sub> readings under different physiological conditions

#### Materials and Methods:

1: Questionnaire based survey was issued to clinical staff at four university hospitals to assess current knowledge and opinions regarding how nail treatments impact on clinical decisions pertaining to DPO.

2: An interventional experiment on 12 volunteers analysing effects of nail polish of different colours and acrylic nails from popular brands, on SpO<sub>2</sub> measurements under varying physiological conditions (healthy, venous congestion, venous constriction). Congestion modelled using venous stasis on non-invasive blood pressure cuffs and constriction modelled using water immersion for 10min at 10°C.

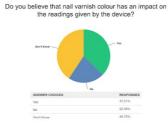
# Results and Discussion:

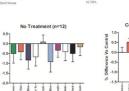
**Survey**: 86 Respondents (55 doctors, 21 nurses). Nail treatments affect 45% of respondents' clinical practice, and >30% of respondents intervene to remove treatments.

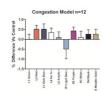
**Experiment** (n=12):  $\Delta$ <1%(±SEM) in SpO<sub>2</sub> readings across all nail treatments and models analysed, none of which resulted in a SpO<sub>2</sub> reading <95%, at which O<sub>2</sub> intervention is recommended.

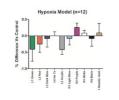
Conclusions: Knowledge of, and approach to, potential complications of nail treatments on DPO varies amongst healthcare staff, with poor knowledge or understanding of effects. Our survey data suggest it would be reasonable to establish hospital policies that do not require prior removal of nail treatments examined in this study. Experimental data indicate the nail treatments specified do not contribute significantly to a difference in SpO2 readings, therefore have no clinical impact on patient care.

Nail varnish and fake/acrylic nails are often considered to interfere with patient pulse oximetry readings. Does this consideration interfere with your practice?









## 01AP05-2

# Using capnography: Delivery of an education package for recovery nursing staff

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Background: AAGBI guidelines¹ advocate the use of capnography for all patients who are deeply sedated or have a supraglottic airway or endotracheal tube in situ. The 4th National Audit Project highlighted the role of capnography in earlier identification of obstructed airways in recovery, noting the limitations associated with poor interpretation². Having identified limited use of capnography in recovery and poor nurse confidence in interpretation, we planned an education program to address this.

Materials and Methods: An education package for recovery staff was developed from an already established program<sup>3</sup>. A survey of confidence in capnography use

and an assessment of knowledge was undertaken by the staff before and after the education sessions. The education was delivered as small group tutorials covering practical aspects of capnography use. Test scores, maximum 21, were compared using a paired student's t-test. Confidence was reported on a scale of 1 (no confidence) to 5 (very confident).

Results: Twenty recovery staff members (83%) attended tutorials in 5 groups. The mean test score rose from 7.85 (SD=3.34) to 17.45 (SD=2.68) following the education session (p<0.05).

The percentage of nurses who rated their confidence as 3 or more rose from 13% to 100% following the education package.

Conclusion: The results show the education package has increased recovery staff

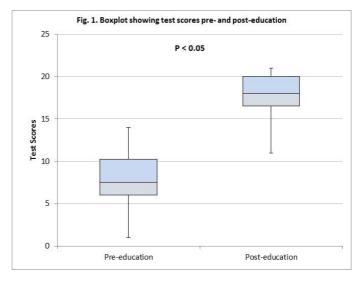
**Conclusion**: The results show the education package has increased recovery staff knowledge and confidence. This improvement has already led to greater adoption of capnography use in recovery. Ultimately this should improve patient safety by aligning our unit with national standards.

#### References:

 Association of Anaesthetists of Great Britain and Ireland. Recommendations for standards of monitoring during anaesthesia and recovery 2015. *Anaesthesia* 2016; 71: 85-93

2. TM Cook, N Woodall, C Frerk. Major Complications of airway management in the UK: Results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. *British Journal of Anaesthesia* 2011; 106(5): 617-631

3. Capnography resources. Scottish Paediatric Anaesthetic Network. http://www.span.scot.nhs.uk/?page\_id=873 [Accessed 15 December 2017]



## 01AP05-3

# Routine BIS monitoring allows to cut down the costs of volatile anaesthetics

<u>Andruszak – Kot A.</u><sup>1</sup>, Bzowska A.<sup>1</sup>, Dyl P.<sup>1</sup>, Borun M.<sup>1</sup>, Napiorkowski T.<sup>1</sup>, Symonides M.<sup>1</sup>

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Background and Goal of Study: Volatile anaesthetics are a costly element of anesthesia, even with low flow, while monitoring anesthesia depth(e.g. bispectral index) is becoming more common. The aim of this analysis was to if bispectral index monitoring allows to decrease the use of volatile anesthestics and limit costs. Materials and Methods: We calculated the average cost of volatile anesthetics per procedure in consecutive general anaesthesia cases performed in a tertiary

reference hospital over a period of three years. The types, average duration and extent of procedures were similar over the years. In 2014 BIS was used in few cases, In 2015 BIS monitoring was as routine approach in all general anaesthesia cases for 6 months; in 2016 BIS was used for all general anesthesia cases. The costs of desflurane and sevoflurane were divided by the number volatile anesthesia cases performed by the same team of physiscians. Routine maintenance includes low-flow of 1.5 litres maximal fresh gas flow. No significant changes in anaesthesia techniques were observed in those years.

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Results and Discussion:In 2014 (no BIS monitoring; approx. 7100 volatile anesthesia procedures) 578 sevoflurane bottles (97 Euro per bottle) and 283 desflurane bottles (113 Euro per bottle) were used; total cost of volatile anaesthesia was approx. 88 427 Euro (i.e. 12.45 Euro on average per procedure) In 2015 (6 months of BIS monitoring; approx. 8600 volatile anesthesia procedures) 621 sevoflurane bottles (97 Euro per bottle) and 333 desflurane bottles (113 Euro per bottle) were used; total cost of volatile anesthesia was approx. 98 520 Euro (i.e. 11.45 Euro on average per procedure) In 2016 (all procedures BIS monitored; 9400 volatile anesthesia procedures) 578 sevoflurane bottles (97 Euro per bottle) and 299 desflurane bottles (116 Euro per bottle) were used; total cost of anesthesia approx. 89 767 Euro (i.e. 9.55 Euro on average per procedure)

Conclusion: We conclude that the routine use of BIS monitoring has allowed to decrease the average cost of volatile anaesthetic used per procedure to 76% of initial expenditure, thus allowing to save approximately 27 376 Euro per annum. This does not cover the costs of BIS electrodes, but in view of the prices on our market it allows for a return of approximately 30% of their cost.

#### 01AP05-4

# "Triple-low" - the unicorn of anaesthesiology?

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Background and Goal of Study: "Triple-low" is described as simultaneous occurence of low mean arterial pressure (MAP), low MAC and low bispectral index (BIS) during general anesthesia[1]. "Triple-low" is being associated with increased mortality. Our aim was to determine whether the occurence of "triple-low" is associated with increased mortality basing on the results observed in a consecutive patient series from a single institution where it is departamental policy to monitor BIS value in all patients undergoing general anesthesia.

Materials and Methods: We performed a retrospective analysis of 14,021 consecutive non-cardiac surgery patients operated at a tertiary reference teaching hospital between Jan.2016 and Sept.2017. "Triple-low" was observed in 245 patients (90 male, 155 female; median age 61; range 18-91; ASA score II – VE) on recognition of the following criteria: MAP <75 mmHg, MAC <0.8, BIS <45 [1]. We evaluated the possible association between triple low occurrence and increased 28-day mortality.

Results and Discussion: Overall 28-day mortality was 2.4%; in the "triple-low" cohort 28-day mortality was 2.86% while in the "no triple-low" cohort it was 2.39%. We determined that the deaths in the "triple-low" cohort were highly unlikely to be associated with "triple-low" occurrence during surgery – noted causes of the overall 7 deaths listed according to the ICD 10 classification included: cardiac arrest (3 cases), respiratory arrest (1 case), respiratory failure (2 cases), heart failure (1 case). In comparison there were 549 deaths in the control group: cardiac arrest (162 cases); respiratory arrest (174 cases), respiratory failure (122 cases), heart failure (16 cases), multiple organ dysfunction due to advanced cancer (69 cases) and others (6 cases). It is important to note, that usually secondary cause of death was due to advanced cancer.

Conclusion: We failed to find a significant connection between "triple-low"

occurence and 28-day mortality in a case series of patients from one institution.

References: "Concurrence of Intraoperative Hypotension, Low Minimum Alveolar Concentration, and Low Bispectral Index Is Associated with Postoperative Death" Willingham MD et al 2015

# 01AP05-5

# Correlation between triple low and ASA score – does it exist?

<u>Dyl P.</u><sup>1</sup>, Misztal A.<sup>1</sup>, Andruszak – Kot A.<sup>1</sup>, Napiorkowski T.<sup>1</sup>, Borun M.<sup>1</sup>, Symonides M.<sup>1</sup>

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Background and Goal of Study: Triple low, commonly described as intraoperative occurence of low mean arterial pressure, low mean alveolar concentration of an anesthethic, and low bispectral index is a phenomenon which is presently widely discussed. Our aim was to assess if and how the preoperative ASA score influences the likelihood of triple low occurence. We chose a patient case series homogenous as to the method of anaesthesia maintenance (sevoflurane monitored by BIS value). All desflurane cases were excluded.

Materials and Methods: Between Jan.2016 and Sept.2017 5218 patients underwent general anesthesia with sevoflurane. In order to assure that induction

was standardised all emergency cases were excluded from the analysis. Typical induction consisted of (on average) propofol 2 mg/kg, fentanyl 2.8 ug/kg; rocuronium 0.6 mg/kg. Maintenace consisted of sevoflurane adjusted by BIS, rocuronium (infusion 0.6 mg/kg/h) and fentanyl in adjusted doses. 245/5218 patients presented "triple low" i.e.: MAC <0.8, MAP <75 mmHg, BIS <45. Group I (no triple low) consisted of 4973 pts; group II – 245 pts. Statistically the groups did not vary (Fisher's test). The ASA scores in both patient groups were compared. **Results and Discussion**: We found that the distribution of ASA scores did not vary between the groups. Detailed results are presented in Table 1.

ASA score	Group I	Group II
ASA 1	0,59%	0,41%
ASA 2	82,34%	85,54%
ASA 3	15,98%	13,22%
ASA 4	1,09%	0,83%

**Conclusion**: We have found no corelation between the incidence of triple low and ASA score.

References: "Concurrence of Intraoperative Hypotension, Low Minimum Alveolar Concentration, and Low Bispectral Index Is Associated with Postoperative Death" Willingham MD et al 2015

## 01AP05-6

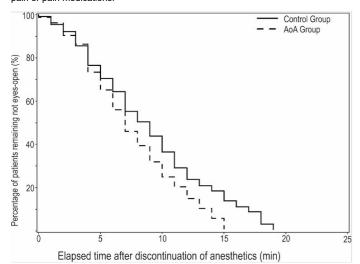
# Comparison of Adequacy of Anaesthesia monitoring with Standard clinical practice during routine general anaesthesia: an international, multi-centre, single-blinded randomized controlled trial

Grünewald M.<sup>1</sup>, Harju J.<sup>2</sup>, Preckel B.<sup>3</sup>, Molnár Z.<sup>4</sup>, Yli-hankala A.<sup>5</sup>, Bein R. 6. The AoA study group

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Background and Goal of Study: The use of clinical signs such as hypertension or tachycardia for guidance of anaesthesia can be challenging. Previous studies have suggested that incidence of unwanted anaesthesia events could be reduced by measuring the components of anaesthesia i.e. hypnosis and analgesia (1,2). However, the evidence regarding the benefits for such monitoring is still limited (3). Materials and Methods: After approval of each ethic committee, a total of 494 patients were recruited in a multi-centre, single-blinded, randomized controlled trial (RCT). Patients were randomized into two groups and anaesthesia was guided with Entropy (hypnosis) and surgical pleth index SPI (analgesia) in (adequacy of anaesthesia group; AoA group) or standard monitoring alone (Control group). Anaesthesia was conducted with TCI of propofol and remifentanil. The patients were followed for signs of inadequate anaesthesia (i.e. grimacing, hypertension or tachycardia) or signs of too deep anaesthesia (i.e. hypotension and bradycardia) namely unwanted anaesthesia events.

Results and Discussion: Incidence of unwanted events was 0.7 events per subject in both groups (p=0.519). In the AoA group, the overall consumption of propofol was significantly reduced with 6.88 vs. 7.53 mg/kg/h in Control group (p<0.01). Time of emergence was significantly shorter in AoA group with 8.0 vs. 9.6 min in Control group (p<0.01; figure 1). With respect to post-anaesthesia care, we found a trend towards faster full recovery with AoA monitoring but no difference with respect to pain or pain medications.



**Conclusion**: In the present RCT, the guidance of TIVA by Entropy and SPI in comparison to standard monitoring alone was unable to reduce unwanted events. However, there was a slight reduction in the use of propofol and shorter times for emergence. The findings may have been influenced by low-risk profile of surgeries with low frequency of unwanted events.

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#### 01AP05-7

# Comparison between UNICON Index and Bispectral Index using Population Pharmacodynamic Analysis during Sevoflurane Anesthesia

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Background and Goal of Study: ADMS (Anesthetic Depth Monitor for Sedation, Unimedics Co., Ltd., Seoul, Korea) is a recently introduced anesthetic depth measurement system, which displays the patient's arousal state as the UNICON Index. We performed pharmacodynamic analysis to compare the performance of the UNICON index to the bispectral index (BIS) as electroencephalographic

measures of sevoflurane drug effect during general anesthesia.

Materials and Methods: We observed 30 adult patients scheduled for laparoscopic gastrectomy with a combined epidural–sevoflurane general anesthesia. During a phase of constant surgical stimulation, end-tidal sevoflurane concentrations were varied between 1 - 4 vol%. This procedure was repeated twice, and end-tidal sevoflurane concentrations, BIS, and UNICON index were recorded simultaneously. Population pharmacodynamic models based on double-sigmoid curves were developed to evaluate the relationship between effect-site sevoflurane concentrations and two electroencephalographic indices. The parameters of the models were estimated by NONMEM VII (Icon Development Solutions, LLC, Ellicott City, USA) by minimizing log likelihood.

Results and Discussion: A significant (P < 0.001) correlation between BIS and UNICON index was found ( $\rm r^2$  =0.60) for the two experimental periods. The individual  $\rm k_{00}$  (effect site efflux constant), E  $_{\rm pateous}$  (pharmacodynamic plateau between two sigmoid curves) and CE  $_{\rm 50}$ (ow (effect-site concentration associated with 50% decrease from E  $_{\rm plateous}$  to E  $_{\rm max}$ ) for UNICON (0.29 ± 0.45 min-1, 37.9 ± 3.8, and 3.42 ± 0.96 vol%) did not differ from those of BIS (0.25 ± 0.13 min-1, 38.6 ± 5.0, and 3.87 ± 1.50 vol%). The CE  $_{\rm 50}$  upper (effect-site concentration associated with 50% decrease from baseline to Eplateau) was significantly smaller (p < 0.001) for UNICON (0.43 ± 0.27 vol%) than for BIS (0.69 ± 0.25 vol%), however, its clinical importance may be limited.

**Conclusion:** Population pharmacodynamic models using double-sigmoid curves adequately described the responses of BIS and UNICON index to sevoflurane anesthesia, and most pharmacodynamic parameters for the BIS and UNICON index were similar.

#### 01AP05-8

# Continuous optical blood pressure measurement in the perioperative setting

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Background and Goal of Study: Obtaining accurate continuous blood pressure (BP) monitoring is mandatory in critically-ill, anesthetized patients or during complex surgical procedures. The gold standard for continuous BP measurement-invasive arterial catheter- is complex and associated with morbidity.

To allow non-invasive beat-to-beat BP measurement, we used a commercially available pulse oximeter probe and analyzed its signals in order to assess performance of optically acquired signals transformed into continuous BP values. The aim of the study is to prove the accuracy of the optical non-invasive blood pressure device compared to the invasive arterial measurement.

Materials and Methods: We included and obtained informed consent from 40 patients aged more than 18 years and scheduled for an elective surgery necessitating general anesthesia and invasive BP monitoring at CHUV- University Hospital of Lausanne. An arterial catheter was inserted in a radial artery. The fingertip device was placed on the contralateral side. Both signals were recorded at induction of general anesthesia and compared.

The signal obtained through the fingertip device was analyzed based on published pulse wave analysis algorithms, and a patient-dependent calibration procedure. **Results and Discussion**: We provide here the preliminary results from the first

8 patients when estimating diastolic BP from optical signals. Data analysis on the remaining 32 patients is underway.

During anesthesia induction, large changes of diastolic BP were measured by the radial catheter (average diastolic BP change of 62 mmHg ± 30 mmHg).

Overall, the measured mean error for diastolic BP was of 2.1 mmHg (95%)

Overall, the measured mean error for diastolic BP was of 2.1 mmHg (95% confidence interval (CI) between -2.6 and 6.9 mmHg), and the measured standard

deviation of the error for diastolic BP was of 9.6 mmHg (95% CI between 1.1 mmHg and 18 mmHg). For such a simple optical measurement setup, and given the large BP variabilities observed in the study, these performances are already very close to the exigent ISO81060-2 requirements.

**Conclusion**: Our results demonstrate feasibility of estimating BP changes in the operating room through an algorithm-based signal analysis acquired through a commercially available pulse oximeter. Further studies are needed but this research validates a promising track towards non-invasive continuous monitoring of BP.

#### 01AP05-9

# Comparison of Ramsay Sedation Score and BIS monitoring in sedoanalgesia for ERCP

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Introduction: Bispectral index (BIS) monitoring provides noninvasive objective measurement of consciousness level in sedated patient. Endoscopic retrograde cholangiopancreatography (ERCP) is an invasive endoscopic method that requires deep sedation. Patient monitoring and close follow-up is necessary to avoid cardiovascular and respiratory problems during the procedure. The results of studies evaluating the benefits of BIS monitoring for gastrointestinal procedures

have not been found consistent. In this study, we aimed to evaluate the effect of BIS monitoring on propofol usage, hemodynamic parameters, respiratory functions, endoscopist and patient satisfaction by comparing it with Ramsay sedation scale in sedoanalgesia for ERCP patients.

Method: Sixty adult patients in the ASA 1-2 category who were scheduled for ERCP were randomly divided into two groups after the approval of Ethics Committee. Sedoanalgesia was performed so that Ramsay Sedation Score (RSS) would be 4-5 in the first group (Group 1), while the BIS value would be 65-75 in the second group (Group 2). Heart rate, arterial blood pressure and arterial oxygen saturation (SpO2) were monitored noninvasively. Both groups received 0.03 mg/kg midazolam and 1 mg/kg lidocaine intravenously followed by 1 mg/kg propofol and 1 mcg/kg fentanyl. Sedation was maintained with propofol infusion (4 mg/kg/h), and an additional dose of 0.1 mg/kg propofol was administered when needed. The total duration of the procedure and the total amount of propofol consumed were recorded together with cardiac and respiratory complications. Recovery time, nausea-vomiting, pain, patient and endoscopist satisfaction were evaluated postopeeratively. All data are compared between groups.

**Results:** SpO2 values at the beginning of sedation, and at 1st, 5th and 10th minutes were significantly higher in the BIS group (p<0.05). The number of times that SpO2 value was decreased to under 90% was higher in the RSS group (p<0.05). There was no difference in the amount of propofol used, recovery time, hemodynamic values, and patient and endoscopist satisfaction between groups.

Conclusion: Although there was no difference in the amount of total propofol consumed in both groups in our study, higher SpO2 values in the BIS group during induction suggests that a safer sedation can be achieved with BIS monitoring when the respiratory depression is concerned.

#### 01AP05-11

Monitoring depth of anesthesia decreased the incidence of postoperative delirium in surgical patients receiving intravenous patient-controlled analgesia postoperatively

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Background and Goal of Study: Postoperative delirium(POD) is a common surgical complication. The aim of the before-after study was to examine whether monitoring intraoperative depth of anesthesia decreased the incidence of POD in surgical patients receiving intravenous patient-controlled analgesia (IVPCA) postoperatively

Materials and Methods: The acute pain service team (APS) including attending anesthesiologists, pain nurses and pharmacists provides pain management in our hospital. APS team regularly visits IVPCA patients at least twice daily. The nursing delirium screening scale (NuDESC) is used as the screening tool of POD. Pain severity and NuDESC are assessed and entered into a computerized database by APS team during each visit. Entropy, an anesthetic EEG monitoring, has been used during general anesthesia since mid-April, 2016. IVPCA patients were divided into two groups: patients without intraoperative entropy (2013.09-2016.03) and patients with intraoperative entropy (2016.05-2017.11). The POD incidence of the two groups were calculated and compared.

Results and Discussion: There were 3635 surgical patients receiving postoperative IVPCA (morphine in 1 mg/ml concentration). In total, 33 patients developed POD. In 1883 patients without entropy monitoring intraoperatively, 23 patients developed

POD. The POD incidence was 1.22%. In 1752 patients using entropy monitoring intraoperatively, 10 patients developed POD with a POD incidence 0.57% (p=0.039, chi-square test)

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Old age is an established risk factor of POD. With the aging population growing, the incidence of POD increases. How to prevent POD becomes an important issue. The POD incidence in IVPCA patients without entropy intraoperatively was 1.22% which was lower than those in previous reports. The finding supports that reducing postoperative pain by the usage of IVPCA decreased POD incidence. Comparing the POD incidence in patients without intraoperative entropy, the POD incidence in patients with intraoperative entropy was significantly lower. This study demonstrated that providing more appropriate depth of anesthesia decreased the occurrence of POD in postoperative IVPCA patients effectively.

**Conclusion**: In postoperative patients receiving IVPCA, monitoring intraoperative depth of anesthesia reduced POD incidence effectively.

## 01AP05-12

To Observe the Correlation between train-of-four count(TOF) and diaphragmatic thickness fraction(DTF) in patients of myasthenia gravis (MG) undergoing minimally invasive thymectomy including VATS and robotic thymectomy: A Pilot Study

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**Background and Goal of Study**: Ultrasonography(USG) is a valuable diagnostic modality because it is ubiquitous in medical facilities and no risk of ionizing

#### radiations

As this equipment is portable, it has the advantage of bedside assessment of the structural and functional components of the diaphragm. The MG patients are at increased risk of respiratory failure, So, primary objective is to find out correlation between TOF count and DTF, whether DTF can be used as an aid for extubation in OT setting in MG Patients. As all the studies were conducted in emergency department and ICU patients for weaning, this is the pilot study conducted in OT for extubation.

Materials and Methods: After obtaining Ethics committee approval and informed consent from the patients, an observational study conducted which included 20 ASA I/II/III patient with MG. Patient's refusal and diaphragmatic palsy due to other comorbid conditions were excluded. After thorough preoperative evaluation base line DTF by using ultrasound linear probe was measured in preanesthesia room and again at the end of surgery after administering reversal every min till extubation. Standard anesthesia was given Intraop as well as postop TOF count was measured till extubation. Postop TOF count and DTF till the extubation was correlated by using SPSS 14 by using kruskal wallis H test, chi square test, Dunn test. DTF=(thickness at end insp-thickness at end exp)/thickness at end exp\*100

Results and discussion: Of 20 patients, 11(55%) were males and 9(45%) were females. Mean DTF at 1min was 17.7, at 2min it was 30.41, at 3min it was 48.64 and on extubation it was 55.62 with the p-value<0.05 at every time point. DTF was not found to be statistically correlated with TOF count, clinical parameters such as tidal volume(TV) and respiratory rate(RR) but clinically all the patients were extubated on TOF>0.9, TV and RR satisfying extubation criteria. All patients have DTF>28% on extubation

Conclusion: We conclude, in patients with MG undergoing minimally invasive thymectomy, a diaphragmatic thickness fraction of more than 28% is an index of neuromuscular recovery and may assist in tracheal extubation at the end of surgery. DTF was not found to correlate with TOF Count and clinical parameters. Further studies may need to find the role of DTF can be used as an extubation tool. References:

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Acknowledgement: Prof. Dwivedi and Mr. Satti for statistics

#### 01AP06-2

Postoperative outcomes of cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC)

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**Background:** CRS/HIPEC is performed to treat diseases such as pseudomyxoma peritonei, carcinomatosis, and malignant mesothelioma. It's highly invasive, and requires complicated surgical manipulation. Therefore it requires large volumes of fluid/blood transfusion to address ascites and/or bleeding, which can result in various complications. This study retrospectively examined the postoperative outcomes and factors contributing to the outcomes in our hospital.

**Methods:** Data on patients who underwent CRS/HIPEC between 2010 and 2017 were extracted from electronic health record in our hospital. The relationships

between postoperative outcomes and patient backgrounds or intraoperative factors were examined through multivariate analysis.

Results and Discussion: Subjects were 166 patients (61 men and 105 women mean age 56.7±12.7 years). Median operative time was 682 minutes, median volumes of blood loss, ascites, total fluid infusion, red blood cell (RBC) transfusion fresh frozen plasma (FFP) transfusion were 627 mL, 2189 mL, 8075 mL, 840 mL 1815 mL, respectively. The median intubation duration was 2 days, the median length of intensive care unit (ICU) stay was 6 days. Grade III or higher postoperative complications according to the Clavien-Dindo classification occurred in 39/166 patients (23.5%), of which 1 patient died. The most frequent complication was intra-abdominal bleeding in 11 patients (6.6%), followed by respiratory complication in 6 (3.6%), cardiac complication in 4 (2.4%), and disseminated intravascular coagulation in 3 (1.8%). Risk factors for all complications were operative time. crystalloid infusion, and RBC transfusion. The length of ICU stay was longer in patients with longer operative time. Results of this study showed that operative time was most strongly associated with postoperative outcomes. This association was considered mainly related to the number of resected organs, extent of resection, and surgical manipulation such as adhesiolysis. Close collaboration with operators is essential for safe anesthesia management. Additionally, adequate management of fluid/blood transfusion is required to prevent disease progression and related complications.

**Conclusion:** The incidence of postoperative complication of CRS/HIPEC in our hospital was 23.5%. Close collaboration with operators and adequate fluid/blood management is required.

#### 01AP06-3

# The effect of Sevoflurane vs. Isoflurane on Emergence Time and PACU Length of Stay

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Background and Goal of Study: In ideal operating room setting, the goal is to minimize emergence timing and post anaesthesia care unit (PACU) length of stay, thus reducing cost. With the routine use of shorter acting inhalational anaesthetic agent quicker emergence and shorter PACU length of stay seems to be possible. We therefore assessed the treatment difference of Isoflurane versus Sevoflurane on PACU length of stay and emergence timing.

Materials and Methods: We included 1498 adults from a previously conducted prospective alternating intervention trial (Kopyeva et al), mostly having colorectal surgery, who were assigned to isoflurane or sevoflurane based on protocol. The PACU length of stay was defined as the time from entering to exiting PACU phase I. Emergence time was defined as the time from last 0.3 (or higher) MAC inhalational dose towards the end of the procedure to out of the operating room. Treatment effect was assessed using Cox proportional hazards regression and adjusting for imbalanced baseline variables. In a post-hoc analysis we compared the two anaesthetics by type of surgery.

Results and Discussion: PACU length of stay did not differ between groups, with a median [quartiles] of 158 [117, 216] minutes for isoflurane and 155 [118, 219] minutes for sevoflurane group; the adjusted hazard ratio for PACU discharge time was 1.03 (95% CI; 0.92, 1.16) (P=0.53), Table 1. However, isoflurane did have shorter PACU length of stay for non-abdominal surgeries. Emergence timing was longer for isoflurane, with median [quartiles] of 16 [12, 22] minutes versus 14 [11, 19] minutes for sevoflurane, with adjusted hazard ratio of 0.80 (95% CI: 0.72, 0.90), P<0.001.

**Conclusion**: Use of inhalational agent isoflurane versus sevoflurane had no effect on PACU length of stay. Emergence timing is on average about two minutes quicker with sevoflurane, which may be of limited clinical significance. Sevoflurane, per Minimum Alveolar Concentration (MAC) hour, is twelve times more expensive compared to isoflurane and thus offer no advantage with respect to PACU length of stay and emergence timing.

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## 01AP06-4

Association between American Society Anesthesiologist Physical Status classification and postoperative survival in patients subjected with a major surgical intervention in a high-complexity hospital.

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Background and Goal of Study: In Chile, almost one million major surgical operations are performed per year, from minimally invasive to highly complex. Every surgical intervention implies a risk that has associated morbidity and mortality. There are numerous ways to categorize patients into risk groups. One of the most widely used scales in the world is the American Society Anesthesiologist Physical Status Classification System (ASA PS), which allows us to assess the preoperative status of patients. This is used and registered universally by anesthesiologists, generating in a permanent way relevant information, for health professionals and administrators. However, there are no studies that assess the ASA PS scale and its relation to the morbidity and mortality of patients undergoing surgery in our population. This study has Institutional Review approval. The aim of this study was to determine the association between postoperative survival and ASA PS in patients undergoing major surgery in a High Complexity Hospital in Chile, Dr. Hernán Henríquez Aravena Hospital in Temuco (HHHA).

Materials and Methods: Retrospective cohort of patients operated on for major surgery during 2016, at the HHHA. We excluded patients who presented records with incomplete or inconsistent data. Descriptive and analytical statistics were performed with measures of central tendency (medium and medium) and central dispersion (standard deviation and range). To assess survival, the Kaplan-Meier method was used.

Results and Discussion: Data from a total of 18,751 surgeries were analyzed. The average age was 44 years (83.2% > 15 years), with 55.7% female. The average surgical time was 93. 66.7% were elective. 23.2% on an outpatient regimen. The types of anesthesia were 50.6% Inhalational, 27.2% Neuroaxial, 15.2% Regional, 7.1% TIVA. The distribution according to ASA PS was: ASA 1, 23.2%; ASA2, 52.5%; ASA 3, 24.0%; ASA 4, 0.3%. The mortality according to ASA PS was: ASA 1, 2.1%; ASA 2, 5.0%; ASA 3, 11.7%; ASA 4, 43.3%. Overall mortality at 20 months was 6.1%

**Conclusion**: An association was found between ASA SP classification and mortality, with higher mortality with higher ASA. The ASA SP classification is a good risk estimator for postoperative mortality.

# 01AP06-5

# Lidocaine infusion for enhanced recovery in hystercetomy: a clinical trial

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Background and Goal of Study: Continuous infusion of lidocaine has been widely used in colorectal surgery as part of a morphine saving and enhanced recovery program. The aim of this study was to assess the impact intravenous lidocaine on analogsia and enhanced recovery in hysterctomy

**Materials and Methods**: In this study we included 58 ASA I – II class young women (20-60 years) sheduled for hysterectomy. Our patients were divided into two groups:

Group 1: receiving lidocaine at the dose of 1mg / kg before induction and 2mg / kg as maintenance during surgery.
 Group 2: received placebo.

The anesthesia and analgesia protocol was standardized for both groups. We evaluated the time of the 1st mobilization and the restoration of the transit as well as the postoperative analgesia in the two groups.

Results and Discussion: Demographic data (age, weight, size) were comparable between the two groups as well as surgical date (the duration of naesthesia and the duration of surgery). The first mobilization time was 13.3 h in group 1 versus 21 h in group 2; p<0.001. The RNS score significantly lower in group 1 from the first to 24th post operative hours. The morphine consumption was 1.38 mg in group 1 versus 6.14 mg in group 2 with p<0.001.

**Conclusion**: Lidocaine intravenous infusion may be safe and useful for enhanced recovery in hysterectomy as it provides better analgesia and early mobilisation comparing with placebo.

#### 01AP06-6

# The role of Intravenous lidocaine in preventing chronic postoperative

Pain - a systematic review

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**Background and Goal of Study**: Chronic postoperative pain (CPOP) is an increasing public health issue considering its impact on the patients quality of life and its associated costs for the healthcare systems. The incidence of CPOP can be as high as 75%, depending on the surgical procedure and other factors.

Lidocaine is a local anesthetic with anti-inflammatory, analgesic and antihyperalgesic properties. Several studies have been describing its use in controlling acute postoperative pain when used intravenously.

The goal of this study was to define the role of intravenous lidocaine in preventing

**Materials and Methods**: The MEDLINE database from 2006 to 2017 was searched with the keywords: Chronic postoperative pain and intravenous lidocaine.

Results and Discussion: Three randomized controlled trials that met inclusion criteria were obtained: two on breast surgery and the other on open nephrectomy. All trials used intravenous lidocaine during surgery, suspending the perfusion up to the first 24 hours of the postoperative period. All three of them showed a significant decrease on the incidence of CPOP. There was a 20-fold decrease six months after breast surgery.

**Conclusion**: Intravenous lidocaine seems to decrease the incidence of CPOP, however there is limited evidence. More trials are necessary to define the efficacy and safety of intravenous lidocaine. A generally accepted definition of CPOP is needed.

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#### 01AP06-7

# Effects of intraoperative fluid volume and blood pressure on postoperative nausea and vomiting in patients undergoing breast surgery

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**Introduction:** Postoperative nausea and vomiting (PONV) is a problem in addition to pain for patients who have undergone surgery. There have been few studies on the possible effects of intraoperative fluid volume and blood pressure on the occurrence of postoperative nausea and vomiting.

Materials and methods: This was a retrospective study that included female patients aged 40 to 60 years who underwent mastectomy at our institution during the period from January 1, 2016 to December 31, 2016. Data for age, height, weight, operation time, anesthesia time, anesthesia method, airway device, fluid volume, amount of bleeding, amount of an opioid, dose of acetaminophen, mean blood pressure, presence or absence of lymph node dissection and amount of postoperative meals were obtained from electronic medical records, and the data were compared in two groups (nausea group and no nausea group).

Results: There were 85 patients during the study period. Twenty-one of those patients suffered from nausea and 61 of them did not. The volumes of fluid during surgery were 1122.5 ml (95% Cl: 928.2 – 1316.8 ml) in patients with nausea and 1008.7 ml (886.8 - 1130.6 ml) in patients without nausea, and the difference was not significant (P=0.33). Mean blood pressure was slightly lower in patients with nausea than in patients without nausea (66.4 mmHg [95% Cl: 63.0 - 69.7 mmHg] vs 69.1 mmHg [95% Cl: 67.0 - 71.2 mmHg]), but there was no statistically significant difference (P=0.18). There were 5 patients who had vomiting postoperatively and 80 patients who had no vomiting. The amounts of fluid volume during surgery were 1210 ml (95% Cl: 783.5 - 1636.5 ml) in patients with vomiting and 1030.3 ml (95% Cl: 923.6 - 1136.9 ml) in patients without vomiting, and there was no significant difference (P=0.42). Mean blood pressure during surgery was also lower in patients with vomiting than in patients without vomiting (65.1 mmHg [95% Cl: 57.7 - 72.5 mmHg] vs 68.5 mmHg [95% Cl: 66.7 - 70.4 mmHg]), but the difference was not significant (P=0.38).

**Conclusion**: In patients with postoperative nausea, there is a tendency for mean blood pressure to be low during surgery, but fluid volume and mean blood pressure during surgery are not associated with PONV in young women after mastectomy.

#### 01AP06-8

# The Path to Enhance Recovery after Colorectal Surgery

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**Background**: Enhanced Recovery After Surgery (ERAS) care pathway reduce surgical stress, maintain postoperative physiological function and enhance mobilization after surgery, reducing morbidity and length of hospital stay (LOHS). The aim of this study was to evaluate the institutional compliance with a perioperative ERAS path and patients' outcome in colorectal surgery (CS).

Materials and Methods: A retrospective audit was conducted after Quality, Health and Safety Department approval. Data were collected from elective CS patient's electronic medical records (2014-2016). Analyzed variables: age, gender, American Society of Anesthesiologists Physical Status (ASA), comorbidities, Colorectal Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity (CR POSSUM), compliance with perioperative ERAS items, LOHS, and perioperative complications using the Clavien-Dindo classification (CDc). Descriptive statistical analysis, Pearson and Spearman correlation and t-student test were run in SPSS® version24.

Results and Discussion:272 patients' medical records were analyzed. Patients' mean age was 64 years (18-89), 145 males. ASA 1(14), 2(171), 3(82) and 4(5).162 were laparoscopic procedures (59.56%) and 30(11.03%) converted to open surgery. General anesthesia was performed in 119 patients and combined anesthesia (transversus abdominal plane block/epidural) in 81 patients. Items that didn't comply ERAS care: fasting>8h in all patients, bowel preparation (69.85%), use of benzodiazepines (45.46%) and abdominal drains (42.28%). Mean LOHS observed was 12.96 days and published data show a 5-day of LOHS with CS ERAS care. A positive relation was observed between the first feeding and ambulation day, the beginning of gastrointestinal transit and LOHS (p<0.001). Patient Control Analgesia with morphine was used in 45 patients with no significant increase in mean LOSH. There were 28 re-interventions, 54 infectious complications and 40 other major medical complications. 1 death was observed at 108 days of LOSH (ASA 3 patient and CR POSSUM estimated a mortality of 14.8%). The CDc grade was positively related to CR POSSUM physiological score (r=0.246, p<0.001).

There was a statistically significant difference between the means in physiologic and mortality CR POSSUM scores and a CDc>III (p<0.001).

**Conclusion**: The path to ERAS protocol implementation in our institution is a gradual but a critical process to improve patients' outcome in CS.

## 01AP06-9

# Effects of inhalational anaesthesia and TIVA on intraocular pressure and recovery during gynecological laparoscopic surgery

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Background and Goal of Study: During pelvic laparoscopy, pneumoperitoneum and trendelenburg position may increase intraocular pressure (IOP) leading to decrease in perfusion of retina and at times the significant risk of ischemic retinopathy. The aim of our study is to compare the effects of desflurane and propofol for general anaesthesia on IOP and recovery in gynecological laparoscopic surgery.

Materials and Methods: After taking permission from the Institutional Review Board 60 female patients were divided in two groups (Group P: Propofol, n=30) (Group D: Desflurane, n=30). Anaesthesia induction was performed with 0.5 mg/kg lidocaine, 2-3 mg/kg propofol, remifentanil 0.1-0.2 mcg/kg/h, 0.6 mg/kg rocuronium. Anaesthesia was maintained with desflurane + 50 %O2 + air, and 0.1-0.2 mcg/kg/h remifentanil iv infusion in Group D or with propofol 4-12 mg/kg/h iv infusion + 50% O2 + air, and 0.1-0.2 mcg/kg/h remifentanil iv infusion in Group P. IOP was measured using Tono-Pen AVIA® applanation tonometer following topical anaesthesia, preoperatively (horizontal), 1 min after intubation, 1 min after pneumoperitoneum, 5 min after Trendelenburg position, 3 min after exsufflation and 20 min after extubation in the recovery room, along with measurement of ocular perfusion pressure (OPP). Hemodynamic parameters were recorded. Modified Aldrete Recovery Score (MARS) and Ramsey Sedation Scale (RSS) and time to reach MARS ≥9 were recorded.

**Results and Discussion**: There was no significant difference in patient characteristics in two groups (p>0.05). The IOP was significantly lower at 1. min after pneumoperitoenum in Group P (p=0.022); however, there were no significant difference at all other times between groups (p>0.05). End of the operation, MARS was significantly higher in Group P (p<0.001). MARS in the recovery room was significantly higher in Group P (p<0.001). Time to reach MARS  $\geq 9$  was significantly shorter in Group P (p<0.001). End of the operation, RSS was significantly lower in Group P (p<0.001).

Conclusion: Propófol TIVA has an IOP taming effect and protects ocular perfusion during laparoscopy. Also, propofol is a superior agent regarding its effect on recovery in this surgery. Since our study was conducted on young population and in short-time surgery, further studies in different populations (older or patients with glaucoma etc.) are useful to understand the ocular effects of propofol and desflurane.

#### 01AP06-10

# Does intraoperative hyperoxia increase cardiovascular complications after colorectal surgery?

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Background and Goal of Study: In 2016 the World Health Organization strongly recommended intraoperative high inspired oxygen fraction (>80%) to reduce the incidence of surgical site infection (SSI).

However some authors warned about the potential increase of cardiovascular complications when applying this therapy.

The goal of the study was to audit if 80% FiO2 administered increased cardiovascular complications when compared to standard therapy (<50% FiO2).

Materials and Methods: We reviewed the patients scheduled for elective oncologic

colorectal surgery in 2015.

We divided them according to the intraoperative FiO2 received into two groups:

We divided them according to the intraoperative FiO2 received into two groups: -HG: Hyperoxia Group(FiO2>80%)

-CG: Control Group(FiO2<50%)

We recorded demographic data (gender, age and ASA status and anaemia), previous cardiovascular disease (ischaemic heart disease, congestive heart failure and arrhythmia) and coronary risk factors (hypertension, obesity, diabetes, dyslipidemia and smoking). We also recorded intraoperative data (type and duration of surgery).

We reviewed medical charts to determine the incidence of acute coronary syndrome (myocardial infarction or angina pectoris) and other cardiovascular complications (arrhythmia, congestive heart failure or stroke) in the immediate postoperative period (up to 30 days) and in the delayed postoperative period (up to 2 years). Statistical analysis: Fisher test to compare demographic data and also the incidence

of the complications between the 2 groups. P value <0.05% was considered as significant.

**Results and Discussion**: We included 100 patients divided between hyperoxia (n=53) and control group (n=47).

No differences were found between groups according to demographic or intraoperative data, preoperative cardiovascular disease or coronary risk factors. In the 30-days postoperative period, the incidence of acute coronary syndrome was 0% in HG and 4.2% (n=2) in CG. Incidence of other cardiovascular complications was 2% in HG and 8.5% in CG. No significant differences were observed.

In the 2-year postoperative period, the incidence of acute coronary syndrome was 3.7% in HG and 2% in CG. The incidence of other cardiovascular complications was 17% vs 13% respectively. No significant differences were observed between two groups.

**Conclusion**: Immediate or delayed cardiovascular complications doesn't seems to increase when applying hyperoxia to patients scheduled to elective colorectal surgery.

# 01AP06-11

# Results after the implementation of a preoperative anaemia correction protocol in elective colorectal surgery with an "eras" protocol: a prospective cohort study

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Background and Goal of Study: Preoperative anaemia is associated with an increase in perioperative mortality. Enhanced recovery after surgery (ERAS) protocols recommend the detection of anaemia to reach a preoperative hemoglobin within the margins of normality defined by the World Health Organization (WHO) (men≥13 g/dl: women≥12 g/dl).

Materials and Methods: A total of 256 patients were included. We compared the first 121 consecutive patients that participated in the ERAS (from May 2016 to January 2017) with 135 consecutive patients that were operated prior to implementation of the program (from January to December 2015). The inclusion criteria were: elective colorectal surgery, >18 years, appropriate cognitive state and ASA (American Society of Anaesthesiology) I-II-III. The exclusion criteria were: urgent surgery and existence of higher concomitant surgical processes. The main variables of the study were preoperative hemoglobin, number of patients transfused and number of red blood cell transfusions during the hospital stay. The statistical analysis was performed with the SPSS software. The Chi-square, Fisher's test or t-Student statistical tests were applied as appropriate. The results were considered statistically significant when p <0.05.

Results and Discussion: There were no statistically significant differences between groups in terms of age, sex, ASA, diagnosis or preoperative hemoglobin. Statistically significant differences were found in the surgical approach, with more patients underwent laparoscopy in the ERAS group: 27 (20%) vs 45 (37.2%), p 0.006. A total of 31 patients (22.96%) were transfused in the pre-ERAS group versus 15 (12.4%) in the ERAS group, with a statistically significant difference (p 0.028). There was a lower number of red blood cells transfusions in the ERAS group because of the application of the preoperative anaemia correction protocol (3 ± 1.57 vs 1.8 ± 0.56, p <0.001). No significant differences were found between patients who received oral iron or not, but the difference reach statistical significance in those

who received intravenous iron administration (3 (2.23%) vs 31 (25.6%), p <0.001). 
Conclusion: The application of a pre-operative anaemia optimization protocol in patients undergoing elective colorectal surgery according to ERAS guide allowed a reduction in the number of red blood cell transfusions and in the total number of patients transfused.

# 01AP07-1

# Arrest under Anesthesia - What was the culprit?

#### Yeoh C:

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**Background:** Intraoperative Cardiac Arrest is uncommon but potentially catastrophic. Risk factors include emergency surgery, significant cardiac history, increased operative duration and transfusion requirement.

Case: A 70y/o male with no significant cardiac history and metastatic colon cancer s/p chemo and resection in 2010, presented for a hemicolectomy/debulking for tumor recurrence. Induction was uneventful. Prior to incision, dexmedetomidine infusion was started (0.4mcg/kg/h) and bupivicaine (0.05%)/hydromorphone (8mcg/ml) epidural was initiated after a 20mg bupivicaine bolus dose. Shortly thereafter, patient developed bradycardia that progressed into asystolic arrest. CPR was initiated with ROC after 3 minutes.

Discussion: Postop cardiology evaluation revealed recent bradycardia and syncopal events. The patient had prior anesthetics without event. However, dexmedetomidine and bupivicaine had not previously been administered. While most theories regarding bradycardia and asystole during regional anesthesia involve direct effects of bupivicaine on the heart, inhibition of sympathetic efferents may lead to decreased venous return to the heart which activates reflexes that can cause bradycardia. At least three such reflexes have been proposed and the effector arm of each of these resulst in increased vagal tone. A high level of sympathetic blockade may alter the balance of autonomic input, favoring vagal tone and bradycardia.¹ Studies have shown that both sinus and atrioventricular nodal

functions can be depressed by dexmedetomidine, and case reports have described dexmedetomidine-induced bradycardia culminating in cardiac arrest.<sup>2</sup>

Conclusion/Learning Points: A focused yet detailed anesthesia preoperative evaluation can uncover information that could influence a patient's perioperative management.<sup>3</sup> The patient probably had underlying sinus node dysfunction. Combined with intraoperative dexmedetomidine and bupivicaine, these factors likely interacted synergistically to precipitate bradycardia and asystole.

1. Liguori G Asystole and Severe Bradycardia during Epidural Anesthesia in Orthopedic Patients. Anesthesiology 1997; 86: 250-7

2. Bharati S Incidence of cardiac arrest increases with the indiscriminate use of dexmedetomidine: A case series and review of published case reports. Acta Anaesthesiologica Taiwanica 2011; 49: 165-7

3. Jin F Minimizing perioperative adverse events in the elderly†. BJA: British Journal of Anaesthesia 2001; 87: 608-24

# 01AP07-2

# Takotsubo cardiomyopathy presenting during a surgery under local anesthesia: a case report

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Background: Takotsubo cardiomyopathy (TCM), characterized by transient left ventricular (LV) dysfunction without angiographic evidence of coronary artery lesion, mainly affects postmenopausal women and is often triggered by stressful situations1. Here we present a case of TCM, whose initial manifestations were tachycardia and pulmonary edema during a surgery under local anesthesia (LA). Case Report: A 68-year-old female without past medical history underwent paranasal sinus surgery under LA. Premedications (diphenhydramine 30 mg IM, atropine 0.3 mg IM and midazolam 2.5 mg IV push) were given 0.5 h before surgery. Gauze packing and local infiltration of nasal cavity were done with lidocaine epinephrine. However, sinus tachycardia with intermittent short-run VT and desaturation occurred toward the end of operation. Anesthesiologists were called for help. Supplemental O2 via facemask was given. The breath sound (BS) was diffuse rhonchi and wheezes, and several puffs of inhaled fenoterol (100 µg/puff) were given. Rapid sequence intubation was done in view of persistent desaturation (SpO<sub>2</sub> 71-80%) and hypotension. Much pink foaming sputum and diffuse crackles in BS were noted, while arterial blood gas showed poor oxygenation and mild CO. ention. IV infusion of dopamine (11 ug/kg/min) was started for hypotension at OR. At ICU, blood level of high-sensitivity troponin I was 4563.2 ng/l, 12-lead EKG showed T-wave inversion in leads V1-6, and chest X-ray revealed bilateral pulmonary edema. Echocardiography demonstrated an ejection fraction of 50% with anteroseptal LV hypokinesia. Coronary angiogram showed a myocardial bridge of LAD without other coronary artery lesion. Thus, TCM was diagnosed. The patient was treated with isosorbide, furosemide and aspirin. She was extubated 3 days later and was discharged 6 more days later without seguelae. Echocardiography 1 month later showed no regional wall abnormality of LV.

**Discussion:** Catecholamine excess has been postulated as a pathogenic mechanism for TCM. Exposure to epinephrine, pain on LA injections and emotional

stress in this patient may have induced vasoconstriction or vasospasm, and subsequent myocardial stunning that caused TCM<sup>2</sup>

#### References

- 1. Gianni M, et al. EHJ. 2006;27:1523-9
- 2. Wittstein IS, et al. NEJM. 2005;352:539-48

**Learning points**: Since stress is a possible trigger of TCM, emotional stress and pain should be avoided by adequate sedation, reassurance and analgesia in the perioperative setting.

## 01AP07-3

# Peri-operative management of ACTH secreting pancreatic tumour with thrombocytopenia and major vascular reconstruction

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**Background**: ACTH secreting pancreatic neuroendocrine tumors are extremely rare and present a significant management challenge.

Case Report: 49-year-old male presented for a pancreatoduodenectomy for a ACTH secreting neuro endocrine tumor involving the head/neck of the pancreas. Pre-operatively, the endocrinology team was involved in the work-up and started the patient on insulin.24-hour urine was negative for 5- HIAA. The patient did not suppress with 1mg dexamethasone. The MEN-1 screen was negative. Echocardiogram was normal. Thrombocytopenia was thought to be due to splenic congestion as per hematology. As part of the pre-operative planning, a vascular surgeon was assigned to the case. The 10-hour surgery involved reconstruction of several branches of the coeliac trunk, superior mesenteric artery, splenic vein and IVC. The estimated blood loss was 8 liters. Intraoperative metabolic disturbances included hypokalemia and hyperglycemia. Due to massive transfusion and the duration of the surgery the patient was taken to intensive care ventilated. He developed adrenal insufficiency and was discharged home on a tapering dose of hydrocortisone.

**Discussion:** Patients presenting for surgical management of neuroendocrine tumors, must have the tumor type and hormone production assessed in order to provide appropriate treatment and management<sup>1</sup>. Somatostatin analogs are used to control the excessive hormonal output, symptoms of carcinoid syndrome and to prevent a carcinoid crisis during interventions. Octreotide use has shown a significant reduction in the pancreatic fistula rate. Carcinoid heart disease is observed in 3–4% of all patients with a neuroendocrine tumor and in 40–50% of those with a carcinoid syndrome<sup>1</sup>. It is a late manifestation and significantly impacts management and prognosis. There should be a low threshold for echocardiography. Radiological investigations are important for evaluation of tumor extent and relation to adjacent anatomical structures, regional and distant metastases and vascular involvement.

## References:

I.Kaltsas G et al.ENETS Consensus Guidelines for the Standards of Care in Neuroendocrine Tumors: Pre- and Perioperative Therapy in Patients with Neuroendocrine Tumors. Neuroendocrinology 2017;105:245-254

**Learning points**: Our case highlights the role of the anesthesiologist within a multidiscplinary team in maintaining homeostasis in a patient with a complex, rare secretory neuroendocrine tumor requiring significant vascular reconstruction.

# 01AP07-4

# Anesthetic management of a patient with congenital insensitivity to pain and anhidrosis using remifentanil

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**Background:** Congenital insensitivity to pain and anhidrosis (CIPA) is a rare autosomal disease characterized by episodes of unexplained fever, systemic analgesia, anhidrosis, and mental distress. Only a few reports of the anesthetic management of patients with CIPA have been published.1

Case Report: A 37-year-old man (153 cm, 69 kg) with CIPA underwent posterior spinal fusion for thoracic spondylotic myelopathy. Anesthetic induction involved intravenous propofol (3 mcg/ml), fentanyl (100 mcg), and rocuronium (70 mg), and anesthetic maintenance was achieved by propofol at a bispectral index of 40 to 60. After intubation and at the time of skin incision, the patient's blood pressure and heart rate increased. We administered 50 mcg of fentanyl and maintained anesthesia with propofol (2.0–2.5 mcg/ml) and remifentanil (0.02 mcg/kg/min). The blood pressure and heart rate then remained stable during surgery. We also continuously monitored the rectal temperature and maintained it at 36°C to 37°C using an air conditioner and warming device. After extubation, the patient reported no sore throat, wound pain, or shivering, and his postoperative course was uneventful

**Discussion:** The most important points of management of patients with CIPA are selection of the most appropriate analgesic drug and maintenance of body temperature. We used fentanyl and remifentanil as the analgesic drugs in the

present case. To our knowledge, no reports have described the anesthetic management of patients with CIPA using remifentanil. Because of their insensitivity to pain, anesthesia can be maintained without analgesia in patients with CIPA. However, despite the lack of pain sensation, patients with CIPA still have pressure sensation, and some require fentanyl for airway manipulation.2 In our patient, the blood pressure and heart rate increased at the time of skin incision, and fentanyl was therefore administered. We were otherwise able to maintain anesthesia with a low dose of remifentanil to prevent reaction to surgical stimuli without hyperalgesia3 or shivering.

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- 1. Pediatric international 57: 30-36, 2015.
- 2. Anesth Analg 121: 1316-1320, 2015.
- 3. Anaesthesia 71: 1347-62

**Learning points:** We herein report the safe anesthetic management of a patient with congenital insensitivity to pain and anhidrosis (CIPA) using remifentanil without hyperalgesia or shivering. Remifentanil, a short-acting opioid, might be useful for the management of patients with CIPA.

# 01AP07-5

References:

# Sevoflurane Improved Seizure Quality in a Treat-resistant Depression Patient Undergoing Electroconvulsive Therapy

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**Background:** Intravenous anaesthetics are commonly used in electroconvulsive therapy (ECT). We report a case suggesting that sevoflurane is more suitable than intravenous anaesthetics for inducing adequate seizures in ECT.

Case Report: A 78-year-old woman suffering from refractory eating disorder due to severe depression had received pulse-wave ECT for 5 years. Although

the initial symptoms of depression improved after three courses of acute ECT, maintenance ECT was introduced 2–4 times a month and acute ECT several times a year to maintain the remission. As a result, elevation of convulsion threshold and tolerance to thiopental developed. To achieve effective convulsion, sinewave ECT (a higher energy-output device) was started from the 108th treatment session, and the anaesthetic was changed to propofol from the 125th treatment session. However, propofol could still not provide a stable anaesthesia for achieving effective convulsion. Thus, sevoflurane was used instead of intravenous anaesthetics at the 136th treatment session. As a result, in addition to facilitating rapid anaesthesia induction and emergence, effective convulsive seizures were observed even under lower energy output by the pulse-wave ECT. Comparisons of the quality of convulsions between 10 treatments each, just before and after changing anaesthetics, indicated that the more effective convulsive seizures were obtained after changing the anaesthetic to sevoflurane. High-amplitude seizure waves were significantly increased under sevoflurane (Relative Risk, 3.33; 95% Confidence Interval, 1.29-8.59; p = 0.003, Fisher's exact test). Similar changes were also observed in the median score of post-ictal suppression (p = 0.03, Mann-Whitney test). Thereafter, adequate anaesthesia for ECT was constantly achieved with sevoflurane

**Discussion:** Although inhalation anaesthetics have been reported not to have any advantage over intravenous anaesthetics<sup>1</sup>, it is easier to adjust the depth of anaesthesia using sevoflurane, which also induces less inter-individual variations than intravenous anaesthetics. This case suggested that sevoflurane could be more suitable for ECT anaesthesia in cases where stable sedation and effective convulsive seizures could not be achieved with ordinary intravenous anaesthetics. **References:** 

1. Ding Z, et al. Anesth Analg 2002

**Learning points:** Sevoflurane may change the anaesthesia method for ECT dramatically especially in treat-resistant depression cases.

# 01AP07-6

# Poland Syndrome and anesthesia

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**Background**: Poland syndrome describes the entire sagittal chest and upper extremity deformities that accompany the congenital absence of the pectoralis major and minor muscles. However, the only fixed finding of the syndrome is the absence of the sternocostal component of the pectoralis major muscle. This fixed finding may be accompanied by additional findings such as absence of pectoralis minor muscle, development of breast tissue, axillary alopecia, absence of ribs 2 to 5, latissimus dorsi, serratus anterior and external oblique muscles. The incidence is about 30,000 live births, which is more common in men.

**Case Report:** A 21-year-old male patient with the diagnosis of 'Poland syndrome' without any complaints, disease and anomaly and dysfunction in other organs, but left hemithorax was seen hypoplastic of the pectoral muscle group, was taken to

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the operation room to replace (implant) the left pectoralis muscle. Following routine monitoring, the patient underwent anesthesia induction with 2mg midazolam, 100mcq fentanyl, 150mg propofol and 40mg rocuronium. The patient underwen anesthesia treatment with TIVA for infusion of remifentanil (0.5 mcg/kg/min) and propofol (6 mg/kg/h) against the risk of malignant hyperthermia. Preoperative, peroperative and postoperative hemodynamics of the patient were stable. The patient was awakened with 1 mg/ g sugammadex. There were no peroperative or postoperative complications.



Conclusion: Anesthesia of patients with Poland syndrome; is important because anesthesia requires special care and effort to prevent malignant hyperthermia, which is a feared major complication. Succinvlcholine and volatile anesthetics should be avoided during anesthesia of the patients, care should be taken in terms of uneven chest motion and negative results during spontaneous or controlled ventilation. In our case, we wanted to draw attention to anesthesia management of a high-risk patient for malignant hyperthermia.

# 01AP07-7 Oculocardiac reflex during face mask ventilation

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Background: The oculocardiac reflex (OCR) is very frequent during ophthalmic surgery (30-90%). It is provoked by pressure applied to the eye globe or traction of surrounding structures resulting in an increased parasympathetic tone. OCR during face mask ventilation is a rare event and can be the cause of difficulty in the airway

Case report: A 71 year old male with history of hypertension and diabetes, admitted for a laryngeal microsurgery. At airway examination, there were no signs of difficult ventilation/intubation, only a prominent nose, with its base starting at the level of the eves. Before induction, HR was 70 beats/min, BP of 190/80mmHg, StO2 of 97% Induction was made with fentanyl 1.5mcg/kg, a propofol TCI and recuronium 0,6mg/kg. A facial mask no5 was used to ventilate the patient; at first it was difficult to adapted because of the size of the nose; when optimal adaptation was achieved HR started to fall (40 beats/min and BP of 107/63mmHg). This bradycardia was responsive to minimizing pressure applied on the face mask. Atropine 0,5 mg was administrated and the patient effectively ventilated and intubated. The surgery was uneventful and the patient was admitted to post-anesthetic unit where he recovered Discussion: OCR is characterized by sudden onset of bradycardia and a drop of mean arterial pressure; this vagal mediated reflex is provoked by mechanical stimulation of the eye globe and surrounding structures enervated by the ophthalmic branch of trigeminal nerve(1). Factors associated with an increased risk of ORC are: hypoxia, hypercapnia, age, male, light anesthesia. This reflex is very common in ophthalmic surgery, specially strabismus and retinal surgery. OCR during mask ventilation has never been described before and it happened because of facial features our patient that not allowed an optimal mask adaptation without applying pressure on ocular globe. The reflex responds to withdraw of stimuli but without this pressure we could not ventilate the patient, so administration of an atropine was

Learning points: OCR is a rare complication during mask ventilation that presents some concerns related with hemodynamic stability and a difficulty in airway management. Administration of atropine may be the best option instead of compromising efficacy of ventilation

References: 1- Meuwly C. et al. Definition and Diagnosis of Trigeminocardiac reflex: A Grounded Theory Approach for an Update. FrontNeurol. 2017, 8:533

# 01AP07-8

# Anestehetic Management of a Patient with Kabuki Make-up and Wolf Parkinson White Syndrome

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Background: Kabuki Make-up syndrome (KMS)is related with multiple anomalies such as facial features(long palpebral fissures, ptosis, arched eyebrows and prominent eyelashes and ears), cardiac defects (40-50% of patients; atrial/ ventricular septal defects, mitral/aortic valve disease), pulmonary dysfunctions, neurologic disorders (West syndromes), and skeletomuscular disease and possible airway anomalies. Approximately 1/3 of patients have a cleft lip/palate, while 2/3 have a high arched plate.

Case Report: A 8.5 years old female and 22 kg patient with KMS and cleft palate, was scheduled for Furlow palatoplasty. She had the typical facial features (Figure 1). The 2D Echo showed mitral stenosis, patent foramen ovale, left persistent vena cava and left atrial dilatation. EKG was compatible with Wolf Parkinson White (WPW) syndrome. She was premedicated with 0.5mg/kg midazolam. Anesthesia was induced with 2mg/kg Propofol, 1µgr/kg fentanyl and 0.5mg/kg rocuronium. After an easy tracheal intubation, for maintenance we used sevoflurane 2%. Vital signs remained stable and no complication was occurred during surgery. The patient was extubated after applying 2mg/kg squammadex. Tramadol 1mg/kg and 20mg/kg paracetamol were given for postoperative analgesia.

Discussion: The goal during perioperative management of anesthesia was to avoid any factors (such as pain, anxiety, fear, stress response of intubation/extubation, lighter plane of anesthesia, hypovolemia) that increase sympathetic activity. We also avoided from bradicardia because of mitral stenosis. We preferred fentanyl rather than remifentanil while it provides adequate hemodynamic stability. Because WPW patients have a risk of PSVP or atrial fibrillation during perioperative period, anesthetic agents that precipitate tachycardia should be avoided. Sevoflurane has no effect on AV node. Rocuronium is cardiac stable and, sugammadex is also nemodynamic stable than neostigmin-atropin.

#### References:

1. Johnson G, Mayhew JF. Anesthesia for a child with Kabuki Syndrome. Paediatr Anaesth. 2007 Sep:17(9):900-1.

Learning points: Anesthesiologist should be aware of a possible difficult tracheal intubation, cardiac lesions, arrhythmia, respiratory problems, and neurological and musculoskeletal disorders when dealing with Kabuki Make-up syndrome.

## 01AP07-9

## Rare diseases, an anesthetic challenge. Report of one case of Phelan-McDermid Syndrome

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Background: Rare syndromes pose a challenge for the anesthetic management since they are almost unknown diseases and it is rare to find them in the operating room. Most of them present symptoms in various organs and systems.

Phelan-McDermid syndrome is a contiguous gene disorder resulting from deletion of the distal long arm of chromosome 22, which leads to the absence or mutation of the gene SHANK3. This syndrome is characterized by neonatal hypotonia, normal growth, absent or delayed speech, moderate to profound developmental delay, and minor dysmorphic features. Other common features are large fleshy hands. dysplastic toenails, lymphedema, and decreased perception of pain.

Case Report: The aim of this poster is to share our experience in a case of a 17 old woman with Phelan-McDermid diagnosis, who underwent a gastroscopy or episodes of cyclic vomiting and weight loss in the last six months. His personal history included a surgical correction of the anomalous origin of the left coronary artery of the pulmonary artery trunk.

The patient had a severe intellectual disability but collaborated well, so that a peripheral venous line could be inserted. The procedure was performed under sedation with very low doses of propofol (approximately 1 mg/kg), with very good tolerance on the part of the patient. There were no respiratory problems or other ncidents during gastroscopy, the awakening of the patient ran without any problem. The final diagnosis was erosive gastritis with helicobacter pylori infection.

Discussion: Phelan-McDermid syndrome, like other rare diseases, is a problem in routine clinical practice due to the low frequency with which we find them in the operating room.

There are not many publications on this syndrome related to anesthesia, so it is important to publicize this disease to perform a safe anesthetic practice. Both inhalatory and intravenous anesthesia are safe techniques, and it is

remarkable that these patients have a decreased perception of pain, so the doses of the administered drugs have to be adjusted.

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Learning Points: It is vital to acquire knowledge and have a bibliography about the anesthetic management of rare diseases like Phelan-McDermid Syndrome

## 01AP07-10

## A dangerous and unknown disease in the operating room: Creutzfeldt-Jakob

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Background: Creutzfeldt-Jakob disease (CJD) is a lethal dementia. It's classified as a form of transmissible spongiform encephalopathy. Infective agents appear to be misshapen prion proteins resistant to sterilization currently used (1) Highest prion concentration occurs in neurological tissue (2) but contamination can occur in procedures that do not involve it (1)

Case Report: A 77 year-old male diagnosed of CJD with severe dementia was programmed for closed reduction of ankle dislocation. It was performed under sedation anesthesia and ventilatory facial mask support. Atropine was used to reduce oral secretions. Operating room (OR) was cleared of unnecesary equipment. Personal used ocular protection mask. Contact skin surfaces were covered in disposable plastic. After procedure all used equipment was placed in a burn bin including facial mask and disposable ventilator items.

Discussion: It's a rare disease but due to their unusual resistance to standard decontamination methods and consequent risk of patient-patient transmission, management of infected patients requires additional precautions (2) OR should be cleared of unnecesary equipment and staffing reduced to the minimum. Single use disposable equipment should be used wherever practical. All surfaces that may be exposed to high-risk tissues must be covered in plastic, which can then be incinerated. No evidence of infectivity of saliva or body secretions, but antisialogogues should be considered to reduce secretions (3). Specimens should be sent with a biohazard label, double-bagged and laboratories should be advised (2). The ventilator must be stripped of disposable circuits and filters, and these must be incinerated (3) At the end all single-use items, drapes, gowns, mask should be placed in a cytotoxic burn bin, that will be sealed, tagged and sent for incineration

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Learning points: CJD is of clinical importance due to resistance of prion proteins to standard sterelisation (2) Planning appropriate anaesthetic include keep all techniques as simple as possible (3) Multidiscipplinary effort is required (3)

## 01AP07-11

# Anaesthetic management for a liver transplant in a patient with Aagenaes syndrome

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Background: Aagenaes Syndrome is characterized by cholestasis and lymphedema,autosomal recessive inherited1.It's a progressive disorder that can lead to end-stage liver disease and to hepatopulmonary syndrome (HPS). Liver transplant (LT) is described as the only effective treatment for HPS.

Case Report: We present a case of a 14 year-old boy that was scheduled for a LT due the severe HPS. He presented with severe hypoxemia (paO2 of 44 mmHg) and polycythaemia (19 g/dL). There was mild hepatic dysfunction. We performed a balanced general anaesthesia. Patient was ventilated, no PEEP was added, FiO2 around 0.45 and paO2 above 100mmHg during the procedure. The vital signs remained stable. No blood products were infused. There were no adverse events during de surgery. The patient was transferred to the ICU ventilated.

Discussion: HPS originates from the development of intrapulmonary vascular dilation and usually an intrapulmonary right-to-left shunt develops, with hypoxia, dyspnoea, and polycythaemia in patients with chronic liver disease. This makes LT a riskier procedure and a challenge to the anaesthesiologist. Despite the risk, the only definitive treatment of HPS is LT.2 Several studies have shown that HPS is cured or significantly improved in more than 85% cases within 6-12 months after LT. Hypoxic pulmonary vasoconstriction (HPV) should be maintained to avoid hypoxemia worsening. Despite the use of general balanced anaesthesia, considered to increase hypoxemia by inhibiting the HPV in higher degree when compared to intravenous agents, usually this effect do not persist after one hour.3 There was also a big concern about the polycythaemia and the augmented risk of anastomotic vessels thrombosis during reperfusion phase. In this case, there were no thrombotic complications even with Hα levels around 17 α/dL

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Learning points: The anaesthesiologist should be aware of the HPS pathophysiology to define the best management to prevent worsening of hypoxia and polycythaemia

#### 01AP07-12

## Atrioventricular block following administration of neostigmine: a case report

23

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Background: The use of neuromuscular-blocking drugs is routine in anesthetic management, especially in videolaparoscopy where adequate muscle relaxation improves the surgical field and attenuates the effects of pneumoperitoneum. Before emergence, neostigmine is often administered to revert neuromuscular blocking. However, by stimulating the muscarinic receptors, neostigmine can, among other things, compromise atrioventricular (AV) nodal conduction and cause bradvarrhythmia

Case Report: A male patient (23 years; 80 kg; 1.76 m) was diagnosed with appendicitis and referred for videolaparoscopy, with no reported comorbidities, allergy or use of medication and no cardiovascular complaints or previous ECG. Standard monitoring was initiated (cardioscopy, SpO2, arterial pressure and BIS) and 2.5 mg midazolam was administered i.v. The basal HR was 65 bpm. General anesthesia was induced with 40 µg sufentanil, 180 mg propofol and 4 mg cisatracurium. Orotracheal intubation was event-free and anesthetic depth (BIS 45-60) was maintained with sevoflurane and remifentanil TCI. Surgery lasted 45 minutes. No significant changes in capnography, arterial pressure or HR were observed. At the end of the procedure, sinus rhythm was normal and HR was 48 bpm. Atropine (0.75 mg) was administered. When HR had risen to 65 bpm, the patient received 1.5 mg neostigmine, leading to bradycardia (HR 35 bpm). Another dose of atropine (0.75 mg) was administered, with no result. On cardioscopy, AV block 2nd degree Mobitz I was detected, which progressed to total AV block, with no other hemodynamic changes. Adrenaline (10µg) was administered and sinus rhythm and conduction were normalized in approximately 5 minutes. After emergence and extubation, the patient was observed for 24 hours in the ICU. No further clinical or electrocardiographic events occurred.

Discussion: Neostigmine can cause muscarinic cholinergic syndrome even in young patients with no cardiovascular risk factors and even when preceded by anticholinergics. Vagal predominance induced by anticholinesterase agent can lead to AV block and hemodynamic instability. Anesthesiologists should be prepared to recognize and promptly manage such events. Reference:

Shields, J.A. Heart block and prolonged Q-Tc interval following muscle relaxant reversal: a case report. AANA J. 2008 Feb;76(1):41-5.

Learning points: The importance of promptly identifying and managing the adverse

#### 01AP08-1

# **Perioperative Fluid Management of Robot Assisted** Laparoscopic Surgery patients in the ERAS setting

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Background and Goal of Study: Robot assisted laparoscopic surgery is a widespread technique used more frequently in colorectal surgery. ERAS perioperative management have demonstrated better outcome of patients. Goal Direct Fluid Therapy prevent fluid overload and the risk of Oxygen debt due to occult hypovolemia. These risks influence post operative morbidity and compromise the outcome of patients. In this study we applied ERAS protocol in robotic surgery and we tested the validity of GDFT compared to liberal approach.

Materials and Methods: We enrolled 10 adults patients scheduled to undergo to electiverobot assisted laparoscopic major colorectal surgery. Perioperative management was conducted following ERAS protocol. General characteristics of patients (age, gender, comorbidity) were registered. ASA physical status were recorded before surgery. This group of patients have been compared with 10 laparoscopic colorectal surgery patients. Both of groups were monitored with semiinvasive Pulse Contour analysis device (Flow Track VigileoO). In the first group, intraoperative fluid therapy was guided by hemodynamic assessment of fluid responsiveness based on SV optimization. In the second group intraoperative fluid therapy have been conducted with a liberal classic approach. Hemodynamic data were recorded every 15 minutes in both group. Crystalloid Fluids were preferred and total amount and type of fluid was registered. Finally, complications were registered in the first three days after the surgery.

Results and Discussion: Our results showed no differences in general characteristics, ASA (I-III) physical status and time of surgery (h) (3,2±1,1 vs 3,6±0,5; p<0,05). Hemodynamics parameters (MAP, HR, CI, SVI) were maintained stable during all time of surgery. Using GDFT, in patients underwent robotic surgery, evidencesignificant differences in total amount of intraoperative fluids (1258±350 vs 3375±1362; p<0,05). Furthermore, we observed less incidence of post operative morbidity (edema, vomiting and nausea) in robotic patients with GDFT approach. Conclusion: We performed ERAS protocol in two different surgery settings'. We

observed the same hemodynamic stability. Also in robotic colorectal surgery Goal Direct Fluid therapy give evidence of efficacy in optimization of hemodynamic but, most importantly, giving less quantity of intraoperativefluids.

#### 01AP08-2

Hemodynamic optimization with trans-pulmonary thermodilution and pulse contour analysis during hyperthermic intraperitoneal chemotherapy. A prospective observational study

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Background and Goal of Study: Cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (CRS-HIPEC) associated with intense hemodynamic and metabolic changes related with the thermal stress induced by intraperitoneal instillation of heated chemotherapy. Data on the cardiovascular conditions, intravascular volume status and optimal fluid resuscitation during HIPEC are limited. We conducted a prospective observational trial to assess the detailed amounts of volume given and cardiovascular function during the CRS-HIPEC.

Materials and Methods: After IRB approval, consecutive patients underwent CRS-HIPEC were enrolled. The intraoperative volume therapy and hemodynamic management was guided by invasive transpulmonary thermodilution technique (Volume-View) and was based on cardiac index (CI), stroke volume (SV), mean arterial blood pressure (MAP) and stroke volume variation (VVS). During the debulking phase and after the chemotherapy administration, a restrictive regime was tried; during HIPEC a liberal cool fluid therapy was used to maintain a high urinary output and to control hyperthermia. Statistical analysis: t-student paired test; ANOVA with repeated measures.

Results and Discussion: Thirty-eight ASA I-III patients (57±11 years) were studied. The mean peritoneal carcinomatosis index (PCI) was 15±10, the duration of the procedure was 11±2h and the HIPEC time was 30,60 and 90 min in 18%, 74% and 8% respectively. A combined epidural and general anaesthesia was used in 95% of patients. Large amounts of fluids were administered throughout the procedure (median 5,450ml; range 4100-5950ml); there was a significant difference in fluids administered during HIPEC: 1,500ml/h (1,025-1,683) vs. 376ml/h (333-427); sum of the pre and post HIPEC period; p=0,0001. A hyperdynamic status was observed during HIPEC: a 49% increment in CI (p=0.0001); a 38% decrease in SVRI (p=0.0001) and a 15% decrease in MAP (p=0.014) with respect to baseline. Diuresis during HIPEC was 8ml/kg/h (7.2-14). There were no differences in SVRI vand in VVS. Maximum Ta was 38.8±0.86°C. Transfusion and norepinephrine was required in patients with higher PCI: 23 vs. 13 (p=0.037) and 22 vs. 12,7 (p=0.02)

**Conclusion**: CRS-HIPEC is associated with an intense hemodynamic alteration and an aggressive fluid requirement. The implementation of invasive monitoring permits real time status information that is of utmost importance to maintain fluid homeostasis during this complex surgery.

## 01AP08-3

The usefulness of stroke volume variation to predict the fluid responsiveness in patients undergoing laparoscopic cholecystectomy

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Background and Goal of Study: During laparoscopic cholecystectomy, CO2 pneumoperitoneum and surgical position (reverse-Trendelenburg and right-side-up position) can change intrathoracic pressure and systemic venous return. Consequently, dynamic fluid responsiveness index such as stroke volume variation (SVV) may be affected in laparoscopic cholecystectomy. In the present study, we investigated and the optimal threshold of SVV to predict fluid responsiveness in patients undergoing laparoscopic cholecystectomy.

Materials and Methods: After induction of anesthesia, arterial cannulation was performed to monitor direct arterial pressure and connected to EV1000 via FloTrac system for monitoring stroke volume index, cardiac index, stroke volume variation. Hemodynamic parameters were measured at 4-time points (T1: after induction of anesthesia, T2: before fluid loading, T3: after fluid loading, T4: at the time of skin closure). Fluid loading was performed at 1 minute after application of CO2 pneumoperitoneum and surgical position. For a fluid challenge, crystalloid (plasmalyte solution) 250 ml was infused for 10 minutes. Patients were regarded as fluid responders according to whether they showed an increase of stroke volume index >15% after fluid challenge.

Results and Discussion: In a total of 42 patients, 28 patients were fluid responders (67%). The mean of SVV was higher in fluid responder group (16 vs 9, P=0.0001). In receiver operating characteristic curve analysis, SVV showed an area under the curve of 0.871 (P<0.0001). The optimal cut-off value of SVV predicting a stroke volume index increase of >15% after the fluid challenge was 12.

**Conclusion**: SVV can predict an increase in stroke volume index >15% after fluid challenge in laparoscopic cholecystectomy and its cut-off value was 12. It may provide a helpful information for fluid management in laparoscopic cholecystectomy.

#### 01AP08-5

Intraoperative fluid balance during cytoreductive surgery for late-stage ovarian cancer

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Background and Goal of Study: Extensive tumor debulking challenges both surgeon and anaesthesiologist but promotes survival in late-stage ovarian cancer patients. Little is known about the intraoperative fluid balance and its impact on morbidity and mortality

Materials and Methods: In a retrospective analysis, late stage ovarian cancer patients undergoing cytoreductive surgery at our hospital between 2012 and 2015 were analysed. Patients received crystalloid fluids according to clinical needs (e.g. to maintain a mean arterial blood pressure of 60 mmHg) and red blood cells as well as fresh frozen plasma to substitute blood loss. Few patients were extubated in the theatre and transferred to an intermediate care ward, whereas the majority of patients were extubated on intensive care unit. Fluid intake, fluid balance, tumor histology were taken from the patient's record. Statistical significance was assumed at a p < 0.05.

**Results and Discussion**: 76 patients at an age of  $62 \pm 13$  (mean  $\pm$  sd) years were identified. Cytoreductive surgery and anaesthesia lasted for  $6:39 \pm 1:40$  and  $8:44 \pm 1:48$  hours, respectively. It was associated with both a huge fluid intake (11.1  $\pm$  4.1 l) and fluid balance ( $8.9 \pm 3.5$  l). Following surgery, 25 patients developed pleural effusion and 7 patients showed an anastomotic leak. Fluid balance correlated significantly (p < 0.05) with the duration of anaesthesia (Pearson r = 0.66), surgery (r = 0.51), ventilation (r = 0.52) and hospital stay (r = 0.33), tumor extent (T-grading, r = 0.33) and FIGO-grading (r = 0.31). Patients that developed anastomotic leak exhibited a significantly (p = 0.003) higher fluid balance (12.7  $\pm$  2.7 I versus  $8.7 \pm$  3.4 l) than those who did not. Comparing patients subdivided into two groups with more and less than 8.9 litres (= population mean) of fluid balance, we observed no difference in survival.

Conclusion: In late stage ovarian cancer patients, surgery aiming at complete cytoreduction is accompanied with long surgery time and fluid intake. The high positive fluid balance is associated with prolonged ventilation, pleural effusion and anastomotic leak but seems to have no impact on survival.

# 01AP08-6

Optimization of cardiac output by incremental fluid administration is associated with iatrogenic hemodilution and a paradoxical decrease in oxygen delivery

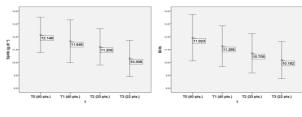
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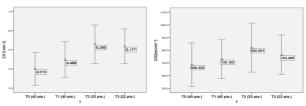
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**Background and Goal of Study**: Fluid administration causes iatrogenic hemodilution that may lead to avoidable blood transfusions [1]. We examined the effects of incremental fluid loading on the oxygen delivery(DO2) and on lab(BHb) and non-invasive(SpHb) hemoglobin levels.

Materials and Methods: After informed consent,40 adult patients undergoing major gastrointestinal or vascular surgery were included. Oxygen saturation(SpO2) and SpHb were continuously measured by a Radical-7 Pulse CO-Oximeter (Masimo Inc.). BHb and PaO2 were intermittently measured (ABL800 Radiometer). Cardiac output (CO) and stroke volume (SV) were continuously measured by the Vigileo monitor. DO2 was calculated as COx((Hbx1.38xSpO2)+(PaO2x0.0031)). Baseline values were recorded after induction of anesthesia (T0) and 5 min after the administration of a 250 ml colloid fluid challenge (FC) (T1). In patients whose SV increased ≥ 10% compared to T0, another FC was given and all parameters recorded 5 minutes after its completion (T2). The same protocol was repeated at T2 and T3. Student's paired and unpaired tests, Wilcoxon signed rank test and ANOVA were used where appropriate.

Results and Discussion: All 40 patients received one FC (T1), 33 patients received 2 FC's (T2), and 22 patients received 3 FC's (T3). Figure 1 represents the mean ± SD of SpHb, BHb, CO and DO2 during the study and the number of patients studied at each time point. There was a gradual increase in the mean SV between T0-T1, T1-T2, and T2-T3. However, the DO2 increased significantly only from T0-T1, remained unchanged between T1-T2, and decreased between T2 and T3. There was a statistically significant decrease in mean SpHb and BHp after each FC. In patients who received 3 FC the SpHb and the BHb decreased by 1.66±0.67 and 1.7±0.7 g/dL, respectively. This decrease in Hb values explains the observed decrease in the DO2





**Conclusion**: Fluid loading in goal-directed therapy may cause a paradoxical decrease in DO2 due to iatrogenic hemodilution, which is reflected by a real-time decrease in the SpHb trend, similar to the intermittent BHb trend.

#### References

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# 01AP08-7

# End-tidal carbon dioxide in predicting volume responsiveness

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Background and Goal of Study: Stroke volume or cardiac output (CO) should be measured to assess the response to the passive leg raising test (PLR)(1). However, it is not always possible to measure CO. In this study, we evaluated whether end-tidal carbon dioxide partial pressure (PetCO2) monitoring could be an alternative method instead of CO measurement in evaluating the response to PLR.

Materials and Methods: 40 healthy volunteers over 18 years of age were enrolled in the study. All subjects (anaesthesiologists, residents and nurse anaesthetist) were experienced in mechanical ventilation. After at least 12 hours of fasting, non-invasive mechanical ventilation with a 5mmHg continuous airway pressure with a face mask without causing any leakage was initiated. The subjects were asked to keep their minute volumes constant during the study; in order to achieve this, they were seated facing the mechanical ventilator and the monitor. CO measurements were done non-invasively using USCOM1A (Sydney, AUSTRALIA). CO measurements were done three times at every position (sitting, supine position with the legs 45° lifted and again sitting position) and their average values were recorded. Non-invasive blood pressures, heart rate and PetCO<sub>2</sub> measurements were recorded.

**Results and Discussion**: After lifting the legs 45°, the CO rise was less than 10% in 12 subjects (30%) and more than 10% in 28 subjects (70%). No correlation was found between in heart rate and MAP changes and the changes in CO at the leg-up position. AUC values for the HR and MAP were found to be statistically insignificant. The AUC constructed for showing the ability of these two parameters to detect an increase in CO  $\geq$ 10% and the reference curve were not significantly different from 0.5. In leg rising position, the AUC for PetCO $_2$  was 0.86±0.05 (95%, CI 0.7-0.9) and it was statistically significant (p<0.0001). The sensitivity and specificity for PetCO $_2$  in detecting 10% change in CO was 69 and 75%, respectively. Bootstrap method showed that the increase in PetCO $_2$  in between -1 and 2 was the gray zone.

Conclusion: Similar changes in CO and PetCO₂ values during PLR in spontaneously breathing healthy volunteers were observed. It is found that a 2mmHg increase in PetCO₂ could be associated with an increase of ≥10% in CO. We believe that PetCO₂ can be used as an alternative to CO measurement if conditions of respiration and carbon dioxide production are fixed.

References:

# 1.Intensive Care Med 2008;34:659-63

### 01AP08-8

Respiratory variation in central venous pressure as a surrogate for stroke volume variation for predicting fluid responsiveness during noncardiac surgery

25

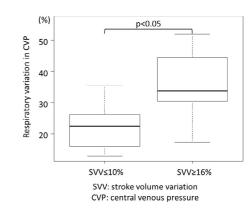
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Background and Goal of Study: Stroke volume variation (SVV) is of diagnostic value for fluid responsiveness in patients monitored with the FloTrac/Vigileo system, whereas central venous pressure (CVP) is considered not very useful for predicting fluid responsiveness; however, few studies investigated the relationship between intraoperative respiratory variation in CVP and fluid responsiveness. We hypothesized that respiratory variation in CVP could be a surrogate for SVV in mechanically ventilated patients under general anesthesia and analyzed the correlation between respiratory variation in CVP and SVV.

Materials and Methods: The study sample included 5 patients with normal heart function and normal sinus rhythm undergoing abdominal aorta replacement between June and November 2017, in whom hemodynamic changes including those before and after aortic clamping/declamping were captured on the vital signs monitor and invasive hemodynamic monitoring data including CVP and SVV were recorded every minute. Respiratory variation in the CVP waveform over a single respiratory cycle was calculated as follows: [(maximum CVP)-minimum CVP)/maximum CVP]×100 (%). Respiratory variation in CVP was compared by dividing SVV values into two groups: SVV ≥16% (high SVV group) and SVV ≤10% (low SVV group). Statistical analysis was performed using Spearman's correlation and the Mann-Whitney *U* test. Differences were considered statistically significant when p<0.05.

Results: Hemodynamic changes were captured 64 times in total. Respiratory variation in CVP was significantly correlated with SVV (r=0.567, p<0.001) and was significantly greater in the high SVV group than in the low SVV group (p<0.001, Figure). Invasive hemodynamic monitoring data were recorded 1203 times in total. The median CVP was 9 mmHg (interquartile range [IQR] 7-11) and the median SVV was 10% (IQR 8-15). The absolute value of CVP was only slightly correlated with SVV (r=-0.283).

**Conclusion:** Respiratory variation in CVP can be a surrogate for SVV for predicting fluid responsiveness in mechanically ventilated patients under general anesthesia during noncardiac surgery, but the absolute value of CVP was not.



#### 01AP08-9

# Goal Directed Fluid Therapy and the NPO Period: Does the Case Start Time Influence Fluid Management?

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Background and Goal of Study: The level of dehydration that develops during the nothing per os (NPO) period and its impact on intraoperative fluid management remain uncertain. Goal directed fluid therapy (GDFT) with SVV is a simple, hemodynamic variable for evaluating fluid responsiveness that was associated with improved outcomes in patients undergoing high-risk surgery. The aim of this study was to investigate if there is a statistically significant difference between the total volume of fluid administered to patients who underwent surgery in the morning (08.00 AM, first cases) versus the afternoon (12.00-15.00 PM) when using GDFT Materials and Methods: We retrospectively analyzed data from 100 patients in whom GDFT was applied intraoperatively with the FloTrac/Vigileo system and divided them into two groups: AM first case start (0800am start time) versus PM case time start (1200-1500). Patients with history of CHF or ESRD, and those who received bowel preparation were excluded. Variables recorded and compared between the two groups included: age, gender, American Society of Anesthesiologists class, comorbidities, body mass index, type of surgery, NPO time, blood loss, urine output, length of stay, readmission rate, fluid volumes and

types, intraoperative hemodynamics, use of epidural analgesia. Primary outcome was influence of case-start time on crystalloid and colloid volumes. Secondary outcomes were total length of hospital stay (LOS) and 30-day readmission rates. Variables were compared using a Generalized Linear Model.

Results and Discussion: Variables found to predict total volume of fluids were ASA class (p=0.001), urine output (p<0.001), blood loss (p<0.001), and duration of surgery (p<0.001). Age, time of day for case start, NPO time, gender, use of epidural, weight, and height were not statistically significant predictors of total fluid volume. When including all of the model factors, there was no association between time of day and readmission rate (p=0.96), or time of day and length of hospital stay (p=0.25).

Conclusion: In our study population there was no association between NPO time and fluid volume needed in patients managed with GDFT. Thus, the use of a formula based on the patient's weight per unit time (ml/kg/hr) for fluid rescuscitation may not be justified.

### 01AP08-10

Influence of pneumoperitoneum and trendelenburg position on fluid responsiveness predicted by pulse pressure variation and stroke volume variation during anaesthesia for laparoscopic gynaecological surgery

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Background and Goal of Study: In our study, we aimed to evaluate how dynamic parameters such as SVV and PPV are affected during the Trendelenburg position and pneumoperitoneum in patients who will undergo an elective gynaecological laparoscopic surgery and their reliability in assessing response to fluid delivery. Materials and Methods: After obtaining approval of the IRB and written informed consent, 45 patients with ASA I-II, age between 18-65 years, undergoing elective laparoscopic gynaecological surgery were included. Before and after pneumoperitoneum combined with the Trendelenburg position (30°) degrees, 5 mL/kg bolus Ringer's lactate was administered and SVV, PPV were measured to evaluate the response to the fluid. KAH, OAB, and CI were also evaluated. Results and Discussion:

	Before P and VL (control)	Before P and after VL	After P	After P and T	After P+T+VL
PPV	14,00	10,00	13,00	10	7 (6-9) *#
(%)	(7,5-11,5)	(12-16)*	(9,5-14)	(7-13) *#	
SVV	15,00	10	14,00	11	8 (7-10,5) *#
(%)	(14-17,5)	(12-16)*	(12-18)	(9-14) *#	

P: Pneumoperitoneum, VL: volume loading T: trendelenburg position PPV: pulse pressure variability SVV: Stroke volume variability

\*:p<0.01 vs. control values.

#: p<0,01 vs. after pneumoperitoneum value.

Although there are measurable changes in hemodynamic parameters due to insufflation and patient position during laparoscopy, these changes are not reflected in the clinic when standard 15 mmHg pressure is applied. Since we also preferred 12-14 mmHg as the working pressure, minimal hemodynamic changes were not significantly reflected in the clinic.

Conclusion: SVV and PPV values were reliable in assessing response to fluid

delivery during the Trendelenburg position and pneumoperitoneum in patients with gynaecological laparoscopic surgery. Pneumoperitoneum did not significantly affect the dynamic parameters that we examined in terms of response to the fluid.

## 01AP08-11

Study of prediction of hypotension at induction of general anesthesia by internal jugular vein measured by ultrasonography

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Background and Goal of Study: It has been reported preoperative ultrasonographic inferior vena cava evaluation to assess the intravascular volume could be useful as a predictor of hypotension during the induction of general anesthesia. However, no report can be found about pre-anesthetic internal jugular vein (IJV) evaluation even despite it can be performed easily and quickly. Therefore, this study has been conducted to clarify whether ultrasonographic IJV evaluation just before anesthesia

induction can be a predictor of hypotension caused by the anesthetic administration. Materials and Methods: With patients' informed consent obtained, adult patients scheduled the surgeries under general anesthesia were enrolled. Patients had cardiovascular disease, and ASA-PS III or worse were excluded. Just before anesthesia induction, ultrasonographic IJV transverse images were recorded at the supine and Trendelenburg (10 degree) patient's positions both. Using those IJV images, IJV diameter and area change ((measurement at Trendelenburg - measurement at supine) / measurement at supine) were off-line measured. Blood pressure (BP), heart rate were recorded before induction (baseline) and continuously during 5 min after propofol administration (1.5 mg/kg). Hypotension during the induction was defined as mean-BP less than 60 mmHg or greater than 30% decrease from baseline. Patients' characteristic and measured values were analyzed by Man-Whitney U test and receiver operating characteristic curve.

**Results and Discussion**: 29 patients were studied. Hypotension after induction was observed in 12 patients. IJV areas at supine were 1.35 (0.93 - 1.53) in hypotensive group and 0.79 (0.44 - 1.01) in non-hypotensive group (P = 0.03). AUC of IJV area at supine are 0.75 (0.54 - 0.93) and the cutoff value of IJV area was  $1.35 \text{ cm}^2$ 

Contrary to previous reports of IVC, in our study, the larger IJV area was associated the hypotension after induction. A possibly explanation was that in the patient with larger IJV area, the higher sympathetic tone just before induction had shifted temporary large amount of blood to central vein. Therefore, it was suggested that after induction, BP had fallen greater as a result of sudden decrease in sympathetic tone.

**Conclusion**: IJV area at supine may be negatively associated with hypotension after induction and it may be a potential predictor of hypotension after induction. **References**:

1.Zhang J, et al. Anesthesiology 2016; 124:580-9

#### 01AP08-12

Low Perfusion Index may negatively affect the accuracy of the non-invasive continuous arterial pressure measured with ClearSight®: a method comparison study

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Background: ClearSight® (Edwards Lifesciences, Irvine, California, USA) is a non-invasive continuous hemodynamic monitor based on finger arterial pulse contour analysis. Its accuracy may be compromised in patients with reduced perfusion of the finger caused by factors such as severe hypotension, high peripheral vascular resistance, use of vasopressors, or hypothermia. However, there is no real-time monitoring device that indicates the reliability of ClearSight®. Perfusion index (PI) is the ratio of the pulsating to the non-pulsating blood flow. It is measured with a pulse oximeter and is widely used as a continuous estimate of peripheral perfusion in clinical settings. We hypothesized that a low PI value would negatively affect the accuracy of ClearSight®. To test this hypothesis, we compared the blood pressure measurements obtained with ClearSight® and those obtained with a radial arterial catheter under conditions of both high and low PIs.

**Methods**: Our prospective observational study enrolled 30 patients who underwent elective major hepatectomy or pancreaticoduodenectomy under general anesthesia. Systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean blood pressure (MBP) measured with the radial arterial catheter and the ClearSight device, and PI values measured with the pulse oximeter [Radical-7° (MASIMO, Irvine, California, USA)] were simultaneously collected for 1 minute in the operating theatre and intensive care unit. All the arterial pressure data were classified into 2 groups based on whether the PI value was >1 or  $\leq$ 1. The bias and limits of agreement (LOA) [bias  $\pm$  (1.96 SD of bias)] for the blood pressure values measured by the two methods in each group was calculated according to the Bland-Altman analysis for repeated measurements.

Results: A total of 6312 measurement pairs of blood pressure were analyzed. Overall the mean bias was 0.7 mmHg (95% LOA –26.6 to 25.1 mmHg) for SBP, 10.1 mmHg (–24.4 to 4.1 mmHg) for DBP, –7.9 mmHg (–23.8 to 7.9 mmHg) for MBP. In the PI  $\leqq$ 1 group, mean bias was 3.5 mmHg (95% LOA –29.1 to 36.1 mmHg) for SBP, –13.1 mmHg (–31.6 to 5.4 mmHg) for DBP, –8.7 mmHg (–29.1 to 11.7 mmHg) for MBP. In the PI >1 group, mean bias was –2.2 mmHg (95% LOA –24.7 to 20.3 mmHg) for SBP, –9.0 mmHg (–20.8 to 2.7 mmHg) for DBP, –7.6 mmHg (–21.7 to 6.4 mmHg) for MBP.

**Conclusion**: The mean bias and LOA in the PI ≦1 group were worse than those in the PI >1 group. Low PI values may negatively affect the accuracy of ClearSight®.

#### 01AP09-1

Enhanced recovery in bariatric surgery. Retrospective six month clinical analysis after implementation in a tertiary care hospital

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Background and Goal of Study: Obesity is a worldwide epidemic with increased clinical impact and healthcare expenses.

Application of an enhanced recovery program in bariatric surgery (ERBS) could permit to identify individualized risk factors and allow perioperative optimization. Adaptation to the local setting might be essential. However this has been scarcely explored

Our goal was to evaluate the results of the first 6 months after implementation of an ERBS

Materials and Methods: Perioperative data of 44 consecutive patients (39 women) were analyzed. With the purpose of comparability of the results. Spanish national guidelines were followed up: process evaluation indicators (procedure and followup adequacy, preop evaluation focused on enhanced recovery, nutritional and hidrocarbonated beverages support, preop medications, thromboembolic, antibiotic and hypothermia prophylaxis, drains, analgesia, early mobilization); and evaluation indicators (re-operation due to bleeding, withdrawn of the clinical way, unscheduled ICU admittance during first 24h, early and late morbidity, 30 day mortality, LOS compliance -24-48h-, patient satisfaction). Compliance (%) with these items were evaluated, as recommended by the Spanish Society for Obesity Surgery (SECO). Results and Discussion: Mean (SD) age was 52.19 (6.34) yo, BMI 46.22 (6.29) kg/m2. One patient was excluded due to severe comorbidities. Type of surgery: 35 Roux-en-Y gastric bypass (RYGBP), 17 vertical gastrectomies (VG), and 2 single duodeno-ileal anastomosis with sleeve gastrectomy (SADIS) through laparoscopic approach. 4 cases were re-operations (2 RYGBP, 2 SADIS). See tables 1-2. Six month mean compliance was 88.85% (82.46% process indicators, 95.23% results indicators). Two patients excluded due to complications. SECO morbimortality quality objectives were 100% achieved (table 3).

Conclusion: Clinical guidelines use to approach high volume-high risk-high cost medical procedures. In addition multidisciplinary management is usually required. In this setting, perioperative interventions should be evidence-based and adapted to the local scenario. Our results are encouraging regarding compliance with the national and international enhanced recovery guidelines and bariatric surgery society recommendations.

#### 01AP09-2

Enhanced recovery in bariatric surgery. Economic analysis of the first six months after clinical pathway implementation in a tertiary care hospital

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**Background and Goal of Study**: Enhanced recovery after surgery programs aim at improving patient's quality of recovery. The main objective of published articles uses to be length of stay (LOS), related to in-hospital expenses.

Our main objective was to evaluate the effects of implementation of an enhanced recovery in bariatric surgery (ERBS) on direct healthcare costs and LOS.

Materials and Methods: In a retrospective fashion, economic expenses of implementation of an ERBS were calculated in a cohort of consecutive patients (march-august 2017, ER group). For comparison a random sample of patients operated on the previous year was selected (traditional management, TM group). Main changes in ERBS: abdominal CT scan and gastroesophageal contrast X-ray by abdominal US; and cardiac US and respiratory function test performed

only following consensus-based algorythms. Postop patient destination was preoperatively estimated by specific bariatric-related risk evaluation (ASA physical status, Obesity Surgery Mortality Risk Stratification score -OS-MRS-, and Edmonton Obesity Staging System -EOSS). Perioperative complications were analyzed. TM included systematic preoperative tests, ASA and mandatory ICU discharge.

Hospital economic service provided costs.

Demographic data (age, gender, BMI), ASA, EOSS and OS-MRS were evaluated.

Costs of preoperative tests, postop destination and LOS were calculated.

Data were analyzed by bilateral Student's t and Mann-Whitney U tests.

Results and Discussion: ER group (n=43) 39 women [mean (SD) age 52.19 (6.34), BMI 46.22 (6.29) kg/m2]. One patient excluded due to severe comorbidities. TM group (n=43) 29 women [age 49.86 (8.24), BMI 44.90 (5.84) kg/m2]. Groups were comparable regarding ASA, EOSS and OS-MRS [p=0.275, p=0.201, p=0.166 (table 1. figure 1)].

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ER: Two patients excluded due to complications (one suffered anastomotic bleeding). TM: one patient re-operated due to bleeding. No patient died.

Conclusion: In-hospital costs (€) and LOS (days) for the ER and TM groups were respectively [1282.79 (334.18) vs 2683.65 (845.79), p=0.0001); 2.21 (0.71) vs 4.23 (2.1) (p=0.0001) (figure 2)].

Applying specific patient centered scales and avoiding unnecessary preoperative tests and ICU routine destination, improve savings, quality of management and postop outcomes.

### 01AP09-3

# Remifentanil and Post-operative Opioid Administration in Patients undergoing Bariatric Surgery

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**Background**: Recent years has seen a strong drive to reduce the use of intraoperative opioids in morbidly obese populations. The use of Remifentanii infusions intra-operatively, whilst providing good operating conditions and rapid early recovery, has been increasingly questioned, particularly with regard to suggestions of rebound hyperalgesia.

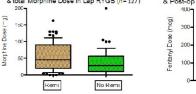
**Methods**: A database of bariatric surgical patients operated on at our institution was matched to a downloaded report of over 6,000 prescriptions from the electronic prescribing system, looking at only primary uncomplicated laparoscopic gastric bypass procedures, with postop stay less than 72 hours.

We identified and compared the intra-operative and post-operative doses of Remifentanil, Fentanyl, and Morphine Statistical analysis was performed with GraphPad Prism, using Mann-Whitney test for non-parametric data.

Results: Preliminary results are available for 127 patients (94 females,74%).

The striking finding was increase in postop opioid use amongst patients who received remifentanil as part of the intra-operative technique. The median total doses of Morphine were 45mg vs 28 mg(fig 1) P value of 0.022.

Figure 1. Association of Intra-op Remifentanil Usage & total Morphine Dose in Lap RYGB (n=127) & Post-op Fentanyl Dose after Lap RYGB (n=127)



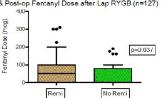


Figure 3.Intra-op Remifentanil & Total Morphine dose (Excludes chronic pain & Ketamine). n=87

p=0.057

Comparing recovery unit (post-operative) rescue fentanyl administration there was an increased requirement, with a median of 50mcg vs 0mcg (fig 2) P value 0.037. Limitation to the study were inclusion of patients receiving chronic opioids and adjuvants. Patients receiving Ketamine intraoperatively showed a marked reduction in post-operative opioid consumption. Eliminating patients on chronic opioids and Ketamine showed a strong trend for increased opioid requirement.(fig 3) P value 0.057

Conclusion: Whilst a retrospective study is inevitably at risk of unrecognized bias, the use of intra-operative Remifentanil was associated with significantly elevated post-operative opioid administration, presumably reflecting increased post-operative pain. Whilst this is preliminary data, it would strongly support the concept of acute opioid induced tolerance using the typical remifentanil regimens used within UK Bariatric practice. This study is ongoing and the updated results published may vary from the abstract data.

#### 01AP09-4

# Efficacy of low opioid anaesthesia protocol in a high volume centre for bariatric surgery

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**Background and Goal of Study**: In morbidly obese patients, anaesthesiologists are recommended to use an obstructive sleep apnoea safe anaesthetic technique (minimising opioids).

The primary goal of the study was to assess the efficacy of using a low opioid protocol for general anaesthesia in bariatric surgery.

Materials and Methods: After local ethics committee approval, in February 2016 we introduced a protocol of low opioid general anaesthesia for obese patients undergoing laparoscopic bariatric operations (sleeve gastrectomy and gastric bypass). The protocol was used by all anaesthetists and was based on using low dose of fentanyl (100 mcg), adjuvants (ketamine, magnesium sulphate, lidocaine) and opioid free analgesics ( Table1).No intravenous morphine was administered at the end of the procedure. All patients received a protocolised opioid free multimodal postoperative analgesia and intravenous morphine only if the visual analogue score (VAS) was higher than 5. Cumulative opioid (iv mg morphine) consumption for 24 hours and pain severity scores (VAS) at rest and movement (cough) were recorded at 1, 4, 12, and 24 h postoperatively.

Results and Discussion: Between February 2016 and August 2017 in Ponderas Academic Hospital, 1227 patients were operated on for bariatric procedures. The descriptive statistical data showed that 70,18% were women and 29,82% men with a mean age of 40.63 (±12.03 SD) and the median BMI (kg/sqm) of 39,7(IQR-9,30). 247 (20,13%) patients presented moderate –severe obstructive sleep apnoea and received CPAP treatment. Out of 1227 patients only 361 (29,43 %) received intravenous morphine in the first 24 hours after operation at a VAS higher than 5. The median of cumulative consumption of morphine at 24 h (mg morphine) in the morphine group was 6.00 (IQR 2.00). The pain scores at rest and with movement during all measured intervals were significantly low.

3.70 (±1.92) Vas 4h - Mean (±SD) 2.60 (±0.96)

Vas 12h - Mean (±SD) 1.50 (±0.97)

Vas 24h - Mean (±SD)

1.20 (±0.63)

Women were more susceptible to the pain with increased consumption of morphine. In the CPAP group of patients the morphine used was statistic significantly lower (p<0.00001). Only 14 % of the patients with moderate-severe OSA needed morphine comparing with 33 % of the patients without OSA.

**Conclusion**: The low opioid anesthesia protocol in bariatric patients proved to be safe and feasible.

# 01AP09-5

# IV Lidocaine infusion for postoperative pain management in bariatric surgery

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**Background and Goal of Study:** Obese patients are a challenge in anesthesia. Postoperative treatment with opioids in this patients can have a negative impact on a previously altered lung ventilation. IV lidocaine has been suggested in Fast-Track guides as an alternative for pain management, and our hospital has an established protocol for its use in bariatric surgery (BS).

Our objective was to determine if the use of a continuous infusion of lidocaine decreases postoperative pain and opioid consumption in BS by doing a retrospective review of the registered cases.

**Materials and Methods:** The protocol includes patients over 18 who undergo BS and don't have any contraindication for the administration of iv lidocaine. A bolus of 1,5 mg/kg of lidocaine is delivered during induction of anaesthesia, followed by a lidocaine infusion at 1,5 mg/kg/h based on adjusted body weight.

Retrospectively, we collected data from 7 patients treated with intravenous lidocaine (group 1), and 7 patients who weren't (group 2). We looked up lidocaine, fentanyl and remifentanil dosage, total postoperative morphine administration and VAS score for pain at admission in the ICU, and evening and midnight nursing shifts.

Results and Discussion: Both groups had similar traits, with a mean age of 52 years and mean weight of 120kg in group 1; and 50 years and 112kg in group 2. All patients were ASA II. Mean dose (with a 95% CI) of intraoperative fentanyl(mcg) and remifentanil(mg) were 654(374-933) and 1,89(0,64-3,12), respectively, in group 1; while in group 2 they were of 600(290-910) and 1,89(0,89-2,89). No statistically significant differences were found.

Postoperatively, we found that the administered mean dose (95% CI) of morphine(mg) in group 1 was 4,7(0,6-8,8), with a mean VAS score for pain at admission, evening and midnight of 4(2-7), 4(2-6) and 2(1-4), respectively. For group 2, mean morphine dosage was 3,3(-0,2-6,9), and VAS scores were

2(0-4), 4(1-7) and 4(0-7). No statistically significant differences were found for this variables either.

We didn't find any acute complications in our search.

**Conclusion:** We didn't find significant differences in our study to point to lidocaine as effective in the reduction of postoperative pain and opioid consumption. This could be attributed, mainly, to our limited sample size. New prospective studies with a larger number of patients will be needed to determine its efficacy in BS.

### 01AP09-6

# Weight-based scalars for Propofol maintenance doses in obese patients

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Background and Goal of Study: The optimal weight-based dosing scalars for propofol in obese patients remain controversial. This study aimed to evaluate propofol dose required during maintenance of general anaesthesia (GA) in obese patients, in order to assess the ability of size descriptors to estimate propofol doses. Materials and Methods: A study on adult class II and III obese patients scheduled to laparoscopic bypass surgery was carried out. GA was induced with remifentanil, propofol and rocuronium. Propofol was started at 2000mg/h until loss of consciousness (LOC). After LOC, propofol infusion rate (IR) was adjusted according to BIS values 40-60. Bioelectrical impedance analysis and Brice modified interview were completed during pre- and postoperative evaluation, respectively. Measurements of propofol plasma concentration were performed.

Results and Discussion: Twenty patients were enrolled in the study. The linearity of the propofol cumulative doses for each patient was verified. The IR varied from 2.5-6.4mg/kg/h and the mean BIS value was 44.9±2.5. A moderate correlation levels for total body weight (TBW) (R²=0.49) and adjusted body weight (R²=0.45) was observed. An adaptive model that explicitly includes the TBW as scalar to determine the maintenance IR was derived [IR=8.49-(393/TBW)]. The mean propofol plasma concentration during the study period was 3.3±1.0µg/mL and none of the patients' interviews indicated awareness during anaesthesia.

**Conclusion**: Due to the BIS-based titration adopted and to the adequacy of the average plasma concentrations, this model can be seen as a consistent approximation for propofol manual titration, avoiding a random selection of the IR from the recommended range.

## 01AP09-7

# Use of an Airway Exchange Catheter for a high Risk Extubation

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**Background**: Airway exchange catheters (AEC) have been reported to be relatively easy and safe to use. AEC are thin, long, rigid, hollow tubes that can be used as a guide for re-intubation if extubation fails. AEC also allows oxygenation, ETCO<sub>2</sub> monitoring, suctioning and jet ventilation.

Case Report: A fit and healthy 37-year-old male, BMI 34, presented to us for an elective laparoscopic cholecystectomy. Airway examination raised concerns for a potential difficult airway: MP 3, TMD < 6cm, prominent incisors, presence of overbite, beard, short and thick neck. Prior to induction, he was preoxygenated in a ramping position with a tight fitting mask to an ETO<sub>2</sub> of 90%. Anaesthesia was induced and ventilation was made possible only with the help of a guedel airway and 2 persons BMV technique. McGrath videolaryngoscope revealed a CL grade 3. He was successfully intubated with a size 8 ETT on second attempt with a bougie. Upon skin closure, we extubated him with an AEC in situ, in the unforeseen event that he needs re-intubation. He was kept under observation in recovery with the AEC in situ till he was fully awake.

**Discussion**: Tracheal extubation is a critical step during emergence from general anaesthesia. The DAS extubation guidelines promote the concept of an extubation strategy, involving a stepwise approach to planning, preparation and risk stratification, aimed at clear identification and management of patients 'at risk' during extubation. Patients for which re-intubation is expected to be difficult, like our patient, may benefit from continuous airway access and this may be achieved via an AEC. This device is inserted through the ETT before extubation and stays in situ till the patient is awake and fully conscious. Our patient tolerated the AEC comfortably without any problem and it was removed prior to him going to the ward.

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2.Benumof J. Airway exchange catheters for safe extubation: The clinical and

scientific details that make the concept work. Chest 1997; 111(6): 1483-86.

Learning points: Extubation is an elective process, and it is important to plan and execute it well. The goal is to ensure uninterrupted oxygen delivery to the patient's lungs and have a back-up plan, that allows ventilation and re-intubation with minimum difficulty and delay in case extubation fails.

# 01AP09-8

# The hoarseness's impact on the quality of the recovery in elderly

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**Background and Goal of Study:** Postoperative hoarseness is a common perioperative complication and an important symptom for the patients, affecting their daily life<sup>1,2</sup>. The goal of this study was to assess the hoarseness's impact on the quality of the recovery in elderly patients.

Materials and Methods: After approval by institutional ethics committee, we conducted an observational prospective study. Patients submitted to elective surgery admitted at the post anesthesia care unit (PACU), from May to July of 2017, were included. Exclusion criteria were: age <60 years old, postoperative ICU admission and inability to give informed consent. Quality of Recovery was evaluated using Quality of Recovery-15 (QoR-15) before (T0) and 24 hours (T24) after surgery. Hoarseness was evaluated using a scale between 0 (none) and 3 (severe) classified by the patient himself at T0 and T24. Patients were considered to have hoarseness if at T24 they have a higher score than at T0 on hoarseness evaluation. Patient's demographics and perioperative data were collected from anesthetic chart. The Chi-square, Fisher's exact or Mann-Whitney U tests were used for comparisons.

**Results and Discussion:** A total of 235 patients were included. The incidence of hoarseness was 37.4%. There were no differences in QoR-15 at T0, but at T24 hoarse patients scored lower in seven items of QoR-15 and, in overall, they had lower scores at QoR15 (p=0.004). After General anesthesia patients had more frequently hoarseness compared with regional anesthesia. (35 vs 15, p=0.001). **Conclusion:** In this study hoarseness was common in postoperative period.

Conclusion: In this study hoarseness was common in postoperative period. QoR-15 revealed differences in the overall rate of recovery in all domains at T24 evaluated as a global score and at the following domains: "feeling rested", "have a good sleep", "able to look after my own", "able to return to work", "feeling comfortable", nausea and vomiting" and" feeling depressed and anxious". This shows that hoarseness patients had a poor quality of recovery, suggesting an adverse impact in postoperative recovery. General anaesthesia was associated with a higher incidence of hoarseness.

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## 01AP09-9

# Unanticipated difficulty in mouth opening after applying skull traction for cervical spine injury

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Background: It is recommended to have early closed reduction of cervical spinal fracture/dislocation injuries with craniocervical traction for the restoration of anatomic alignment of the cervical spine<sup>1</sup>. During the traction, some patients experience considerable discomfort in the temporomandibular joint (TMJ). We present a case which illustrates unanticipated difficulty in mouth opening after cervical traction was applied.

Case Report: A 24-yr-old man, diagnosed with a burst fracture of atlas in a car accident presented for posterior screw fixation after 5kg Gardner Wells tong(G-tong) traction was applied for 5 days. Anesthesia was induced with propofol and remifentanil. Muscle relaxation was done with 0.6 mg/kg rocuronium.Then, the patient's mouth was opened for intubation, but it was opened only one finger wide, so 30 mg of rocuronium was administered additionally. Patient's mouth however did not open any further. So we could use the lightwand to perform the intubation successfully and proceed with the surgery.

The patient was consulted to the department of oral and maxillofacial surgery about the patient's mouth opening defect. The patient could open his mouth 2 fingers wide and he experienced TMJ ankylosis when his mouth was forced to open. Swelling with Rt TMJ on the preauricular area was observed and there was Rt side disclusion in the dental interlocking.

Clinical and MRI findings showed complications caused by G-tong traction. Muscle contusion induced myositis and TMJ disc dislocation.

The patient underwent reoperation after 8 months, and his mouth was opened 3 fingers wide. So intubation could be performed without any problems

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**Discussion**: We suspect that the use of G-tong may cause the myositis and TMJ dislocation. It may cause TMJ ankylosis, which can result in a mouth opening problem.

The most common complications associated with skeletal traction for cervical spine are pin-site irritation and infection. Cervical traction can result in a permanent TMJ problem if it is not applied properly and carefully. Signs and symptoms of TMJ dislocation involve inability to occlude the teeth, gagging of occlusion, pre-auricular depression and preauricular pain².

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**Learning points**: A preoperative assessment of patient's mouth opening should be done before endotracheal intubation for a patient who is scheduled to get an operation during or after cervical traction.

#### 01AP09-10

## Hoarseness incidence: what to expect?

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Background and Goal of Study: Hoarseness is one of the most common postoperative symptom after airway approach and their severity differs, depending on causative factors. The goal of this study was to determine the incidence of hoarseness following airway approach in elderly patients and its associated factors. Materials and Methods: After study approval by institutional ethics committee, we conducted an observational prospective study. Patients submitted to elective surgery admitted at the post anaesthesia care unit (PACU), from May 2017 to July 2017, were included. Exclusion criteria: age < 60 years old, postoperative ICU admission and inability to give informed consent. Hoarseness was evaluated using a scale between 0 (none) and 3 (severe) classified by the patient himself before (T0) and 24 hours (T24h) after surgery, the result was positive if hoarseness at T24 was higher than at T0. Patient's demographics and perioperative data were collected, including if there was airway approach, type of dispositive used and anaesthesia duration. The Chi-square, Fischer's exact or Mann-Whitney U tests were used for comparisons. A multivariate logistic regression was done with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.

Results and Discussion: Two hundred thirty five patients were included. From the 164 patients with airway approach, 123 had orotraqueal intubation (OT) and 39 laryngeal mask (LM) insertion. Hoarseness incidence was 48.8% in OT and 33.3% in LM. Hoarseness was more frequent after airway approach (44% vs. 20%, p=0.001). Hoarseness was more frequent in patients submitted to general surgery (56% vs. 44%, p<0.001). Patients that had taken intraoperative benzodiazepines had a lower incidence of hoarseness (p=0.039). Patients that took hipnotics (p=0.004), muscle relaxants (p<0.001) and anti-emetic drugs (p=0.022) had a higher incidence of hoarseness. AT PACU patients with hoarseness took more frequently endovenous morfine (p=0.039). No differences were found when considered type of used device (OT or LM), duration of anesthesia, age, gender, and comorbidities. In a logistic regression analyses the use of muscle relaxants were the sole variable independently associated with postoperative hoarseness (OR 3.0, Cl95% 1,7 – 5,3, p<0.001).

**Conclusion:** Hoarseness seems to be frequent after anesthesia and the incidence is higher in those with a airway approach. Muscle relaxants use was independently associated with hoarseness.

# 01AP09-11 Difficult airway in a patient with lymphoma

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**Background**: Unanticipated difficult airway management is a challenge for every anesthesiologist. We report the case of a patient with Waldeyer's ring hypertrophy secondary to a lymphoma whose parapharyngeal involvement resulted in severe difficult airway management. This fact remained unnoticed in preoperative assessment.

Case Report: A 86-year-old male patient, ASA III, diagnosed with lymphoma, was scheduled for a submaxillectomy to choose his best chemotherapy treatment. He had a medical history of hypertension, ischemic heart disease and lacunar infarct. He didn't have any surgical history. He referred nasal voice and prominent laterocervical adenopathies without respiratory symptoms. There were no risk predictors in preopeoperative airway assessment. Following anesthesic induction, mask ventilation was impossible (Han IV). First direct laryngoscopy was done,

observing Cormack-Lehane Grade III, severe anatomic distortion and bleeding. After that, a more skilled anesthesiologist performed two videolaryngocopy attempts without any improvement. A suppraglottic airway device was then inserted in order to priorize oxygenation. Finally, successful intubation was achieved by performing a fiberoptic broncoscopy through the supraglottic device although glottis could not be correctly observed. We decided to delay extubation and patient was transferred to the Reanimation Unit. There were no incidences in extubation. TC imaging seen after the procedure revealed a severe narrowing of parapharyngeal space due to Waldeyer's ring hypertrophy.

**Discussion**: Hypopharyngeal affection due to a lymphoma is an uncommon difficult airway's ethiology. Its importance lies in the fact that it may go unnoticed in preoperative assessment, as happened to us. Moreover, pharyngheal pathology hinders fibrobronchoscopic and videolaryngoscopic intubation. Limiting airway manipulation is mandatory. Imaging test should be performed and evaluated in order to diagnose a possible difficult airway and elaborate a proper therapeutic approach.

**References:** Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults.BJA. 2015.

Learning points: Advanced lymphoprolipherative syndromes cause disseminated adenopathies whose pharapharyngeal involvement can lead to a difficult airway. Absence of risk predictors in preoperative airway assesment does not exclude it, so we should always consider imaging tests results in our preoperative airway assesment.

## 01AP09-12

# A case of achalasia on a Down syndrome patient: balancing between a predictable difficult airway and the risk of aspiration

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**Background:** Achalasia is characterized by an impaired relaxation of the lower esophageal sphincter, leading to an increased risk of massive regurgitation and aspiration of esophagogastric content. Its prevalence in Down Syndrome patients is superior to that of the general population. Besides, Down syndrome may occur with other structural anomalies associated with a possible difficult airway. Our aim is to shed a light on the anesthetic management of these patients.

Case Report: A 47-year-old male, ASA III, with Down Syndrome and achalasia, was posted for Heller's miotomy. Our main concerns were the risk of aspiration of esophagic content and the possibility of a difficult airway (DA). In this case, the only criteria for DA were macroglossia and lack of teeth. We performed a rapid sequence induction and intubation with direct laringoscopy, in semi-sitting position, after nasoesophagic tube insertion and aspiration of the esopghagic content. The equipment for difficult airway was kept ready. Endotracheal intubation was successful at the first attempt. The surgery and postoperative period were uneventful and the patient was discharged after 2 days.

**Discussion:** The presence of several criteria for DA should prompt a fibreoptic intubation, following the current guidelines. However, we should keep in mind that this strategy has limitations, particularly the need for a deeper sedation in patients that don't cooperate due to cognitive dysfunction and the increased risk of massive recurritation.

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**Learning Points:** Anesthetic management of these patients, especially for this type of surgery, is challenging. Suitable pre-anesthetic preparation for difficult airway management is the key.

## 01AP10-1

# Inhaled budesonide does not attenuate hypoxic pulmonary vasoconstriction after rapid ascent to 4559 m

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Background and Goal of Study: Hypoxic pulmonary vasoconstriction (HPV) contributes to the pathophysiology of numerous diseases. Perhaps the best characterized disease where HPV has been implicated is high altitude pulmonary edema (HAPE). Individuals who develop HAPE have an increased HPV that

augments fluid filtration across the alveolar capillary barrier into the alveolar space (1). The oral intake of the corticosteroid dexamethasone has previously been shown to lower HPV and to prevent HAPE. In this study we tested whether inhalation of the corticosteroid budesonide attenuates HPV after rapid ascent to 4559 m.

Materials and Methods: In this prospective, randomized, double-blind and placebocontrolled trial, 50 subjects were randomized into 3 groups to receive budesonide at 200 or 800 µg twice/day (n=16 and 17, respectively) or placebo (n=17). Inhalation of the study drug was started 1 day prior to ascent from 1130 to 4559 m (Margherita-Hut, Monte Rosa, Italy) within 22 hours. The ascent included an overnight stay at 3611 m. Systolic pulmonary artery pressure (sPAP) was assessed by transthoracic echocardiography and capillary blood samples were drawn at low altitude (423 m) and after 7, 20, 32, and 44 hours at 4559 m.

Results and Discussion: Ascent to high altitude increased SPAP in all three study groups by about 1.7-fold (P<0.001 versus low altitude). SPAP remained unchanged throughout the 48 hours at high altitude. Neither at low altitude nor at any time point at high altitude was there a significant difference in SPAP between groups (P=0.419). Capillary partial pressure of oxygen (PO2) and carbon dioxide as well as the alveolar to arterial PO2 difference were decreased at high altitude but not affected by budesonide. This finding indicates that inhaled budesonide had no effect on interstitial and alveolar water content, ventilation-perfusion ratio, shunting, or a hypoxia-mediated change in lymphatic drainage, all of which might affect pulmonary diffusion capacity. SPAP correlated inversely with capillary PO2 (r=-0.58, P<0.001).

Conclusion: This study shows that inhaled budesonide did not reduce the degree of HPV after active and rapid ascent to 4559 m. Therefore, and in contrast to oral dexamethasone, inhaled budesonide is unlikely to be effective in the prevention of HAPE.

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#### 01AP10-2

Comparison of the 3 different levels of PEEP on haemodynamics, respiration and arterial oxygenation; which is the best PEEP for sleeve gastrectomy under general anaesthesia?

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Background and Goal of Study: In this prospective randomised study, our goal is to compare the effects of 3 different PEEP levels (0-5-10 cm H2O) on hemodynamic parameters in order to evaluate their effects on respiration and arterial oxygenation in patients undergoing laparoscopic bariatric surgery of obese patient (sleeve gastrectomy) under general anesthesia.

Methods: After approval of local ethics committee and patient consent, 60 adult patients with a body mass index(BMI) of >40 with American Society of Anesthesiologists group I-II were randomised into three groups according to aplied PEEP level: Group I; zero PEEP, Group II; 5cmH2O PEEP and Group III; 10 cmH2O PEEP. All other variables (e.g., anesthetic and surgical techniques and ventilatory settings) were the same for all patients. Duration time, heart rate, invasive arterial blood pressures, arterial blood gases (ABG),Ppeak, Pplateau, SpO2 and ETCO2 were measured intraoperatively and postoperatively in the postanesthesia care unit (PACU). IBM SPSS statistics 22 (IBM SPSS Turkey),Shapiro Wilks test, One-way anova test, Tukey HSD,Tamhane's T2 test, Kruskal Wallis, Mann Whiyney U,paired sample t and chi-square tests were used for statistical anlyses. A value of p<0.05 was considered to be significant.

Results and Discussison: The study conducted 60 patient (11.7% males and 88.3% females and mean age of 37.8±10.81, BMI ranged between 41,58-51.7 kg/m2). There was no difference between groups with respect of the demographic data, operation time, hemodynamic measurements and Ppeak, ABG. Atallgroups significant increases were detected in Plateau atall times compared to initial value and among groups Group III values were always higher than other groups (p<0.01). The statical compliances of group II and group III were significantly higher than group I at all times (p<0.01). After intubation, after position and before extubation values, Group I's PO2 values was significantly lower than other groups, after extubation returned to nornal (p<0.01).

**Conclusion:** According to this study, we suggest that 5 cm H2O PEEP is optimal PEEP in sleeve gastrectomy cases, because it causes a significant increase in compliance without affecting P peak and slightly increase in P Plateau.

# 01AP10-3

# Intravenous versus inhalational anaesthesia and lung ventilation-perfusion matching

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Background and Goal of Study: The efficiency of lung gas exchange deteriorates after induction of general anaesthesia due to increased ventilation-perfusion (*V/Q*) scatter.¹ Blood gas data from studies in the setting of one lung anaesthesia suggests that propofol TIVA may preserve *V/Q* matching better than inhalational agents.² We compared *V/Q* matching in patients under relaxant general anaesthesia randomized to either propofol TIVA or sevoflurane maintenance anaesthesia, using both Bohr deadspace and shunt fraction measurements and the MIGET (Multiple Inert Gas Elimination Technique) for characterization of *V/Q* dstributions.³

Materials and Methods: Patients with clinical evidence of underlying lung disease were excluded. Baseline arterial blood sampling and collection of mixed expired gas was done before induction and repeated after 1-2 hours of relaxant general anaesthesia, supine with controlled ventilation at an FiO<sub>2</sub> of 0.3 and a target end-tidal PCO<sub>2</sub> of 30-35 mmHg and bispectral index range of 40-60. Blood samples for MIGET were processed by headspace equilibration in 20mL gas tight glass syringes at 36<sub>0</sub>C, with measurement of partial pressures in expired and headspace gas samples by gas chromatography. The primary endpoint was comparison of the two groups in the change from baseline of absolute difference between log standard deviation (dδlogSD) of ventilation and blood flow distributions.

Results and Discussion: Data from 20 patients (10 in each group) to date was suitable for analysis. Alveolar deadspace (SD) calculated from the Bohr equation increased across both groups from baseline with anaesthesia [12.1 (9.1)% to 23.5 (5.7)%, p<0.0001) and log PaO₂/FlO₂ decreased [465.9 to 403.5 mmHg, p=0.001), but shunt fraction (SD) was not significantly changed [12.8 (10.1)% to 9.4 (5.1)%, p=0.18]. Primary endpoint: dδlogSD (SD) was not different between TIVA and sevoflurane groups (0.17 (0.29) versus 0.2 (0.83), p=0.92).

**Conclusion:** We found no evidence that TIVA preserved *WQ* matching in patients with normal lung function undergoing anaesthesia with controlled ventilation compared with sevoflurane.

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## 01AP10-4

The effect of desflurane vs. sevoflurane on perioperative respiratory complications in LMA anaesthesia: a prospective randomised double-blinded controlled trial (a preliminary report)

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Background and Goal of Study: Inhaled anaesthetics are popularly used during maintenance of anaesthesia using a larryngeal mask airway (LMA). The limitation of desflurane (DES) on its odor leads to a controversy if desflurane is similar to or worse than sevoflurane (SEVO) for LMA anaesthesia. This is a non-inferiority study designed to compare occurrences of respiratory complications between desflurane and sevoflurane during LMA anaesthesia.

Materials and Methods: Ethics approval from Maharaj Nakorn Chiang Mai Hospital was obtained and the ClinicalTrials.gov was registered (ID: NCT03006250). A total of 220 patients undergoing elective surgery, who receive LMA anaesthesia will be equally randomised into DES and SEVO groups. Intravenous propofol, fentanyl, and lidocaine were administered for an induction of anaesthesia. Inhaled anaesthetic, either desflurane or sevoflurane, was started after LMA insertion and discontinued at the end of surgery. The LMA was removed after the patient awakened. During the maintenance and emergence of anaesthesia, occurrences of adverse respiratory events, including coughing, laryngospasm, bronchospasm, breath holding, and desaturation, were recorded as primary outcomes. Secondary outcomes were recovery profiles, which included time to and quality of recovery.

**Results**: From 26 September 2016 to 30 October 2017, 110 out of 220 patients were recruited with similar demographic data, anaesthesia induction techniques, and intraoperative doses of fentanyl in both groups. The respiratory complications during anaesthesia were not different between groups but laryngospasm during emergence was significantly higher in the SEVO group (0% vs. 11%; p = 0.013). Times to eye opening, response to command, and LMA removal were significantly faster in the DES group (all p < 0.001). Quality of recovery defined as a return of orientation to time and place within 15 minutes after surgery was significantly higher in the DES group (100% vs. 73%; p = 0.037). Both groups were ready for discharge from post-anaesthesia care unit (PACU) at similar times (p = 0.410).

**Conclusion**: Desflurane is not inferior to sevoflurane regarding occurrences of adverse respiratory events during LMA anaesthesia. Desflurane has a quicker and better recovery, however, the PACU discharge times are comparable.

#### 01AP10-5

Effects of neuromuscular block reversal with sugammadex versus neostigmine on postoperative respiratory outcomes after major abdominal surgery, a randomized controlled trial

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**Background and Goal of Study**: Postoperative pulmonary complications may be reduced when neuromuscular block is reverted with sugammadex due to a lower incidence of residual block and to impairment of diaphragm function after neostigmine administration.

The aim of the study is to compare lung function after major abdominal surgery when reversal of neuromuscular blockade is carried out with sugammadex or neostigmine.

#### Materials and Methods:

Design: A randomized controlled trial.

Setting: A tertiary teaching hospital in Spain.

Patients: Adults scheduled for major abdominal surgery under combined general and epidural anaesthesia with no contraindications for any of the study drugs. Interventions: Spirometry and lung ultrasound were performed before surgery and

Interventions: Spirometry and lung ultrasound were performed before surgery and one hour and 24 hours postoperatively. Differences in mean changes from baseline were analyzed with repeated measures ANOVA.

Main outcomes measures: Forced vital capacity (FVC) loss, rate and size of atelectasis one hour after surgery in patients reverted with  $40\mu g/kg$  of neostigmine versus 4mg/kg of sugammadex.

**Results and Discussion**: One hundred and twenty-six patients were included for the main analysis. In the neostigmine group, basal FVC was  $2.98 \pm 0.13$ , IC95% (2.76 - 3.24) and one hour after surgery FVC was  $2.5 \pm 0.12$ , Cl95% (2.27 - 2.74) In the sugammadex group basal FVC was  $3.02 \pm 0.13$ , Cl95% (2.76 - 3.29) and decreased to  $2.58 \pm 0.12$ , Cl95% (2.35 - 2.81) in the first hour. A total of 39.34% of patients in the neostigmine group and 29.51% in the sugammadex group had visible atelectasis one hour after extubation. Mean size was 14.80 cm2 (Cl95%: 6.58-22.03) and 8.0 cm2 (Cl95%: 5.78-10.22), respectively.

**Conclusion**: We could not find differences in pulmonary function after reversal with sugammadex or neostigmine in a high-risk population.

# 01AP10-6

An Innovative Device For CO<sub>2</sub> Removal Using Membrane Technology Instead Of Chemical Absorbent In Anesthetic Circuits: Preliminary Clinical Results

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Background and Goal of Study: There is long standing and renewed interest in low fresh gas flow (FGF) anesthesia in clinical practice because of its economic and environmental advantages and the availability of better anesthesia technology and monitoring devices. The application of low FGF anesthesia and metabolic anesthesia was limited by the well-known fact that the chemicals used to absorb carbon dioxide react with volatile anesthetic agents. As the chemicals in carbon dioxide (CO $_2$ ) absorbers are responsible for the production of both, carbon monoxide and toxic compounds, we present a novel CO $_2$  filtration membrane technology (memsorb $^{\rm TM}$ ) that does not create the known dilemma in low flow anesthesia using chemical absorbents. The goal of this study is to evaluate this novel next-generation membrane filter regarding its safety and efficacy in removing CO $_2$  in a clinical setting.

Materials and Methods: This controlled clinical trial (ClinicalTrials.gov Identifier: NCT03014336) was approved by our Research Ethics Board and received investigational testing authorization by Health Canada. We recruited 200 ASA I – III elective surgical patients (n=100 for both, the memsorb™ device and the control group using Drägersorb® 800+). After obtaining informed consent, patients underwent general anesthesia for their surgical procedure. Routine general anesthesia was administered at the discretion of the attending anesthesiologist and demographic and vital parameters were recorded electronically. Fraction of inspired (F<sub>insp</sub>) and expired (F<sub>exp</sub>) CO₂ were the primary outcome measures. Where applicable, t-test or ANOVA was used.

Results and Discussion: This data set describes preliminary results of a subgroup of 179 patients evaluated to date. We investigated gender, weight, height, intraoperative F<sub>exp</sub>/F<sub>insp</sub>CO<sub>2</sub>, Sevorane/ Desflurane consumption and FGF. There were no statistical differences in the demographics between the two study groups. The median FexpCO<sub>2</sub> between the groups were comparable and stabile over 2 hours of anesthesia (5.1% for memsorb™ and 5.0% for control). Vapor consumption was also comparable between groups. It was not part of this study to evaluate ultralow FGF conditions. Anesthesiologists used fresh gas flows at their discretion (300 – 2700 ml/min).

**Conclusion(s)**: memsorb<sup>™</sup> can remove CO2 from an anesthesia circuit safely and efficiently without the known limitations of chemical absorbents. A next study step will evaluate vapor consumption with low FGF.

## 01AP10-8

# Theoretical emergence of xenon in adults - a Gas Man ® Simulation

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Background and Goal of the Study: Emergence of anesthesia starts by discontinuing the administration of the inhaled anesthetic agent (IHA) and increasing fresh gas flow (FGF). We simulated the pharmacokinetics of xenon (1) during emergence with normoventilation (NV) and isocapnic hyperventilation (ICHV).

Materials and Methods: Part I. Using GasMan® (2) a computerized inhalational

Materials and Methods: Part I. Using GasMan® (2), a computerized inhalational anesthesia simulation program, 1 MAC of xenon (70 %) was administered to a 70 kg patient. After 8 h, administration was discontinued. At that same time, we continued one simulation with NV, while in a second simulation ICHV was instituted. After reaching MACawake (0.3 MAC ~ 21 %) in the vessel rich group (VRG), both groups were investigated for rehypnotization by allowing hypoventilation to occur at that point. Part II. Emergence times with increasing duration of anesthesia with NV and ICHV were determined.

Results and Discussion: Part I. Time to reach MACawake in the VRG during emergence after 8 h at a level of 1 MAC was 5 min 36 s and 4 min 42 s with NV and ICHV, respectively, reducing recovery time by 16 %. Part II. Rehypnotization was observed only with near-apnea ventilation or apnea. Emergence time for xenon administration is virtually independent from anesthesia duration but depends on minute ventilation.

**Conclusion:** GasMan® suggests that ICHV hastens emergence from xenon anesthesia only minimally compared to NV. Rehypnotization is absent during mild hypoventilation.

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## 01AP10-9

# Effect of dexmedetomidine on endotracheal intubating conditions during endotracheal intubation without neuromuscular blocker following propofol/remifentanil

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**Background:** In the present study, we investigated the effect of dexmedetomidine on the intubating conditions and hemodynamic changes during endotracheal intubation following anesthetic induction performed using propofol and remifentanil without a neuromuscular blocking agent.

**Methods:** We selected 70 adult patients aged 20 to 65 years scheduled to undergo general anesthesia. Induction was performed using 2 mg/kg of propofol and 1.5  $\mu$ g/kg of remifentanil. The patients were divided into two groups, a dexmedetomidine group (Group D) and a control group (Group C). Group D received an infusion of dexmedetomidine 1  $\mu$ g/kg for 10 minutes before induction, and Group C received the same volume of normal saline infused in the same manner. Intubating conditions were evaluated and blood pressure and heart rate were recorded at various time points to assess hemodynamic stability.

**Results:** Intubating conditions were evaluated as excellent for 34 patients and good for 1 patient in Group D, and excellent for 4 patients, good for 20 patients, poor for 4 patients, and bad for 7 patients in Group C (P < 0.001). The heart rate was significantly lower in Group D than in Group C at all measurement times. The mean arterial blood pressure was significantly lower in Group C than in Group D at 10 minutes after dexmedetomidine administration (P = 0.049), after the induction of anesthesia (P < 0.001), immediately after endotracheal intubation (P = 0.008), and 3 minutes after endotracheal intubation (P < 0.001).

Conclusion: Dexmedetomidine 1 μg/kg improved the intubating conditions and stabilized hemodynamic changes following anesthetic induction performed using propofol 2 mg/kg and remifentanil 1.5 μg/kg without a neuromuscular blocking contract.

Table 1. Intubating Condition Classification

	Group C (n-35)	Group D (n-35)
Exellent	4	34*
Good	20	1*
Poor	4	0*
Bad	7	0*

Value are number of patient. P<0.001 between group C and D C: The group injected with 0.9% normal saline. Group D: The group injected with dwxmedetomidine 1ug/kg

## 01AP10-10

# Respiratory muscle activity after deep neuromuscular blockade and reversal with sugammadex

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Background and Goal of Study: The use of neuromuscular blocking agents (NMBAs), different reversal agents and their effect on respiratory outcome after surgery is still the subject of research and debate. Since the availability of sugammadex the use of a deep neuromuscular block (NMB), i.e. post-tetanic count of 1-2 on acceleromyography, has regained in popularity. As part of a larger trial, we wanted to assess whether a deep neuromuscular blockade reversed with sugammadex resulted in similar inspiratory muscle activity when emerging from anesthesia compared to spontaneous reversal of NMB after a single dose of NMBA. Materials and Methods: We used a transcutaneous electromyography (EMG) method to evaluate both diaphragm (EMGdi) and intercostal (EMGic) muscle activity in a prospective, double-blind randomized controlled trial in patients receiving propofol-remifentanil anaesthesia. EMG activity was measured after the train-of-four (TOF) returned to >90%, in the interval between the onset of spontaneous breathing and extubation of the trachea. EMG amplitude peaks on inspiration were used. Data were compared with the Mann-Whitney U statistical test.

Results and Discussion: 32 patients were analyzed. Median EMGdi and EMGic were similar for both groups (P=0.83 and P=0.06): spontaneous recovery from single dose NMBA median EMGdi 4.0  $\mu$ V (IQR 2.0 - 7.9) and EMGic 2.3  $\mu$ V (1.3 - 4.6); deepNMB EMGdi 4.4  $\mu$ V (IQR 1.9 - 7.5) and EMGic 1.8  $\mu$ V (1.1 - 3.7). The use of a deep NMB did not influence the action of inspiratory muscles when emerging from general anesthesia in this study.

Conclusion: In this study, the use of a deep NMB reversed with sugammadex resulted in similar activity of inspiratory muscles compared to a single dose of NMBA and spontaneous recovery. More studies are needed to evaluate the effect of sugammadex and neostigmine on respiratory muscle activity.

# 01AP10-11

# Respiratory muscle activity after neostigmine- or sugammadex-enhanced recovery of neuromuscular blockade

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Background and Goal of Study: The use of neuromuscular blocking agents (NMBAs), different reversal agents and their effect on respiratory outcome after surgery is still the subject of research and debate. Since the availability of sugammadex, some studies have suggested that sugammadex may have a positive impact on respiratory outcome. As part of a larger trial, we wanted to assess whether reversal of a moderate level of neuromuscular blockade (NMB) with sugammadex resulted in better inspiratory muscle activity compared to reversal with neostiomine.

Materials and Methods: We used a transcutaneous electromyography (EMG) method to evaluate both diaphragm (EMGdi) and intercostal (EMGic) muscle activity in a prospective, double-blind randomized controlled trial in patients receiving propofol-remifentanil anaesthesia. EMG activity was measured after train-of-four (TOF) returned to >90%, in the interval between the onset of spontaneous breathing and extubation of the trachea. EMG amplitude peaks on inspiration were used. Data were compared with the Mann-Whitney U statistical test.

**Results and Discussion**: 23 patients were analyzed. Median EMGdi values were similar for both groups (P=0.64): after sugammadex-enhanced recovery median EMGdi 2.9  $\mu$ V (IQR 1.3 - 5.3) versus after neostigmine enhanced recovery: 3.2  $\mu$ V (IQR 0.9 - 7.3) Intercostal peak EMG amplitudes were different for the two groups (P=0.009): after sugammadex-enhanced recovery median EMGic 2.2  $\mu$ V (IQR 1.3 - 4.5) versus after neostigmine-enhanced recovery: EMGic 1.5  $\mu$ V (IQR

1.1 - 2.5). The use of sugammadex after intermediate level NMB resulted in similar diaphragm EMG activity but in almost double the intercostal EMG activity compared to pensionine.

**Conclusion(s)**: In this study, the use sugammadex after intermediate level of NMB resulted in similar activity of diaphragm but in almost double the activity of the intercostal muscles, and thus an increased inspiratory muscles activity use. More studies are needed to evaluate the effect of sugammadex and neostigmine on respiratory muscle activity.

## 01AP10-12

#### Post-intubation tracheal stenosis: monitoring is essential!

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Background and Goal of Study: This case report portrays the risk of postintubation tracheal stenosis in patients under GA with ET placement. The objective is to show one of the most feared complications of ET tube placement without cuff pressure monitoring and its impact on patient's life quality.

Materials and Methods: A 59-year-old woman with Ćrohn's disease who was subjected to multiple GA with ET placement without cuff monitorization, developed progressive dyspnea and stridor over the last one and half year. It was detected a subglottic tracheal stenosis at bronchoscopy which was followed by dilatation and prosthesis placement.

After three more flexible fibroscopies and due to the persistent complaints, she was subjected to another bronchoscopy with prosthesis removal. The patient is still under medical supervision and can do her daily activity but with some limitations.

**Discussion**: Every patient proposed to GA with ET placement without cuff monitorization present a risk of developing post-intubation tracheal stenosis (due to the risk of tracheal wall ischemia by cuff compression followed by fibrosis) which has a huge impact on their quality of life due to the high probability of recurrence and the limiting symptomatology it causes.

Patients with comorbidities such diabetes, CV disease, obesity, smoking are in highest risk. This case report tries to sensitize the medical community the importance of ET cuff monitorization (between 20 to 30mmHg) because in spite of being a rare condition, when happens it can be so limiting to the patient's life. **References**:

1. De, S., & De, S. (2008). Post intubation tracheal stenosis. Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine, 12(4), 194–197. <a href="http://doi.org/10.4103/0972-5229.45081">http://doi.org/10.4103/0972-5229.45081</a>; 2. Gelbard A, Francis DO, Sandulache VC, Simmons JC, Donovan DT, Ongkasuwan J. Causes and consequences of adult laryngotracheal stenosis. Laryngoscope.

**Learning points**: Despite the developing medical industry on trying to give us the best and least invasive products (like ET with low pressure-high volume cuffs), we need to be always precautious and try to offer the best treatment to our patient, thereby minimizing iatrogeny.

## 01AP11-1

Impact of high levels of preoperative Nt-proBNP on intraoperative haemodynamic behaviour and postoperative outcome in patients undergoing liver transplantation

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Background Goal of Study: Liver transplantation (LT) is associated with high incidence of comorbidity and mortality during the postoperative period. The incidence of cardiovascular and renal complications is high and also de probability of death from these causes. Cirrhosis is known to be associated with structural and functional cardiovascular abnormalities that have been termed cirrhotic cardiomyopathy. N terminal B-type proBNP (Nt-proBNP) levels over 300 pg/ml are highly suggestive of ventricular dysfunction, which reflects volume overload and myocardial distension. It has been suggested that high preoperative Nt-proBNP has a predictive value for the development of cardiovascular events after surgery. However, there is a lack of evidence of the intraoperative result of this elevation.

Materials and Methods: After Ethical Committee aproval, 224 adult patients who underwent LT between 2012-2017 were included. Preoperative assessment: transthoracic echocardiography and Nt-proBNP analysis before the surgery (basal Nt-proBNP). Patients were divided into two groups depending on levels of basal Nt-proBNP (300 pg/mL). Haemodynamic monitoring was performed through transpulmonary termodilution catheter. Use of vassopresor drugs, post reperfusion syndrome, transfusion rate, as well as ICG-PDR (indocianine green plasma disappearance rate) after reperfusion were recorded. Analysis: relation between basal Nt-proBNP with haemodynamic behaviour and postoperative course (mechanical ventilation, ICU-hospital stay,30-day mortality). Statistical analysis:U-Mann-Whitney,Chi2.

Results and Discussion:

	Nt pro-BNP > 300	Nt pro-BNP < 300	p value
	pg/mL (n=67)	pg/mL (n=158)	
PREOPERATIVE DATA	Median (IQR	P VALUES	
Age (years)	55 (49-61)	54 (49-58)	NS
BMI (kg/m²)	26.5 (23.8-29.7)	26.7 (23.8-29.7)	NS
Basal Creatinine (mg/dL)	1.05 (0.86-1.54)	0.7 (0.6-0.8)	<0.001
INTRAOPERATIVE DATA Post reperfusion			
haemodynamic parameters			
MAP (mmHg)	61 (55-70)	60 (51-69)	NS
C.I. (L/min/m²)	4.4 (3.7-5.2)	4.3 (3.4-5.2)	NS
GEDVI (ml/m²)	665 (565-792)	645 (568-768)	NS
SVV (%)	8 (6-16)	12 (9-18)	0.004
PPV (%)	6 (3-8)	8 (5-13)	0.004
dPmx (mmHg/seg)	1481 (1163-1749)	1386 (1151-1679)	NS
ELWI (ml/kg)	9 (8-10)	9 (8-10)	NS
Use of vasopressor drugs	60/7	124/34	0.015
(yes/no) (%)	(89.5%)	(78.4%)	
Post reperfusion Syndrome	25/42	32/126	0.012
(yes/no)(%)	(37%)	(20%)	
ICG- PDR (%/min)	16.8 (10.7-21.5)	14.4 (10-19.5)	NS
RBC (Units)	3 (2-5.5)	0 (0-3)	<0.001
Platelets pool (Units)	1 (0-1)	0 (0-1)	0.002
Fibrinogen (gr)	2 (1-4)	2 (0-4)	0.004
Crystalloids (ml)	2500 (2000-3800)	2500 (2000- 3500)	NS
Colloids (ml)	500 (500-1000)	500 (500-1000)	NS
POSTOPERATIVE DATA			
Mechanical ventilation (hours)	15 (8-29)	9 (4-20)	0.001
ICU stay (days)	3 (2-5)	3 (2-4)	NS
Mortality 30 days (yes/no)(%)	5/62	9/149	NS
	7.5%	5.6%	
Hospital stay (days)	18 (14-24)	16 (13-22)	NS

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with Journals index. MAP: The an arterial pressure. It cardial findex. MAP: Break and Adjustic volume index. SVY: stroke volume variation. PPY: pulse pressure uriation. ELWI: extravascular lung water index. RBC: red blood cells. ICG- PDR:

Conclusion: There is a high incidence of elevated basal levels of Nt-proBNP in adult patients undergoing liver transplantation. This could be related to cirrhotic cardiomyopathy. Higher levels of basal Nt-proBNP were associated with haemodynamic instability and more requirements of vasopressor drugs and transfusion rates during the intraoperative period. They also were associated with higher mechanical ventilation time. Patients with elevated Nt-proBNP levels before surgery require greater efforts to achieve optimal intraoperative haemodynamic conditions

#### 01AP11-2

# Remote Ischemic Preconditioning combined with Diazoxide Attenuates from Hepatic Ischemia Reperfusion Injury Induced by Ischemia and Reperfusion

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Background and Goal of Study: Remote ischemic preconditioning (RIPC)

Background and Goal of Study: Remote ischemic preconditioning (RIPC) has been shown to reduce ischemic injury in an ex vivo mice hepatic ischemia reperfusion (IR) model and diazoxide is known to attenuate ischemic injuries in several organ models via the ATP-activated potassium channel [K(ATP)] pathway. However, the combined effect of those two interventions has not been tested in mice hepatic ischemia reperfusion model. This study aimed to investigate the effect in vivo using a mice hepatic ischemia reperfusion model.

Materials and Methods: Forty c57BL6 mice were randomly divided into the following 5 groups: i) sham-operated control; ii) IR; iii) IR+RIPC; iv) IR+RIPC+diazoxide; v) IR+RIPC+glyburide. The histological changes including the hepatic ischemia injury were assessed by H&E staining and the levels of liver aminotransferase enzymes and inflammatory cytokines (IL-6, IL-8 and TNF-alpha) were measured.

Results and Discussion: Both diazoxide and RIPC significantly reduced the hepatic ischemic injury, liver enzymes and inflammatory cytokine secretion compared with ischemia reperfusion group. Furthermore, the combination of diazoxide and RIPC had a synergic hepatic ischemia limiting and anti-inflammatory effects. On the other hand, combination of glyburide and RIPC increased acute liver injury compared with RIPC alone, thereby attenuating the hepatic ischemia limiting and anti-inflammatory effect of RIPC.

**Conclusion**: The findings of this study suggested that the combination of diazoxide and RIPC had a potentially hepatic ischemia preventing effect via the K(ATP) nathway.

#### 01AP11-3

The effect of pneumoperitoneuom on systemic haemodynamic and hepatic enzymes in cirrhotic versus non cirrhotic patients undergoing laparoscopic surgery using non-invasive Electrical Cardiometry

<u>Hussain N.</u><sup>1</sup>, Othman M.<sup>1</sup>, Khalil M.<sup>1</sup>, Helal S.<sup>2</sup>, Case control study

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**Background and Goal of Study**: Pneumoperitoneuom PP can affect hepatic perfusion, systemic hemodynamics variably. Aim: To evaluate PP influence on haemodynamic monitored by electrical bio impedance cardiometry EC (ICON, Osypka, Germany), cirrhotic CHILD A in laparoscopic cholecystectomy LCH.

Materials and Methods: Case control study, with Ethics Committee approval, registered (Pan African Clinical Trial). Consented 43 patients, 3 excluded, cirrhotic C gp (n=20), non-cirrhotic NC gp (n=20).Post anaesthesia a central venous catheter CVP (after consent, for research only)was applied.EC readings (Heart rate HR b/min, cardiac output CO l/min, systemic vascular resistance SVR dyns/s/cm-5, Stroke Volume Variation SVV%, and contractility Index CI( measures contractility, normal range: 37.5 - 62.5) Alanine aminotransferase ALT, aspartate aminotransferase AST u/l and serum lactate mg/dl. All were reported at T1: After induction, T2: Post (CO2) insufflation(14 mmHg) and T3: 6 h after surgery. Surgical complications, hospital and ICU stay were reported.

**Results and Discussion**: Total insufflation and operative times/min were comparable C gp vs NC gp respectively (52±30 vs 58±28, P≤ 0.2), (72±14 vs 79±34, P≤ 0.9)There were comparable parameters between NC gp vs C gp respectively at (T2) HR (75±13 vs 79±12, p=0.3), CVP (13±4 vs 14±2 p=0.3). The EC readings [SVV (8.9±3.6 vs 11.6±7.6 p=0.3), SVR (1153±442 vs 1332±430, p=0.2), CO (5.5±1.3 vs 5±1.9 p=0.1] with no significant change from baseline. At (T3) another comparable parameters between NC gp vs C gp respectively HR (81±12 vs 78.9±10 p=0.5), CVP (7.7±3.7 vs 8.2±3.8 p=0.4), SVV (11±7 vs11±5 p=0.46) SVR (1007±316 vs 1168±373, p=0.1), CO (6.6±1.7 vs 5.6±1.4 p=0.07). AST, ALT, blood lactate mg/dl were also comparable respectively (58 vs 34, p=0.6, 42 vs 19, p=0.1, 24±12 vs 26±15 p=0.6). Median (IQR) Cl in C gp was constantly lower than NC gp after insufflation (T2) 27.9[20-35] vs.40.7 [31-57], p<0.001, post recovery (T3) 36.4[32-47] vs 53.7[36-69], p=0.002) respectively, repeated measures in the C gp were significant (24.3 P=0.002 Friedman test). Postoperative and hepatic complications, ICU and hospital stay all were comparable between the 2 groups.

**Conclusion**:EC were able to track no major haemodynamics changes in CHILD A cirrhotic doing LCH,except from the CI,that may help diagnosing early cirrohtic cardiomyopathy.

# 01AP11-4

The effects of Temporary Portocaval shunt during live donor liver transplantation on the haemodynamics and laboratory parameters of the anhepatic and reperfusion phases

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**Background and Goal of Study**: Temporary Portocaval shunt TPCS is a surgical procedure to help reduce gut congestion in post-dissection phase of LDLT. Aim is to evaluate the effects of TPCS on systemic haemodynamics and laboratory parameters during the anhepatic and reperfusion phases.

Materials and Methods: Randomized control study after ethical comity approval and consent, registered at Pan African Clinical Trial Registry(PACT201712002857722). 64 LDLT, (4 excluded for portal vein extended thrombosis), TPCS S gp (n=30), no shunt C gp (n=30).Post induction Trans esophageal Doppler probe is applied TED(Cardio Q, Deltex, Chichester, UK).Haemodynamic, TED parameters (cardiac output CO I/min, systemic vascular resistance SVR dyns/s/cm-5\min), arterial blood gases (pH, bicarbonate HCO3 mmol/l), serum lactate (mg/dl), dose of vasoactive drugs are reported at: post induction base line (T0), at end of the anhepatic phase (T1) and 5 minutes post-reperfusion(T2).Postoperative 24h (T3). New grafted liver enzymes, blood lactate and complications were monitored.

**Results and Discussion**: MELD score and age were comparable S gp vs C gp (16[15-18] vs.15 [12-17.7] P= 0.055, 49.5[45-52] vs. 47.5[42.25-51.7] P=0.36), respectively.

At (T1): median [IQR] arterial pH values, was comparable (S gp vs. C gp) 7.32[7.24-7.31] vs. 7.29[7.25-7.33]

At (T2) CO, pH, HCO3 were significantly higher with S gp vs. C gp (CO) 7.6 [6.3-8.6] vs. 6.1 [5.4-7.2], (pH) 7.28[7.24-7.31] vs. 7.20 [7.19-7.25] P=0.001), (HCO3) 20.7[18.6-23] vs.16.5 [14-18.7] P= 0.001), respectively.

At (T3) the liver enzymes show no change between 2 gps, while blood Lactate levels (mg/dl) were significantly less with S gp compared to C gp (27.02[18-39] vs. 50[40-82], P= 0.001.

More total noradrenaline support (Nor/mg) were required during anhepatic phase and throughout the procedure guided with TED to support mean BP and SVR in C gp compared to S gp, (Nor/mg 6[0-12] vs. 3.6[0-6] P= 0.03) respectively. Significantly less adrenaline boluses during (T2) were required in S gp vs C gp (17±1 vs. 45± 20 mgm P= 0.001). Packed red cells were comparable (2[0-4] vs. 2[0-6.7] units, P=

0.31.) Warm ischemia time was longer in S gp vs. C (51.1+14 vs. 44.12+16 mins, P= 0.01). 24 h postoperative liver enzymes were comparable (P= 0.6). **Conclusion(s)**: TPCS reduces acidosis, doses of vasoactive drugs needed to support haemodynamics during anhepatic phase and reduces reperfusion injery.

#### 01AP11-5

# Effect of propofol and sevoflurane on hepato - splanchnic blood flow: preliminary

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**Background and Goal of Study**: Maintaining hepato-splanchnic blood flow and perfusion pressure is important for survival of organs. Both propofol and sevoflurane, have an effect on hepato-splanchnic blood flow. Animal studies suggest that sevoflurane results in a reduction of portal blood flow and an increase in hepatic arterial blood flow¹. Propofol increases total hepato-splanchnic blood flow, primarily by an increased portal blood flow². The aim of this study was to evaluate and compare the effect of sevoflurane versus propofol on hepatic blood flow during hepatobiliary surgery.

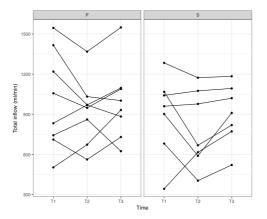
Materials and Methods: After ethical committee approval and written informed consent, 22 patients undergoing pancreaticoduodenectomy were randomized to receive either propofol TCI (Schnider model) (P group) or sevoflurane (S group). All patients received individualized goal-directed hemodynamic therapy. Hemodynamic variables were recorded at designated times using the PiCCO system (Pulsion Medical System). Hepatic blood flow was measured by the surgeon using ultrasound transit time flow measurements (Medi-Stim AS). Hemodynamic measurements were recorded, compared and related to hepatic blood flow measurements. After testing for normal distribution, data between groups were compared using a two-way ANOVA for repeated measurements.

**Results and Discussion**: A total of 15 patients were included. There was no significant difference in cardiac index. The S group has significant lower MAP (P = 0.03) and higher need for vasopressor support (P < 0.01). There was no significant difference between both groups in total hepatic blood flow. Relative blood flow in the hepatic artery and portal vein show similar results.

**Conclusion**: With similar CI, we found no statistically significant difference in hepatic blood flow between both groups. The need for vasopressor support was significantly higher in the S group compared to the P group. Further research is needed to understand the mechanism and clinical impact of these findings.

#### References:

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#### 01AP11-6

# Indocyanine green clearance rate as a predictive factor of complications following major liver resection

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**Background and Goal of Study**: Indocyanine green elimination by pulse spectrophotometry is a non-invasive liver function monitoring system. The aim of this study is to assess the relationship between postoperative ICG plasma disappearance rate (ICG PDR % min) and the onset of medical and surgical complications.

Materials and Methods:33 patients scheduled for mayor liver resection

were selected. ICG PDR was measured preoperatively and on the day 1 and 2 postoperative. We recorded the appearance of surgical complications postoperatively (liver ischemia, biliary leak and intra-abdominal fluid collections and medical complications (pneumonia, ascites, pleural effusion, infection, coagulopathy and thrombosis) This study is registered in ClinicalTrials.gov under the number NCT02813538. This study was approved by the Ethics Committee. All the patients were included after signing an Informed Consent.

Results and Discussion: 7 patients underwent surgical complications and 14 medical ones. When analyzing the surgical complications, PDR the first day was greater in the group that did not develop any events 18,4 ± 6 against 11,3 ± 7 in the group with surgical issues (p 0,014) Regarding medical events, first day PDR was 19± 6 in the patients with no issues versus 13 ± 5 in the group that had any medical complication. Moreover, our results show a significative association between PDR measurement taken on postoperative day 1 and hospital stay (r = -0,62 p=0,001) and ICU stay (r=-0,46 p= 0,008). No significative association was found between routine laboratory tests and adverse events occurrence.

**Conclusion:** ICG PDR is a useful, non-invasive liver function test in patients undergoing major liver resection. It may help to predict both medical and surgical complications in these patients, improving their management and therefore, their outcome

#### 01AP11-7

# Do sex differences affect inflammatory reactions in patients with hepatectomy?

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Background and Goal of Study: Sex steroids have important inflammatory effects, and the liver is involved in their metabolism. However, whether there are sex differences in the relationships between hepatectomy and inflammatory reactions, such as white blood cell (WBC) counts, monocyte counts, and C-reactive protein (CRP) levels remains unclear. We hypothesized that there are no sex differences in these relationships.

Materials and Methods: After approval by the Institutional Review Board

(IRB), 24 adult patients who underwent elective hepatectomy as donors for liver transplantation were prospectively enrolled between November 2014 and September 2017. CRP levels and WBC and monocyte counts were examined prior to surgery (Pre) and on postoperative day (POD) 1, POD 7, and in the fourth week after surgery. Patients' characteristics, WBC and monocyte counts, and CRP levels were evaluated statistically. A p value < 0.05 was considered significant. Statistical analysis was performed using JMP®12.0.1 software (SAS Institute Inc., Cary, NC, USA).

Results and Discussion: There were 14 female and 10 male patients. There were no significant differences in the patients' characteristics between the male and female groups. The WBC counts (mean ± standard deviation: SD) at POD 7 were 5750 ± 1541 x106/L in the female group and 8380 ± 2384 x106/L in the male group (p=0.008), with no significant difference in the monocyte counts (p=0.052). The CRP levels at POD7 were 1.5 ± 0.9 mg/dL in the female group and 3.8 ± 1.7 mg/dL in the male group (p=0.002). Though it has been thought that there is no sex difference in WBC counts, there may be a sex difference in the inflammatory reaction in patients with hepatectomy.

**Conclusion**: Sex differences affect WBC counts and CRP levels of patients after hepatectomy.

#### References:

hepatocaval tumors

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# 01AP11-8 EXTREME LIVER SURGERY: the forgotten surgery for

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Background and Goal of Study: Hepatic tumors that involves the hepatocaval confluence are classically considered irresolvable. However, extreme liver surgery can be used by curative intention. This technique includes total vascular liver exclusion, femoro-porto-jugular venovenous bypass and liver parenchyma cooling, with consequent reperfusion syndrome and the high risk of liver failure.

It is an infrequent surgery. The aim of this study is analyze the survival and recognize intra and postoperative complications.

Materials and Methods: Is a retrospective descriptive case series, includes 13 patients operated by extreme liver surgery from April 2008 to March 2017 in Hospital Universitari Doctor Josep Trueta Girona.

Patients included were 7 women and 6 men, aged 58±10 years old and ASA III. General anesthesia was performed in all cases (desfluorane, remifentanil continuous perfusion and rocuronium). Patients were administered tranexamic acid (loading and maintenance doses, 10mg/kg and 1mg/kg/h), calcium infusion rate

of 100mg/h and 1 liter of 5% albumin, patients were accessed with rapid infusion vascular catheter, central venous catheter and high caliber peripheral access. Basic monitoritzation, invasive blood presure, invasive hemodinamic monitoritzation, TOF and BIS. The last surgery we used cerebral oximetry and tromboelastogram. The posoperatory admision was in our ICU for a deferred awaken.

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Results and Discussion: The mean bypass duration 124±23 minutes, cold ischemia interval 88±15 minutes and normothermal ischemia interval 20±8 minutes. In this series were no intraoperative deads. However, 4 died in the postoperative, 2 in the first week due to liver failure. Therefore, 30-day survival was 76%, 90-day survival was 69% and 3-year survival was 50%. 5 intraoperative incidences were registered: 3 cases of massive bleeding requiring politransfusion, 1 technical surgery difficulty and 1 portal thrombosis. In postoperative period were registered 7 cases of bleeding (2 required relaparotomy) and 4 several liver insufficiency that died, 4 moderate or mild liver insufficiency.

**Conclusion:** Extreme liver surgery is high risk surgery with intra or posoperative complications and high morbi-mortality, especially the masseive bleeding that requeries politransfusion. Otherwise, 3-year survival was 50% and 2-year survival was 75%.

This is a small case series, so cannot draw high evidence conclusions. Extreme liver surgery is a terapeutic option to consider.

#### 01AP11-9

## Liver transplantation: complications and transfusion. Comparative study between brain death and type iii Maastricht donors

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**Background**: Type III Maastricht organ donation after controlled cardiac death (DCD) has became an usual technique in Spain since 2011. Circulatory arrest occurs following limitation of life-sustaining therapy in a controlled ICU or operating room setting in patients with an irreversible and catastrophic illness.

Some studies comparing liver transplantation results between standard brain-death and DCD donors showed no differences in terms of survival while others suggest a higher graft lost and mortality in DCD recipients. None of them assesses transfusion rates.

The goal of this study is to compare transfusion and complications in liver transplantation from standard brain death and DCD donors, considering as well the differences between ECMO and Fast Extraction technique in Type III Maastricht.

Case Report: We retrospectively studied 67 patients who underwent liver transplantation between 2013 and 2017 in Puerta de Hierro Hospital, all of them identified from the database of the National Transplantation Organization (ONT). We considered transfusion rates, complications and one year mortality in the 3 groups. Statistical analysis was permormed using SPSS.

Results and discussion: There were higher rates of biliary complications [IC 95%; 73% (46-84) vs 30% (18-39) p<0,038] and primary graft dysfunction [IC 95%; 45% (19-56) vs 14% (3-16) p<0,031] in Fast Extraction technique versus the other subgroups. Although ECMO-assisted liver donations after DCD were associated with an increase in RBC transfusion in the first 24 hours, there was no statistically difference.

**Conclusion**: Fast extracción tecnique is asociatiated with lower graft survival. There were no differences in liver transplantation RBC transfusion rates among groups.

# 01AP11-10

# Indocyanine green elimination measurement may detect a procoagulant imbalance following major liver resection. Preliminary results

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Background and Goal of Study: The liver plays a central role in maintaining physiological hemostasis and preventing thrombosis. Major liver surgery is occasionally associated with liver dysfunction. Bleeding complication after hepatectomy has been traditionally recognized. However, the risk of postoperative hypercoagulability has been underestimated and only recently its relevance has become acknowledged.

In one hand, procoagulant imbalance has been previously defined by an increased ratio between FVIII levels and protein C in cirrhotic patients. This ratio has not been investigated after major hepatectomy. On the other hand, indocyanine green elimination by pulse spectrophotometry is a non-invasive monitoring system, validated to determinate liver function. The aim of this study is to establish a potential relationship between FVIII/protein C ratio and Indocyanine green clearance (ICG) in patients after a major liver resection on the basis of potential temporary postoperative liver dysfunction.

Materials and Methods: 33 patients scheduled for mayor liver resection were selected. ICG plasma disappearance rate (ICG PDR % min), procoagulant (Factor II, V, VII, VIII, IX, X, XI and XII) and anticoagulant (protein C, protein S

and antithrombin III) factors were obtained preoperatively and on postoperative day 1 and day 2. This study is registered in ClinicalTrials.gov under the number NCT02813538.

**Results and Discussion:** The mean Factor VIII levels were high, protein C levels were low and factor VIII/protein C ratio was high on both postoperative day 1 (186  $\pm$  47, 60  $\pm$  20 and 3.3  $\pm$  1.4 respectively) and 2 (192,3  $\pm$  43,05, 55,4  $\pm$  21,8 and 4,0  $\pm$  2,04 respectively). The median ICG PDR was 16  $\pm$  6,99 on postoperative day 1 and 16,0.35  $\pm$  6,88 on postoperative day 2. Significant correlation was found between factor VIII/protein C ratio and ICG PDR measured on postoperative day 1 (r = -0.42, p< 0.02) and 2 (r = -0.48, p< 0.008).

Conclusions: Our results suggest that low ICG PDR might be associated with an increased FVIII/protein C ratio, likely meaning that liver dysfunction (measured by ICG PDR) is linked to a procoagulant status. Further studies are required to confirm these results.

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#### 01AP11-11

# Comparison University of Wisconsin (UW) solution and alanine for cold preservation of liver

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Background and Goal of Study: In liver preservation UW is the most widely used solution. However, some limitations of UW have been identified, such as risk of hyperkaliaemic cardiac arrest and high cost encouraging to study other preservation solutions (1). Previous studies have shown that alanine, an amino acid, presents a beneficial effect at reperfusion in rat and mice livers after warm and cold ischemia (2). This study compared the protective effect of alanine and UW against cold ischemia-reperfusion injury in ex vivo perfused rat livers.

**Materials and Methods**: After Animal Care Committee approval, female Wistar rats were fasted for 16 h. After they were anesthetised, the portal vein was cannulated, the liver removed and perfused at a flow rate of 5 ml/min in a closed ex vivo system. Animals were divided into 3 groups (n = 10 in each): control in which livers were perfused with a HBSS solution containing 1 g/l glucose; alanine group (HBSS medium containing 25 g/l alanine without glucose); and UW native solution. The experiment consisted of 3 phases: perfusion for 15 min at 4°C, cold ischemia (4°C) for 24 hours, and reperfusion during 60 min at 37°C. Glucose and lactate, potassium, and enzymes were analysed in perfusate samples at different time-points. The ratio between oxidised and reduced glutathione (GSSG/GSH) was determined in tissue biopsies. Mean  $\pm$  SD. ANOVA test.

**Results and Discussion**: UW and alanine attenuated enzymes release in the perfusate during the reoxygenation phase when compared to control group (P < 0.001). Overall, potassium level was greater in UW corresponding to the concentration in the native solution (P < 0.001). GSSG/GSH ratio was lower in livers preserved with the alanine solution when compared to UW (P < 0.001). These results show that UW and alanine are equally effective preservation solutions as suggested by the lowest lactate deshydrogenase release, a marker of cell death. We found some potential advantages of alanine as a preservation of the glutathione buffer system, lower concentration of potassium, and lower cost.

Conclusion: Our results suggest that, similar to UW, alanine in buffer medium seems appropriate for liver preservation. Further studies are needed to determine the potential of alanine for clinical use.

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# 01AP12-1

The effects of lateral 45° downward position and carbon dioxide pneumoperitoneum on the optic nerve sheath diameter in patients undergoing laparoscopic transperitoneal nephrectomies: A prospective observational study

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Background: Trendelenburg position and carbon dioxide (CO2) pneumoperitoneum are in association with increased intracranial pressure (ICP) reflected by the optic nerve sheath diameter (ONSD). Measurement of ONSD by ultrasound-guidance can be used in the diagnosis of ICP (1, 2). We investigated the effects of lateral 45° downward position and CO2 insufflation on ONSD in patients undergoing laparoscopic transperitoneal nephrectomy.

Materials and Methods: Twenty-four patients undergoing laparoscopic nephrectomy were included in this study after obtaining Institutional Ethics Board

approval (2016/1283). Standard general anaesthesia induction, maintanance and extubation techniques were applied to all patients. Longitudinal and transverse ONSDs were measured for each eye by placing a 7.5-10 Hz linear ultrasound probe over the eyeball, and the calculated mean values were noted at each time point: T0: supine position after induction of general anaesthesia, T1: lateral 45° downward position, T2: after CO2 pneumoperitoneum, T3, T4, T5: at 30-minute intervals during surgery, T6: lateral 45° downward position after carbon dioxide exsufflation, T7: supine position at the end of surgery, T8: at postoperative 24th hour. Insufflation pressure was limited to 12 mm Hg during the surgery. Hemodynamic and respiratory parameters were also recorded at the measurement time points.

Results: Both eye ONSD values were found significantly higher than T0 in all time points, except T8 (p<0.001). Hemodynamic and respiratory data were similar (p>0.05)

**Conclusion:** Ultrasound-guided ONSD measurements revealed increment within minutes after both lateral 45° downward position and CO2 pneumoperitoneum in laparoscopic transperitoneal nephrectomies as the early diagnosis of ICP increase. **References:** 

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## 01AP12-2

# The relationship between intraoperative blood pressure variability and all-cause mortality and postoperative acute kidney injury

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Background and Goal of Study: Low intraoperative blood pressure is linked with increased mortality and increased risk of acute kidney injury (AKI). The association between intraoperative blood pressure variability and postoperative outcome remains unclear. The Goal of the study is to assess the association between intraoperative blood pressure variability and postoperative outcome.

Materials and Methods: This is a retrospective cohort study of consecutive adults who underwent surgery at the Lady Davis Carmel Medical Center between 1.1.2005-31.12.2015 of >120 minutes duration. Operations under local anesthesia and cardiac/vascular surgeries were excluded. Intraoperative invasive blood pressure variability was calculated using the generalized average real variability (ARV) equation and its association with all-cause mortality and AKI was assessed using Cox proportional hazard regression models.

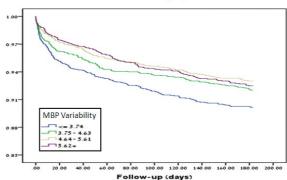
Results and Discussion: Overall, 7677 patients (61.2% men, 83.8% elective surgeries) with mean age 66.1±13.4 years were included in the study. Compared to the lowest quartile of generalized ARV, the adjusted hazard ratio (HR) for all-cause 30 days mortality was 0.90 (95% CI, 0.67-1.22) in the second quartile, 0.76 (0.55-1.05) in the third quartile, and 0.68 (0.49-0.96) in the highest quartile. Compared to the lowest quartile of generalized ARV, the adjusted HR for AKI was 1.3(1.16-1.5) in the second quartile, 1.5(1.4-1.75) in the third quartile, and 1.6(1.4-1.9) in the highest quartile.

**Conclusion(s)**: Intraoperative blood pressure variability estimated with the generalized ARV equation is inversely associated with the risk of all-cause mortality and directly associated with the risk of AKI.

# **Demographics & Baseline Characteristics**

Blood pressure variability Group	Group I ARV⇔3.74 mmHg/min	Group II 3.75 <arv<4.63 mmHg/min</arv<4.63 	Group III 4.64 <arv<5.61 mmHg/min</arv<5.61 	Group IV ARV>5.62 mmHg/min
Age	63.5±15.8	66.3±13.1	66.2±12.4	68.3±11.7
Gender N(%) Male	1199(62.5)	1221(63.7)	1224(63.8)	1046(54.6)
Surgery Type				
Elective	1564(83.4)	1603(85.3)	1632(86.7)	1623(86.0)
Emergency	160(8.5)	111(5.9)	108(5.7)	117(6.2)
Urgent	152(8.1)	166(8.8)	143(7.6)	148(7.8)
Malignancy N(%)	718(37.5)	654(34.1)	518(27.0)	476(24.8)
Renal Failure N(%)	427(22.3)	347(18.1)	305(15.9)	284(14.8)
Dialysis N(%)	80(4.2)	46(2.4)	44(2.3)	34(1.8)
IHD N(%)	275(14.3)	380(19.8)	477(24.9)	570(29.7)
CHF N(%)	334(17.4)	368(19.2)	367(19.1)	312(16.3)
HTN N(%)	1273(66.4)	1348(70.3)	1387(72.4)	1474(76.9)
CVA N(96)	223(11.6)	223(11.6)	292(15.2)	305(15.9)
Lung Disease N(%)	201(10.5)	202(10.5)	234(12.2)	198(10.3)
Cirrhosis N(%)	23(1.2)	12(0.6)	13(0.7)	13(0.7)

# Kaplan Meyer curve of Survival according to MBP variability quartiles



ARV-MBP- Average Real Variability-Mean Blood Pressure (mmHg/min)

## 01AP12-3

#### Living Donors in Renal Transplantation: clinical follow-up

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**Introduction:** Renal transplantation has contributed to increased hope and quality of life in patients with end-stage renal disease (ESRD). Donors should have a similar general health status with no increased risk of ESRD. Literature available shows low morbidity and mortality rates. The purpose of this audit is to conduct a follow-up of living donors at our institution.

Methods: Follow-up audit in 2017 of living donors for renal transplantation from 2011 to 2014. Variables: Age, ASA, BMI, Surgical Technique, Anaesthetic Technique, Surgical and Anaesthetic Complications and follow-up time. Evaluation of pre-operative (PO) and follow-up variables (FL): Associated pathology (AP), Haemoglobin, Urea, Creatinine (Cr mg/dL), Glomerular filtration rate (GFR ml/kg) expected GFR at the time of FL and Pain. Statistical analysis using SPSS® V24. Results: Approval of Risk Management, Health and Safety&Hygiene Institutional Department. Clinical data of 82 live donors was analized. 53 met inclusion criteria With the beginning of laparoscopic nephrectomy in 2012, we get FL of 48-72 months in 14 laparotomies and 21 laparoscopies and FL of 30-48 months in 18 laparoscopies. Mean age 53 years (min 27 - max 77); pre-donation AP: 9 arterial hypertension, 1 DM type 2, 10 Dyslipidemia, 6 Depression and 4 patients with obesity; AP de novo in FL: 5 arterial hypertension, 4 Dyslipidemia, 4 Depression and 6 readjustment of anti-depressant medication. 1 case of intraoperative haemorrhage, without transfusion; complications in FL: 3 incisional hernias and pain in FL was 36% post-laparotomy and 10% post-laparoscopy; mean Cr of PO 0.71 ± 0.14, FL 0.97 ± 0.22. Expected GFR: 101 (max 171 - min 62); TFG FL: 73 (max 116 - min 40). Statistical significant difference was observed between adapted GFR in PO vs FL (p<0.001). No patients had Chronic Kidney Failure (CKF) before donation and after that 12 patients developed stage 3A and 2 patients stage 3B of

**Conclusion:** Living donors in renal transplantation met the clinical requirements at the time of donation. However, when assessed in 30 months FL, there is a decrease in GFR that cannot be neglected with important evolution to CKF. There was also an increase in the prevalence of AP with risk factor for the development of CKF. Laparoscopy seems to have contributed to the decrease of pain. The lack of information regarding the FL of the donors makes it crucial to carry out further studies, to better clarify the described findings.

#### 01AP12-4

## Impact of obesity after elective surgery in elderly patients

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**Background and Goal of Study**: We aimed to evaluate the incidence of Body Mass Index (BMI) ≥ 35 Kg/m<sup>2</sup> and its perioperative impact in elderly elective surgical patients.

Materials and Methods: After study approval by ethics committee, an observational prospective study was conducted. Patients submitted to elective surgery, from May to July 2017 were included. Exclusion criteria: age < 60 years old; inability to give informed consent; patients admitted in the ICU. World Health Organization Disability Assessment Schedule (WHODAS), EuroQOL 5 dimensions (EQ-5D), Lawton Instrumental Activities of Daily Living (IADL) Scale and the Clinical Frailty Scale were used to assess quality of life and health status. Frail patients were considered if they have a score ≥ 5 and disability was defined as a WHODAS score of ≥ 25%. Quality of Recovery was evaluated by Quality of Recovery 15-titem (QoR-15). Patients were evaluated preoperatively (D0), 24 hours after surgery (D1), at day 30 (M1) and at 3 months (M3) follow-up. Patients with a BMI ≥ 35 kg/m² were considered obese (ObP). The Chi-square, Fisher's exact or Mann-Whitney U tests were used for comparisons.

Results and Discussion: A total of 235 patients were included, with a median age of 69 years. 58% were ASA I/II and 42% ASA III/IV. The incidence of ObP was 10%. ObP presented with more problems in all EQ-5D dimensions (mobility: 74% vs. 48%, p=0.002; care: 60% vs. 29%, p<0.001; activity: 60% vs. 41%, p=0.028; pain: 81% vs. 48%, p<0.001; anxiety: 88% vs. 71%, p=0.019) at D0, while at M3 they had more problems in mobility (74% vs. 49%, p=0.003) and care (67% vs. 35%, p<0.001). ObP were more frequently frailty at D0 (38% vs. 19%; p=0.008) and at M3 (48% vs. 26%; p=0.007). ObP were more frequently disable at D0 (50% vs. 32%; p=0.023), and at M1 (50% vs. 34%; p=0.040). ObP had lower median scores in IADL Scale at D0 (p=0.024) and M3 (p=0.030). ObP patients presented lower total median scores at QoR-15 at D0 (p=0.040), but no at D1 (p=0.601). There were no differences in ObP regarding age (p=0.845), type of anesthesia (p=0.068), anesthesia duration (p=0.443), length of hospital stay (p=0.534), reintervention rate at M3 (p=0.206) and mortality at M3 (p=0.500).

Conclusion(s): Obese elective elderly patients presented for surgery with a worse quality of life and health status. Their quality of recovery was similar and have similar percentage of problems in the majority of EQ-5D dimensions three months after surgery.

### 01AP12-5

# Electrocardiogram differences in reperfusion phase of kidney transplantations from living donors

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**Background and Goal of Study**: Graft reperfusion, a phase in kidney transplantation, may show rapid changes in hemodynamic parameters. The purpose of this study is to be able to detect the hemodynamic and metabolic alterations between the two solutions with EKG variations that may occur following the kidney graft reperfusion.

Materials and Methods: While Group 1 (n=40) uses Servator B SALF (S.A.L.F S.p.A., Cenate Sotto, Italy) solution, Group 2 (n=40) uses Bretschneider modificata (Galenica Senede, Siena, Italy) solution. Living kidney transplantation cases that do not have any cardiac complaints were included in the study. Demographic data such as age, sex, ASA as well as preoperative, perfusion and postoperative EKGs were taken at the same time with the blood gases. Hot and cold ischemia times of the kidney graft were recorded according to the amounts of graft wash solution used.

Results and Discussion: No differences were observed in terms of demographic data, operation periods, hot and cold ischemia times, blood gas analyses and electrolytic changes. In Group 1, 23 patients were observed to have cardiac problems (Bradycardia: 15, Asystole: 8 patients). The incidence of bradycardia, asystole and inotrope adjustments between groups were shown at figure 1. No cardiac changes were observed in Group 2. Comparing Group 1 and Group 2, while preoperative corrected QT interval (cQT) was not found to be different, perfusion cQT and postoperative cQT were found to be significantly different (p<0.05). In Group 1, perfusion cQT and postoperative cQT were observed to differ from preoperative cQT (p<0.05). There were no differences between perfusion cQT and postoperative cQT. In Group 2, preoperative, perfusion and postoperative cQTs were observed not to be

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different within the group (Figure 2).

Conclusion: Although hemodynamic and metabolic parameters are at normal levels during kidney transplantation, particularly in graft reperfusion stage, the kidney transplantation bears a risk in terms of disorders in ventricular repolarization period. Evaluation of QT interval can be an essential parameter in order to take required precautions and foresee complications. Whilst preoperative EKG of the cases provides warning, electrolyte levels must also be taken into consideration.

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## 01AP12-6

# Effect of mean arterial pressure (MAP) on early graft function of renal transplant recipients. Our experience

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**Background and Goal of Study**: Early graft function is crucial for successful kidney transplantation. The aim of our study was to evaluate the effect of mean arterial pressure (MAP) on early graft function and biochemical outcome.

Materials and Methods: This was a retrospective study carried out on patients undergoing renal transplant only from live-related donors between January 2016 and June 2017.

One group had mean MAP of > 100 mmHg. Second group was with mean 85< MAP<100 mmHg and other with mean MAP of <85 mmHg. All the donors were genetically related and were evaluated in early postoperative period. The trend in fall of serum creatinine was studied during the first four post-operative days. Correlation analysis, analysis of variance test (ANOVA) and multivariate analysis technique were used in this study for statistical computation.

Results and Discussion: All 3 days mean serum creatinine values of first and second group were comparable with the third group's mean values on 1st, 2nd and 3rd postoperative days. The mean MAP at the time of decamping was for the first group 106.84 mmHg; for the second group 94.68 mmHg and for the third group 81.68 mmHg. Mean MAP varied from a minimum of 78 mmHg to maximum of 118 mmHg. There was no significant difference in the first two groups on 1st, 2nd, 3rd and 4th postoperative days but there were significant differences of first and second group compared to the third one on 1st, 2nd and 3rd postoperative days

**Conclusion**: A mean MAP >85 mmHg with good perioperative fluid hydration is associated with good early graft function.

## 01AP12-7

# Robotic partial nephrectomy under opioid free general anesthesia (OFA): A comparative study

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**Background:** Robotic partial nephrectomy (RPN) has traditionally been performed under regular general anesthesia (RGA) with opioid analgesics. However, opioids are associated with adverse drug events (including nausea, vomiting, constipation, postoperative sedation), which lead to an increased length of stay.

**Objectives:** To compare recovery outcomes between opioid free anesthesia (OFA) and RGA.

Materials and methods: We retrospectively analyzed, the files of 93 patients who underwent au RPN for cancer, between January 2016 and November 2017. We stratified the cohort into groups according to the type of anesthesia. 26 patients received OFA protocol (Dexmedetomidine, Lidocaine, Ketamine and Dexamethasone), and 67 patients received RGA protocol (Sufentanil or Remifentanil, dexamethasone, ketamine and lidocaïne according to anesthesiologist choice). Postoperative analgesia was multimodal (NSAID, nefopam, acetaminophen, lidocaïne, tramadol). Morphine was used as rescue analgesia, by oral or intravenous (IV) route.

We compared occurrence of PONV and use of anti emetics, maximal numeric pain scale (MNPS) and opioid consumption in the first 48 hours, and length of stay in the two groups. Linear and logistic regression analyses were performed with JMB Statistical Discovery Software, results were expressed in mean ± SD.

Results and discussion: There were slightly more men in both groups (OFA group 54% and 61% in RGA, respectively), mean age of 56(±14) years in OFA group and 58(±13) years in RGA group.

OFA was significantly associated with less PONV 12% vs 37% (p = 0,02), and a significant reduction of LOS was observed 3,1±2,6 days vs 4,4±2,6 days (p<0,0001). The trend of reduction of postoperative morphine consumption (expressed in equivalent IV morphine: 1,5±2,7 mg vs 4,5±7,7 mg (p=0,09) and 0,4±1,1 mg vs 1,5±3,2 mg (p=0,11) at D1 and D2) and MNPS reduction (4,3±2 mm vs 4,5±2,2 mm (p=0,69); 2,4±2,2 mm vs 3,3±2,2 mm (p=0,05) at D1 and D2) does not reach the significance.

**Conclusion:** This retrospective study confirms our hypothesis. Despite the lack of significance, the trend of decrease of pain and opioid requirements observed in the OFA group allow to observe a significant reduction of PONV and LOS. These results must be confirmed by a prospective evaluation.

## 01AP12-8

# Sevoflurane anesthesia increases renal vascular permeability in rats

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Background and Goal of Study: Sevoflurane has been suggested to induce ultrastructural changes in cerebral perivascular cells, small veins and capillaries by transmission electron microscopy (1). Because these morphological changes may cause vascular barrier dysfunction, we measured vascular permeability index in brain, liver and kidneys with Evans blue dye solution just after sevoflurane anesthesia in rats.

Materials and Methods: We divided adult SD rats into sevoflurane group and control group (n=5 in each group). Rats in the sevoflurane group were anesthetized with 3% sevoflurane. 33% oxygen in nitrogen with spontaneous breathing. A catheter was inserted into a femoral vein for 0.33% Evans blue dye injection (0.56 mg/100g of rats). Sevoflurane anesthesia was maintained for 3 hours after dye infusion. In the control group, rats were anesthetized with intraperitoneal (IP) medetomidine mixture (medetomidine 0.15mg, midazolam 2mg, butorphanol 2.5mg/100g of rats), and were administered the same dose of Evans blue as the sevoflurane group. Three hours after dye injection, rats in both groups were anesthetized with IP medetomidine mixture and perfused via ascending aorta with 0.9% saline, after heparinized blood sampling transcardially. The brain, liver and kidneys were then removed and minced as tissue samples. A 1-2 g sample of each tissue was incubated with formamide 10 mL at 60°C for 18 hours. Evans blue dye in plasma and formamide solution was measured by dual wavelength spectrophotometric analysis (620 nm. 740 nm) for vascular permeability index (2). Data were expressed as median (min, max), and were analyzed by Mann-Whitney U test, with P < 0.05 being significant.

Results and Discussion: In the control group, vascular permeability index in brain, liver and kidneys was 0 (0-0), 3.9 (2.5-5.5) and 7.1 (4.5-8.5) respectively. The each tissue index in the sevoflurane group was 0 (0-0), 3.5 (2.4-4.9) and 14.3 (7.9-19.6), respectively. There were no significant differences among groups in the index of brain and liver. However, renal permeability index was significantly higher in the sevoflurane group than the control group.

**Conclusion**: We found sevoflurane anesthesia increased vascular permeability in kidneys but not in brain and liver. These findings suggest that sevoflurane anesthesia may cause renal edema.

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### 01AP12-9

# The influence of the maximum bladder capacity on risk factors for postoperative urinary catheterization

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Background and Goal of Study: Post Operative Urinary Retention (POUR) followed by urinary catheterization is a well-known complication. Considered risk factors for POUR are many e.g. gender, age and type of surgery. We performed a prospective, study to analyze the risk factors for postoperative urinary catheterization, using the MBC and the 500mL limit in surgical patients.

Materials and Methods: The study consist of 1851 surgical patients operated under general or spinal anesthesia, without a perioperative urinary catheter. Randomized was between the 500mL group or the MBC group. Postoperatively bladder volumes were hourly scanned by ultrasound (BladderScan BVI9400) until spontaneous voiding, or reaching maximum bladder volume limit being unable to void. Then the patient was catheterized. A list of possible risk factors was composed. Univariate and multivariate analysis of urinary catheterization, influenced by the MBC and the different risk factors, were calculated.

Results and Discussion: The MBC lowers the incidence of POUR (RR=0.723, p=0.034). Univariate risk factors for catheterization are displayed in figure 1. Multivariate analyses showed that the effect of the MBC was the same for all risk factors, except for >60 years (=effect modification, p=0.009). In these patient's the incidence of urinary catheterization was high, around 17% for both groups. Another risk factor for urinary catheterization was the first scanned volume after arriving at the PACU >250mL (RR=3,51, p<0.0001).

Conclusion: Risk factors for urinary catheterization are spinal anesthesia, type of surgery, age older than 60, a preoperative bladder volume >150mL and a postoperative bladder volume >250mL after arriving at the PACU. The MBC prevents unnecessary urinary catheterizations, except for patients >60 years. An implementation study using the MBC is needed to measure the feasibility in daily anesthesia practice.

# 01AP12-10

# Association of cisplatin-based nephrotoxicity in hyperthermic intraperitoneal intra-operative chemotherapy: a retrospective study

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Background and Goal of Study: Cisplatin is commonly used in citoreductive surgery (CRS) associated with hyperthermic intraperitoneal intra-operative chemotherapy (HIPEC) for the management of peritonea carcinomatosis (PC). Nephrotoxicity is chief dose-limiting adverse effect of cisplatin treatment. However there is limited information on risk factors associated with cisplatin nephrotoxicity in HIPEC. We aim to determine perioperative factors involved on acute kidney injury after HIPEC.

Materials and Methods: After committee approval (Ref.145/2016), a retrospective cohort study of patients who underwent CRS and HIPEC using cisplatin from 2011 to 2015 was performed. RIFLE (risk, injury, failure, loss, end-stage kidney) classification was used to assess the development of cisplatin-nephrotoxicity. We evaluated associated risk factors predictive of acute kidney injury (AKI) after cisplatin-HIPEC.

Results and Discussion: From January 2011 and December 2016, 72 patients receive cisplatin and adriamycin was associated in 65% of cases. Based on the RIFLE classification, 29% of patients developed AKI. (Risk: n=6; Injury. n=9; Failure: n= 2; Loss: n=4. There was an association with the development of AKI with: numbers of peritonectomies (> 5; p= 0.042), peritoneal cancer index (PCI) (p=0.03); HIPEC duration (90 vs. 60 min; p= 0.032) and diuresis volume during HIPEC, p=0.013). Patients with AKI had longer intensive care unit length and hospital length stay. Multivariable analysis identified diuresis volume less than 200 ml/15 min during HIPEC [OR: 3.88 (IC 95%, 1.09-13.84; p=0,036)] and PCI >15 [OR: 3.40(IC 95%, 1.02-11.38; p=0.046].

Conclusion: Our study demonstrates that AKI is frequent after cisplatin-based CRS and HIPEC. PCI, as an indicator of extent of peritoneal disease and diuresis volume during time of HIPEC application are independent factors associated with nephrotoxicity. AKI after CRS and HIPEC is associated with longer intensive care unit length and hospital length stay. More attention to be directed toward the impact of urine output during HIPEC after cisplatin use with HIPEC

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## 01AP12-11

# Postoperative abdomen pain after laparoscopic cystectomy with normal-pressure pneumoperitoneum versus high-pressure

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Background and Goal of Study: Pneumoperitoneum with insufflation of carbon dioxide (CO2) is thought to be the most important cause of postoperative pain. Reduction of pneumoperitoneum pressure may compromise visualisation. Some surgeon still prefers high-pressure. The aim of our study was to determine the effect of pneumoperitoneum pressure on anesthetic and opioid consumption, recovery after laparoscopic intervention and early postoperative pain.

Materials and Methods: Having agreed with the local Ethics Committee and obtained the informed consents, 34 women (scheduled for laparoscopic cystectomy) were examined. Women were randomized into 2 groups: N (n=18) normal-pressure pneumoperitoneum (12 mmHg) and H (n=16) high-pressure one (15 mmHg). Pain was assessed on a visual analogue scale (VAS) in 1, 5 and 24 h after surgery. Other endpoints were opioid consumption; anaesthetic consumption; time to mobilization; time to extubation; and duration of surgery. Both groups were similar in relation to age, height, weight, physical status (ASA I-II). Data are presented as mean±SD. Mann-Whitney U test was used for analysis.

**Results and Discussion:** Despite the long duration of the operation in group N, extubation of patients was performed earlier than in group H (Table). Postoperative pain was significantly less in group N, both at 5 and 24 hours, and did not differ after 1 hour. The consumption of fentanyl, sevoflurane and atrakurium did not differ between groups (p = 0.06, p = 0.61 and p = 0.95). Women started walking the same time after the operation. Pain in the shoulders had less number of women after 24 hours in the N group, although it was not significant. Correlation were revealed between pressure of pneumoperitoneum and the VAS level after 5 hours (0.73, p = 0.034) and 24 hours (0.65, p = 0.044).

Table

Indicators	Normal- pressure (n=18)	High-pressure (n=16)	p
Duration of surgery (min)	50.±22.4	32.5±2.9	0.044
Extubation (min)	20.9±8.2	26.3±4.8	0.12
Sevoflurane (ml)	10.4±2.4	9.9±1.4	0.61
Fentanyl (µg)	416.7±162.01	386.±122.3	0.06
Atracurium (mg)	40.1±3.2	35.1±2.1	0.95
VAS-1h (mm)	23.9±7.8	20±7.1	0.29
VAS-5h (mm)	14.4±3.	21.3±2.5	0.0001
VAS-24h (mm)	9.4±3.9	15.0±0.0	0.001
Ambulation (min)	306.7±154.02	320±116.6	0.84
Pain in the shoulders (%-24h)	88.9	100	0.18

**Conclusion:** normal-pressure pneumoperitoneum reduced the level of early postoperative pain after laparoscopic cystectomy in comparison to high-pressure pneumoperitoneum. Further studies are needed to establish the effect of pneumoperitoneum pressure on the consumption of anesthetics and analgetics.

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#### 1AP12-12

# Cystectomy in a Central Lisbon Hospital: a 3 year experience

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**Background and Goal of Study**: Cystectomy is performed for invasive urothelial neoplasm. It has a significant morbidity and mortality that can be predicted in the preoperative phase by the P-POSSUM score. Combined or general anesthesia is possible for the anesthetic technique. The post-operative evaluation is important to understand the quality of daily life of these patients.

The purpose of this study is to evaluate: the preoperative morbidity and mortality predictions with the P-POSSUM score; the intraoperative anesthetic technique in terms of the blood products requirement and duration of the procedure; the post-operative with HRQOL questionnaire after the cystectomy.

Materials and Methods: A retrospective analysis was performed at the Central Lisbon Hospital during three years – from October 2011 to September 2014. The P-POSSUM determination of morbidity was based on Clavien-Dindo scale and 30 days mortality. The HRQOL questionnaire was done by a phone survey of 25 patients with a maximum of three attempts. SPSS v22 was used for the statistical analysis.

**Results and Discussion**: Fifty patients were analyzed, aged 62-78 years and with a majority of males (45/50) and ASA III (32/50). P-POSSUM had a higher estimation of morbidity (79.7% vs 74% with a coefficient O/E = 0.92) and mortality (15.7% vs 2% with coefficient O/E = 0.25). Combined anesthesia was performed in 38 patients (76.6%). Comparing with general anesthesia, combined anesthesia had a lower blood loss ( $1415 \pm 771$ vs  $1675 \pm 1008$  ml) and blood products requirement (47.2% vs 63.6%) but with a higher time of procedure ( $405 \pm 67$  vs  $377 \pm 74$  min). 18 patients responded the HRQOL questionnaire. It showed an impact on the professional level (67%), reasoning ability (28%), associated chronic pain (28%) and quality of daily life (55%).

Conclusion: The P-POSSUM score was useful in pre-operative prediction of morbidity and mortality but it overestimates them. Combined anesthesia had a lower intraoperative blood loss and blood products requirement, which is associated with an improved outcome. The HRQOL after cystectomy showed a significant impact in terms of quality of daily life.

A larger sample would be necessary to validate the P-POSSUM results and the real benefits of combined anesthesia. This study led to an improvement in our multidisciplinary protocol in order to achieve an improved quality of daily life following cystectomy.

## 01AP13-1

# Evaluation of financial, environmental cost and ecoresponsible professional practice of inhaled anaesthesia: an example from Bordeaux University Hospital (France)

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Background and Goal of Study: Anaesthesia gases are the most communly used for general anaesthesia maintenance. However, they are greenhouse gases (1-3). The aim of the study is to determine the healthcare workers knowledges on ecological footprint and their ecoresponsible professional practice.

Materials and Methods: We conducted an observationnal prospective clinical study for the first part of a professional practice patterns evaluation on ecological inhaled agents management in all the operating rooms of Bordeaux's university hospital. We collected datas on intraoperative mecanical ventilation and inhaled agents consumption. Then, all the healthcare workers received a survey on their knowledges on ecological footprint and their ecoresponsible professional practice. The study was approved by the relevant ethics committee.

Results and Discussion: From January to June 2016, 342 patients were included. For induction, the fresh gas flow (FGF) was < 8L/min in less than 19% of cases. For maintenance of anaesthesia, the mean FGF was 2.5(+/- 1)L/min. Manual FGF was < 1L/min in 0% of cases. When Target Controlled Inhalation (TCI) mode was available, it was used in 65% of cases. Nitrous oxide was never used neither for induction nor for maintenance. From January to June 2017, sevoflurane consumption was 496.75 L which represents 98 158 kg carbon dioxide equivalent (EqkgC0<sub>2</sub>). Desflurane consumption was 48.75 L which represents 173 553 EqkgCO<sub>2</sub>. These total emissions are equivalent to 1 940 792 km of a standard european petrol car. 68 practitioners answered the survey. Mean FGF was declared to be settled between 0.9 and 1.5L/min by 70% of participants. None of the participants knew the right cost and ecological footprint of inhaled agents, 99% of participants were willing for a more acurate environmental impact information. Our study highlights three ways of improvement : reducing FGF, increasing the use of TCI mode and making a weel-reasonned choice of inhaled agent. A protocol of well-reasonned use of inhaled anesthesics was established and information was given.

**Conclusion**: By promoting a well-reasonned use of inhaled anesthesics and by reducing FGF, we may decrease our environmental impact. A further study will be conducted to show if these changes in inhaled anaesthesics management were succesfull to reduce our CO<sub>n</sub> costs.

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# 01AP13-2

# Operating room greenhouse gas release reduction

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Background and Goal of Study: Anaesthesiologist are in the front line to reduce environmental impact from professional use of inhaled anaesthetics. In France, the reduction of the environmental impact of health care is required by law since the Granelle act (2000)

Materials and Methods: We performed a search on the ecofriendly practice, datas

and clinical trials on PubMed using anaesthetics volatile, atmospheric pollution, ecological footprint gases, fresh gas flow (FGF), inhaled agent as keywords for analysis

Results and Discussion: All inhaled anaesthesics are greenhouse gases Atmospheric half-life of nitrous oxyde (N2O) is 114 years, desflurane 14 years and sevoflurane 1,1 year. Combined to radiative properties their 100 years global warming potential (GWP, o), which determine their carbon footprint at 100 years, is 2540 for desflurane, 298 for N<sub>o</sub>O and 130 for sevoflurane. The GWP<sub>400</sub> of carbon dioxide (CO<sub>2</sub>) is 1. Medical N<sub>2</sub>O is also an ozone-depleting gas. It represents 0,5% of global human GHG emissions. When used with halogenated agents, N<sub>2</sub>O is responsible of more than 50% of ecological impact. The global carbon footprint of halogenated agents is estimated from measurements by Vollmer (1) at 3.1 +/- 0.6 million metric tonnes of CO equivalents in 2014 of which near 80% comes from desflurane. There are different ways to improve our practice. First by manually reducing the FGF. Guthinger (2) calculated an halogenated consumption decrease of 40% with FGF reduction from 1,24L/min (±0,74) to 1L/min. Second by using an automated control of end-tidal gases mode on ventilators. Tay & al (3) demonstrated a reduction of CO<sub>2</sub> emission by 44% with this mode. Third, regarding the different environmental costs of inhaled agents, users should consider a wellreasoned use of anaesthetic drugs with an ecofriendly approach. Moreover, inhaled anaesthetics are eliminated with low metabolization directly and unchanged into the atmosphere. System of recovery and reuse anaesthesics gases is available

for commercial use in Canada (Deltasorb® technology). It's a canister placed in the scavenging system which adsorb the anaesthetic, later collecte, then retrieved and purified at a company facility.

**Conclusion**: Ecological footprint of inhaled anaesthesics should be considered in our professional practice.

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#### 01AP13-3

## Nurses' job satisfaction survey - a pilot study

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Background and Goal of Study: In Poland, anaesthesia and intensive care is a combined specialty not only for physicians but also for nurses. However, most nurses work in intensive care units (ICU) or operating theaters (OR) and very rare their positions are changed. The main aim of our study was if there is any difference in job satisfaction between nurses who work in intensive care units (ICU) and these ones who work in operating theaters (OR).

Materials and Methods: The questionnaire form contained 12 questions associated with job's satisfaction and 5 supplementary queries regarding demographics of respondents. The form was adapted and modified from the study of Mcdonald K. at al., which was done in nurses of neonatal intensive care. Each of the 12 questions could be responded with one of answers by study participants: completely disagree, moderately disagree, neutral, moderately agree, completely agree, which were ranked from 1 to 5. All data was collected by medical students, thus the identity of respondents was anonymous. The Mann-Whitney U test was used to assed the statistics. All measurements were done with Statistica 13 (Stat Soft. Inc., Tulsa, USA)

Results and Discussion: The study was conducted in November 2017 in 3 university hospitals in Lublin, Poland. Questionnaire forms were collected from 171 nurses. 162 women and 9 men participated in the study. The mean age of nurses working in OR was 47.44 (44.21-50.67) and in ICU 39.99 (38.07-41.75), p=0.00027. Respondents worked in anaesthesia for 21.68 (18.87-24.48) years and in intensive care for 11.33 (9.52-13.13), p=0.00064. 81 respondents worked in OR and 91 in ICU. The total job satisfaction, obtained from 15 questions, did not differ between nurses. It was 3.21 (2.92-3.49) in ICU group and 3.27 (2.85-3.69) in OR group. However, there were differences associated with several queries. More nurses working in OR were satisfied with co-workers support in comparison to personnel working in ICU: rank sum 7597 vs 7109, z=2.30, p=0.021. In contrast, ICU workers were more content with staffing: rank sum 8519 vs 6187, z=-2.21, p=0.027. Not surprisingly, the ICU staff was more concerned about patients in their departments: rank sum 8731 vs 5975, z=-2.80, p=0.0028. Nevertheless, OR nurses were more satisfied with "team spirit" at their current workplace: 7517 vs 7188, z=1.97, p=0.041 Conclusion: The current workplace may influence some aspects of nurses' job satisfaction

## 01AP13-4

# Anaesthesia and plasticized waste. Is it time we stop and think?

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**Background and Goal of Study**: Anesthetists' generate recyclable and non-recyclable plastic waste through inherent procedural necessities and drug preparation. We continuously handle and discard plasticized devices such as laryngeal mask airways, disposable laryngoscope blades, syringes and drapes on behalf of our patients. It is estimated that operating rooms generate 25 – 30 % of

laryngear mask airways, disposable laryngoscope blades, syringes and drapes on behalf of our patients. It is estimated that operating rooms generate 25 – 30 % of a hospital's total waste (1). We believe that the quantity of this waste is increasing annually in our institution. We aim to quantify the types and average amount of plastic waste generated by our department on an annual basis.

Materials and Methods: We will identify a series of typical anaesthesia practice days at our institution. Our institution performs circa 30,000 surgical procedures per annum. We aim to collect, quantify and categorize all anaesthesia generated waste for a series of typical working days and extrapolate annual figures. We will follow our departmental waste as it enters the treatment process which includes landfill and incineration.

Results and Discussion: Unfortunately, medical waste is frequently deemed nonrecyclable due to contaminant risk only. We believe much anaesthesia generated waste can fall outside this general classification with simple intervention by our profession such as sorting, or routinely reusing clean syringes within the same patient care episode. These types of simple interventions can have a positive environmental impact.

Air pollution is a high profile consequence and frequently discussed hazard of anaesthesia (2). However, we believe that our plastic waste signature may be of far greater consequence but is poorly quantified and understood to date.

We wish to present our results in poster format at ESA 2018.

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## 01AP13-5

# 150 cancer surgeries under hypnosis: a valuable alternative to preserve the ecology of the patients

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Background and Goal of Study: Hypnosedation combining hypnosis, conscious sedation and locoregional anesthesia has been evaluated as a valuable alternative to general anesthesia. This technique has been shown to decrease medication, to reduce adverse effects and to fasten postoperative rehabilitation [ref]. By minimizing effects of anesthesia on vital functions while preserving the patients' well being, it contributes to a sustainable development of anesthesia. We report the current use of this innovative technique in a cancer center.

Materials and Methods: We performed a retrospective study on 150 patients operated on under hypnosis between 2011 and 2017 in the Curie Institute. No experience in hypnosis was required from the patients. Usual anesthetic safety conditions and monitoring were respected. The procedure excluded all premedication or hypnotic drugs. A continuous analgesic infusion of target-controlled remifentanil was adjusted to the patient's comfort. The patient received usual preventive antiemetics and painkiller. Local or locoregional anesthesia was performed depending to the surgery: a tumescent technique or a paravertebral block was performed for breast surgeries, a cervical block for gynecological surgeries.

Results and Discussion: Hypnosedations are reported for breast surgeries including total mastectomies and axillary clearance, gynecological surgeries, colonoscopies, superficial plasties. The mean surgical duration was 60 min (30 to 160 min). The mean length of stay in the recovery room was 35 min. The patients were aged between 18 and 100 (mean 60.5). 22% were older than 75 years old. 32% were classified ASA1, 36% ASA2, 30% ASA3. 2% ASA4 patients presented severe cardiac, respiratory or renal failures that questioned seriously the benefit of general anesthesia. For 98.6% of the patients, the hypnosedation let to achieve surgery under comfortable conditions for the patient as well as for the surgeon. In two case of discomfort, the procedure was easily converted to general anesthesia. Conclusion: Hypnosedation can be proposed as a useful alternative to a general anesthesia in various types of surgeries including major breast surgeries. By minimizing effects of anesthesia, this technique contributes to preserve the ecology of the patient and is particularly valuable for vulnerable patients. Adding value to care, hypnosis benefits the patients as well as the caregivers.

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## 01AP13-6

# Halogenated anesthetics choice and management can decrease environmental impact and improve the benefits

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**Background and Goal of Study**: All the halogenated anesthetics (HA) that are currently used are greenhouse gases. HA have potential significant impact on global warming. They are eliminated through exhalation with weak metabolization in the

body, and most ventilators transfer HA directly and unchanged into the atmosphere (1). The use of HA could be reduced if closed circuit anesthesia were widely used for all patients (2). Also, as desflurane has the highest global warming potential (2540) and the longest half life in the atmosphere (14 years), an appropriate drug selection could reduce both direct and environmental costs. Our study's objective was to decrease the use of HA by implementing a written protocol on how to use HA.

Materials and Methods: We performed a prospective survey of 100 randomly chosen patients (type of HA used and hourly consumption) before and after the presentation of the protocol to the staff. Using a bottom-up approach, we collected the data from the pharmacy on the annual consumption of Sevoflurane and Desflurane before and after the staff education. The levels of consumption of the two gases and the annual pharmacy consumption before and after were compared using a parametric t-test. To note, we always perform a Nitrous oxide free low-flow anesthesia.

**Results and Discussion**: The initial mean consumption of Sevoflurane and Desflurane were respectively 11ml/h (+/- 4) and 21 ml/h (+/- 12). After the educational training, both consumptions remained at the same level (11±3 and

21±10 respectively, p>0.05). Conversely, the pharmacy consumption of Sevoflurane increased by 13 % while the Desflurane's one decreased by 23 % generating an economy of 5000€/year (p<0.05) and leading to a reduction of 43 TeqCO2 of our halogenated carbon footprint. The number of cases didn't vary during the study period. The writing of a protocol and an educational staff significantly reduced our Desflurane consumption. A better choice in the gases indications seems to be accountable for this reduction. The absence of reduction in the hourly consumption may be related to the already low fresh gas flow that was used (the baseline measurement of average fresh gas flow was at 0.86 l/min (+/- 0.23)).

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**Conclusion**: A better understanding of the HA properties allow to a better utilization and to an important decrease in costs and environmental impact. **References**:

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#### 01AP13-7

# Which medical specialties hold the most retractions? A systematic review

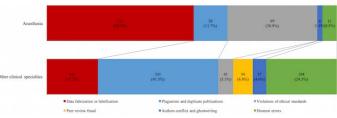
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**Background and Goal of Study:** In the last decade, publicized fraud scandals involving anesthesia have led to mass retractions. Our objectives were to classify clinical specialties by the number of retracted articles and to identify causes of retractions associated with anesthesia publications.

Materials and Methods: MEDLINE/Pubmed was searched on January 5, 2016, using the medical subject heading "retracted publication" without restriction of language or period. Clinical studies, as in, studies involving humans, were included while preclinical studies and basic science studies were excluded. For each included study, clinical specialties were classified according to the European classification of medical specialties and causes of retractions were assessed through retraction notices. Two reviewers assessed eligibility and extracted data both independently and in duplicate using piloted electronic extraction forms.

**Results and Discussion:** We identified and appraised 1555 clinical studies. Anesthesia held 282 retracted publications (18.1%), obstetrics and gynecology 108 (6.9%), oncology 92 (5.9%), cardiology 78 (5%). Causes of retraction were fabrication or falsification of data in 281 articles (18.1%), plagiarism in 232 articles (14.9%), honest errors in 230 articles (14.8%), duplicate publications in 176 articles (11.3%). Compared to retracted clinical studies of other medical specialties, among anesthesia articles, fabrication or falsification of data [50.7% (113/223) v 17.7% (141/798), P < 10<sup>-15</sup>]; as well as violation of ethical standard were more frequent [30.9% (69/223) v 5.1% (41/798), P < 10<sup>-15</sup>]; honest error was less common [4.9% (11/223) v 24.3% (194/798), P < 10<sup>-11</sup>]; studies were more frequently randomized controlled trials (RCT) [58.5% (165/282) v 9.7% (108/1115), P < 10<sup>-15</sup>].



**Conclusion:** Not only was anesthesia the specialty holding the highest number of retractions but, retractions occurred more often due to fabrication or falsification of data and involved more RCTs. Investigating the reasons why anesthesia is exposed might help restore confidence and reduce waste in this field's research.

# 01AP13-8

# The Most Frequently Cited 100 Articles Related to Malignant Hyperthermia in the Anaesthesia Literature

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**Background**: We investigated most highly cited 100 articles related to malignant hyperthermia in the anaesthesiology literature.

Materials and Methods: Using the advanced mode of theWeb of Science (WOS), the words "SU=anest\*AND TI=hyperther\* OR SU=anest\* AND TS=hyperther\* OR SU=anest\* AND TI=ryanod\* OR SU=anest\* AND TS=ryanod\* OR SU=anest\* AND TS=hyperpyre\*" were used to scan articles on December 2017

Results and Discussion: From 1975 to date, it appears a total of 1996 articles

related to malignant hyperthermia in the anaesthesiology were published in the WOS. The most cited article had 548 citations, the least cited articles had 35 citations. The mean citation number was 75.95±69.97. The mean annual citation number for the articles varied from 15.36 to 1.03 and the mean was 3.75±3.12. The most cited article was by Gronert, GA "Malignant Hyperthermia" published in "Anesthesiology". Most three area's of articles related to malignant hyperthermia focused in; "physiology, physiopathology and pharmacology of malignant hyperthermia", "diagnosis and treatment of malignant hyperthermia (included guides)", and "diagnosis of malignant hyperthermia" were conducted in 23.5%, 21.6%, and 20.6% studies, respectively. The three journals that appeared most frequently in the top 102 were Anesthesiology (48%), Anesthesia and Analgesia (20.6%), and British Journal of Anaesthesia (20.6%). Of the articles, 98% were listed in the SCI and only 2% were listed in the SCI-E. The top three countries listed for authors were USA (56.9%), England (11.8%), and Germany (8.8%), Of the authors. 36.3% on the continent of Europe and 63.7% outside the continent of Europe There was no significant difference found between the continent of authors, index of journal and the total number of citations and mean annual number of citations. Conclusion: This is the first study to investigate articles with most citations in the field of malignant hyperthermia and anaesthesiology. The most cited article had 548 citations. The most frequently cited studies in the field of malignant hyperthermia included physiology, physiopathology and pharmacology of malignant hyperthermia topics. The three journals that appeared most frequently in the top 102 were Anesthesiology, Anesthesia and Analgesia, and British Journal of Anaesthesia. There was no significant difference found between the continent of authors or index of journals and the total and mean annual number of citations.

## 01AP13-9

# Evaluation of anesthesia-related fears in patients scheduled for elective breast cancer surgery through a self-administered questionnaire

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Background and Goal of Study: Previous studies documented that levels of preoperative anxiety are associated with outcomes relevant to the anaesthesiologist, such as postoperative pain control and patient satisfaction¹. Risk factors have been identified: female sex, history of cancer and psychiatric disorders, while previous surgeries were associated with less anxiety². We've studied the population of female patients undergoing anaesthesia consultation for elective breast cancer surgery in a specialized center to verify if these risk factors predict self-reported concerns related to anaesthesia.

Materials and Methods: A self-administered questionnaire was directed to 109 adult female patients before preoperative anaesthesia consultation for elective breast cancer surgery. As defined by the local ethics committee, data was collected anonymously and included age, formal education level, previous anaesthesia and known diagnosis of depression, anxiety or neurologic disorders (KDDAND). Participants were required to rate several fears associated with anaesthesia according to a 5 categories ordinal qualitative scale. Test for Trend in Binomial Proportions was used for associations between each variable of age, KDDAND and previous general anaesthesia experience with rating of anaesthesia-related fears. Results and Discussion: From the 109 questionnaires, 24 were excluded due to incomplete data and 85 (78%) were included in the analysis. Average age was 58.7 years. 38,8% reported having a KDDAND. 80% had been previously submitted to general anaesthesia. The most frequent reason for a bad previous experience was nausea/vomiting. Previous anaesthetic experience was associated with less fear of "not waking up/dying" (p=0.0103) and a negative previous anaesthetic experience was related with increased rating of fear of "nausea/vomiting after surgery (p=0.0318). Age and self-reported KDDAND were not found to be associated with anaesthesia-related fears, although this might reflect a small sample size and limited sensibility

**Conclusions**: Previous experience and the increased risk of nausea/vomiting seem to influence anaesthesia-related fears in adult female patients undergoing breast cancer surgery. In this population, other factors might be more predictive, although this must be studied in a larger sample.

# References:

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- 2. Acta Anaesthesiologica Scandinavica. 2001; 45: 298-307

## 01AP13-10

The fragility and reliability of conclusions of anesthesia and critical care randomized trials with statistically significant findings: A systematic review

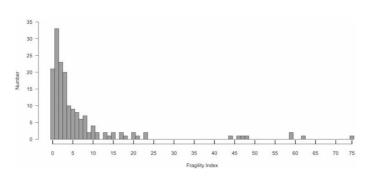
Grolleau F.<sup>1</sup>, Collins G. S.<sup>2</sup>, Pirracchio R.<sup>3</sup>, Gakuba C.<sup>1</sup>, Devereaux P. J.<sup>4</sup> Le Manach Y.<sup>5</sup>

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Background and Goal of Study: The Fragility Index (FI), which represents the number of patients responsible for a statistically significant finding, has been suggested as an aid for interpreting the robustness of results from clinical trials. A small FI indicates that the statistical significance of a trial depends on only a few events. Our objectives were to calculate the FI of statistically significant results from randomized controlled trials (RCT) of anesthesia and critical care interventions and to determine the frequency of distorted presentation of results or 'spin'.

Materials and Methods: We systematically searched MEDLINE from 01 January 2007 to 22 February 2017 to identify RCTs exploring the effect of critical care medicine or anesthesia interventions. Studies were included if they randomized patients 1:1 into two parallel arms and reported at least one statistically significant (P<0.05) binary outcome (primary or secondary). Two reviewers independently assessed eligibility and extracted data. The FI was determined for the chosen outcome. We assessed the level of spin in negative trials and the presence of recommendations for clinical practice in positive trials.

Results and Discussion: We identified 166 eligible RCTs with a median sample size of 207 patients (interquartile range [IQR] 109 to 497). The median FI was 3 (IQR 1-7), which means that adding three events to one of the trials treatment arms eliminated its statistical significance. Further, 21 (13%) trials had a FI of zero as the statistically significant outcome was found non-significant when recalculating the P-value using a 2-sided Fisher exact test.



High spin was identified in 42% (n=30) of negative RCTs while 21% (n=20) of positive RCTs provided recommendations. Lower levels of spin and recommendations were associated with publication in journals with high impact factors (P<0.001 for both). **Conclusion**: Statistically significant results in anesthesia and critical care RCTs are often fragile, and study conclusions are frequently affected by spin. Routine calculation of the FI in medical literature may allow for better understanding of trials and therefore enhance the quality of reporting.

#### 01AP14-1

# Population pharmacokinetics of remimazolam after continuous infusion in volunteers

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Background and Goal of Study: Remimazolam (CNS 7056) is a new ultra-short acting benzodiazepine developed for intravenous sedation and anaesthesia. It undergoes rapid hydrolysis by nonspecific tissue esterases. Its pharmacokinetics after bolus administration have been described by a physiologically based recirculation model (1). It was the aim of this study to develop a mammillary compartmental pharmacokinetic model of remimazolam after continuous IV infusion. Materials and Methods: After ERB approval and written informed consent, 20 healthy male volunteers (20-38 yrs, 64-99 kg) received remimazolam as continuous IV infusion of 5 mg/min for 5 min, 3 mg/min for the next 15 min, and 1 mg/min for further 15 min. Arterial blood samples were taken until 6 h after stop of infusion. Plasma concentrations of remimazolam and its metabolite CNS 7054 were measured by HPLC with tandem mass spectrometry. Pharmacokinetic modelling was performed by population analysis (NONMEM).

Results and Discussion: Pharmacokinetics were best described by a three-compartment model for remimazolam and a two-compartment model with transit compartment for the metabolite (table). The simulated time for a 50% decrease of remimazolam (context-sensitive halftime) after an infusion of 4 h was 6.8±2.4 min. There were no effects of body weight and age. Loss of consciousness occurred 4.6±1.1 min after start, full alertness was regained 19±6 min after stop of infusion. Volunteers maintained spontaneous breathing throughout the study.

Table: Pharmacokinetic parameters (mean $\pm$ SD). CL: clearance; V<sub>1</sub>: volume of central compartment; V<sub>ss</sub>: volume of distribution at steady-state, T<sub>1</sub>, $\alpha$ , $\beta$ : distributional half-lives; T<sub>1</sub>, $\gamma$ : elimination half-life

Conclusion: Remimazolam showed a high clearance, small volumes of distribution, short half-lives, and a fast onset and recovery. The developed pharmacokinetic model may be suitable for administration of remimazolam as target controlled infusion (TCI).

#### References:

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Acknowledgements: The study was supported by a grant of Paion UK, Cambridge, UK, Remimazolam assay was performed by Aptuit, Verona, Italy.

# 01AP14-2 Clevidipine in Pheochromocytoma surgery

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**Background**: Pheochromocytoma is a catecholamine producing tumor whose treatment is laparoscopic adrenalectomy. There is a risk of hypertensive crises during pneumoperitoneum insufflation and tumor manipulation, due to the release of catecholamines. Patients usually present arterial hypotension after tumoral exeresis, due to relative vasodilation and the residual effect of the antihypertensive drugs used before. It is important to control hemodynamic parameters with fast, effective and reversible drugs

Case Report: The use of clevidipine in pheochromocytoma resection has been studied in a series of three cases (C), C1: 36-year-old man, with Neurofibromatosis type 1, diagnosed due to metanephrines determination. Premedication: nifedipine retard. C2: 55-year-old woman diagnosed due to recurrent hypertensive crises. Premedication: doxazosin, nifedipine and propranolol. C3: 73-year-old man diagnosed due to epigastric palpitations and tremors. Premedication: nifedipine. On entering the operating room, every patient was hemodynamically stable. Patient 1 presented a hypertensive peak with blood pressure (BP): 279/122 mmHg during the tumor manipulation. Clevidipine perfusion was started up to 16 ml/h (8mg/h) at that moment, normalizing BP in 8 minutes. After the tumor resection, the perfusion was stopped, remaining stable. Patients 2 and 3 received Clevidipine at 2 ml/h from the beginning of the surgery, despite being normotensive. Both presented hypertensive peaks up to 180/85 mmHg during the tumor manipulation, resolved in a 5 minutes with an increase of the perfusion up to 20 ml/h (10 mg/h). After the tumor excision, Clevidipine was stopped and both of them had temporary episodes of arterial hypotension, that were resolved in a few minutes with fluid therapy by objectives. Any patient required vasopressors.

**Discussion**: Clevidipine is an intravenous calcium antagonist with rapid onset of action, short half-life, minimal effect on heart rate and myocardial oxygen consumption, dose-dependent and linear effect, metabolized by plasma esterases. It does not require dose adjustment by weight, renal or hepatic function. It has not residual hypotensive effect after tumor resection.

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#### References:

1.Kline JP.Use of clevidipine for intraoperative hypertension caused by an undiagnosed pheochromocytoma.AANA J.2010;78:288-90.

**Learning points**: Clevidipine could be an antihypertensive drug of choice in pheocromocytoma from the beginning of the surgery.

## 01AP14-3

# Isoflurane Decreases Interleukin-2 Production by Increasing cCbl and Cbl-b Expression in Rat Peripheral Blood Mononuclear Cells

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Background and Goal of Study: Isoflurane modulates the immune response. In addition to regulating immunesystem homeostasis, interleukin (IL)-2 is considered an indicator of functional suppression of T cells because decreased production of IL-2 is associated with increased expression of Casitas Blineage lymphoma proto-oncogene (c-Cbl) and Cbl-b in T cells. To evaluate the effect of the inhalational anesthetic agent, isoflurane, on Tcell function, we assayed IL-2 production and c-Cbl and Cbl-b expression in rat peripheral blood mononuclear cells (PBMCs).

Materials and Methods: Adult male Sprague—Dawley rats weighing 300–350 g were randomly allocated to the control group (C group), 4 h of isoflurane general anesthesia group (4l group), or 1 day after 4 h of isoflurane general anesthesia group (1D 4l group). Blood was collected by cardiac puncture and PBMCs were isolated. IL-1, IL-2, and IL6 mRNA levels and c-Cbl, Cbl-b, protein kinase C PKC) q, and phospholipase C-g1 (PLC-g1) protein levels in PBMCs were determined by quantitative reverse transcription polymerase chain reaction and immunoblotting, respectively. Moreover, ubiquitination of PKCq and PLC-g1 in PBMCs was assessed by immunoprecipitation.

Results and Discussion: The mRNA level of IL-2 in rat PBMCs was significantly decreased in the 4I and 1D 4I groups compared with the control group. c-Cbl, Cbl-b, and ubiquitin expression was significantly increased and the zeta-chain-associated protein kinase 70 (ZAP70), PLC-g1, and PKCq protein levels were significantly decreased in the 4I group. Ubiquitination of PLC-g1 and PKCq were also significantly increased in the 4I group.

**Conclusion**: Isoflurane influences the expression of ubiquitin, c-Cbl, and Cbl-b in rat PBMCs, which indicates suppression of receptor tyrosine kinase signaling pathways. These results suggest that isoflurane suppresses Tcell function. **References**:

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2.Snyder GL, Greenberg S: Effect of anaesthetic technique and other perioperative factors on cancer recurrence. Br J Anaesth 2010; 105:106–15.

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# 01AP14-4

# Dexmedetomidine as adjuvant to anesthesia a prospective, randomized trial

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**Background and Goal of Study:** A number of investigators have identified antiemetic, antinociceptive and anesthetic sparing effects of dexmedetomidine. We aimed to evaluate the impact of the intraoperative dexmedetomidine infusion on the opioid requirement, efficacy, safety and postoperative outcomes in patients undergoing gynecologic cancer surgery.

Materials and Methods: 120 adult women (20-79 years) undergoing extended abdominal hysterectomy were randomized into 2 groups: 1) control group (CON) n=60, 2) dexmedetomidine group (DEX) n=60. In DEX group the dexmedetomidine infusion has started 15 minutes before induction of anesthesia with the rate of 0,4 µg/kg/h. To assess the speed and quality of recovery, the following were monitored: 1) extubation time; 2) frequency of postoperative nausea or vomiting (PONV); 3) postoperative pain intensity; 4) total rescue dose of analgesics at the first postoperative day. Intraoperatively patients were excluded from the study if they had systolic blood pressure < 80 mmHg for > 5 minutes, heart rate < 40 bpm for > 5 minutes.

Results and Discussion: Patients in both groups were comparable on demographic variables. Total dose of fentanyl did not differ between groups. No patients were excluded from the study due to bradycardia or hypotension in CON group, but in DEX group 6 patients were excluded (p=0,01). Mean arterial blood pressure during anesthesia was lower in DEX group versus CON group after endotracheal

intubation (p<0,01) and at the end of operation (p<0,01). Perioperative heart rate was also decreased in DEX group during endotracheal intubation (p<0,01), after laparotomy (p<0,01) and at the end of operation (p<0,01). Extubation time did not differ between groups. The frequency of PONV was lower in DEX group versus CON group (10% and 26%, respectively p=0,047). There were no differences in the postoperative pain intensity.

**Conclusion:** Intraoperative use of dexmedetomidine did not impact on extubation time, opioids requirement and postoperative pain intensity but significantly reduced the frequency of PONV. Dexmedetomidine decreased hemodynamic parameters during surgery and increased the risk of significant intraoperative hypotension and bradycardia.

## 01AP14-5

# Supplemental administration of droperidol shortened the time of recovery from general anaesthesia

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Background and Goal of Study: The time of recovery from general anaesthesia is one of great concerns of anaesthesiologist in operating theatres. The surgical rooms include a plenty of facilities and a lot of medical staffs. The occupancy of the room by the delay of emergence from general anaesthesia is unpleasant. In our previous study, the supplemental administration of droperidol (Dro) decreased Bispectral Index values and reduced the required dose of volatile anaesthetics for maintenances without adverse effect. In the current investigation, we retrospectively evaluated the recovery time from anaesthesia with or without using Dro.

Material and Methods: The study was a single center and retrospective analysis. The successive 200 surgical adult patients without severe complication receiving ear-nose-throat minor surgery were reviewed. The cases were enrolled when the anaesthesia was maintained by inhalation of desflurane and continuous infusion of remifentanil with intubation. The patients' characteristics, the time of anaesthesia and recovery, final dose of desflurane and remifentanil were compared. The recovery time was defined as the period between the end of surgery and the extubation.

**Results and Discussion:** The data from 66 cases were analyzed. There was no significant difference in patients' background (Table). The supplemental administration of Dro significantly reduced the final dosing of desflurane immediately before the end of surgery and shortened the time of recovery (Fig.). The infusion rate of remifentanil was not different between the groups.

Table. The background of the patients.

	Age (y)	Sex (m/f)	Height (cm)	Weight (kg)	Anesthesia Duration (min)	Droperodol dose (mg)
Control Group (Without droperidol)	58.0 (17.3)	18/16	159 (10.3)	58.6 (12.7)	220 (85.7)	1.03 (0.90)
Droperidol Group (Supplemental administration)	57.5 (18.0)	17/15	160 (9.9)	58.0 (11.9)	210 (123)	0

Data are expressed as mean (S.D.). There was no significant difference between groups.

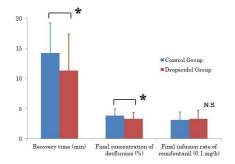


Fig. The recovery time from general anaesthesia, the final concentration of desflurane and the final infusion rate of remifentanil immediately before the end of surgery. Data are expressed as mean and S.D. \*: P < 0.05 between groups. N.S.: not significant (P = 0.58).

**Conclusion:** The results of the current investigation suggested that supplemental administration of Dro during general anaesthesia would be beneficial on the profile of recovery from general anaesthesia.

#### References:

1.Satomoto M, et al. Korean J Anesthesiol. 2017; 70: 27-32.

### 01AP14-6

# A new rapid method of Ion Mobility Spectrometry to measure propofol concentrations to evaluate the predictive performance of a 'Diprifusor' TCI system

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Background and Goal of Study: Due to the technical and methodological problems none of the methods published so far is ready for clinical routine application. In this study, the new ion mobility spectrometer<sup>(1)</sup> (IMS, measurement within 1 minute without any pretreatment) was used to quantify propofol. The aim of the present study was to assess the predictive performance of the 'Diorifusor' TCI system.

Materials and Methods: 33 patients with ASA I or I (Ethical Committee of the First Affiliated Hospital of Harbin Medical University) were included undergoing elective abdominal surgery (Divided into three groups by age). A radial artery cannula was inserted for arterial pressure and collection of blood sample (0.5 ml). Propofol and remifentanil were infused to achieve target effect compartment concentrations of 6 μg ml¹ (Schnider model) and 5 ng ml¹ (Minto model), respectively. Propofol was maintained at 3.5 μg ml¹ after induction. Remifentanil was maintained at 3.5-7 μg ml¹ for analgesia. Blood samples were introduced into the IMS directly without any pretreatment.

Results and Discussion: The values were similar in three groups, with overall median values of 28.6% for MDPE and 40.0% for MDAPE. The measured concentrations (Cm) were higher than the predicted concentrations (Cp). The principal source of performance error is due to pharmacokinetic variability in patients during anaesthesia, blood sampling techniques or different measurement techniques.

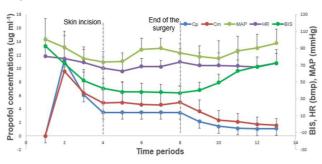


Figure 1. Monitoring of propofol concentrations measured by IMS (red dots), propofol concentrations calculated by TCI system (blue dots), MAP, HR, and BIS. Data are shown as mean ± SD. IMS, ion mobility spectrometry; TCI, target controlled influsion; BIS, bispectral index; MAP, mean arterial pressure; HR, heart rate; SD, standard deviation of the mean. Time periods: 1: 1 minute before induction; 2 minutes after infusion; 3: 5 minutes after induction; 4 skin incision; 5: 30 minutes of surgery; 6: 60 minutes of surgery; 7: 120 minutes of surgery; 8: end of the surgery; 9: 1 minute after stop delivery; 10: 5 minutes after stop delivery; 11: 10 minutes after stop delivery; 12: 15 minutes after stop delivery; 13: 20 minutes after stop delivery.

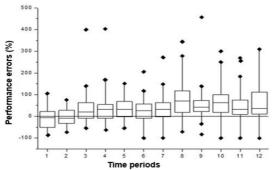


Figure 2. Box and whisker plots of performance error (%) related to different time periods of all patients. The horizontal line within each box is the median; Lower and upper boundaries are the 25th and 75th percentiles; Vertical whiskers extend over the range; Dots show outliers. Time periods: 1: 3 minutes after infusion; 2: 5 minutes after induction; 3: skin incision; 4: 30 minutes of surgery; 5: 60 minutes of surgery; 7: end of the surgery; 8: 1 minute after stop delivery; 9: 5 minutes after stop delivery; 10: 10 minutes after stop delivery; 11: 15 minutes after stop delivery; 12: 20 minutes after stop delivery.

**Conclusions**: The new IMS could be applied to measure the propofol concentrations as a point-of-care mornitor in TCI TIVA. The measured concentrations were higher than the predicted concentrations.

#### References

 Wang X, et al. Ion mobility spectrometry as a simple and rapid method to measure the plasma propofol concentrations for intravenous anaesthesia monitoring[J]. Scientific Reports, 2016, 6:37525.

### 01AP14-7

# Postoperative nausea and vomiting prophylaxis – are we doing too little or too much?

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are associated with decreased patient satisfaction, increased economical costs and delays in discharge. Thus, the identification of patients at risk, effective prophylaxis and treatment are essential. Considering this, we decided to evaluate the incidence of PONV in our centre and ascertain if an appropriate prophylaxis and treatment of PONV were being performed.

**Materials and Methods**: Patients admitted to the post anaesthesia care unit (PACU) in the months of July and October of 2017 were included in this prospective study. Data was collected on a designed form filled with information on the preoperative, intraoperative and postoperative periods. For data analysis the Apfel score was used for stratification of the risk of PONV, and the recommendations of the Portuguese Anaesthesiology Society were used in the evaluation of the prophylaxis.

Results and Discussion: Fifty patients were included in this study, and PONV was diagnosed in 14% of them, which is similar to the usual incidence mentioned in the literature. Reviewing the therapeutic approach used in the prevention of PONV, we ascertained that an appropriate prophylaxis was achieved in 42% of the patients. The remaining 58% were subject to a prophylactic scheme that didn't correlate with their risk of PONV. Evaluating this cases we concluded that the major tendency was to use more anti-emetics than those deemed necessary by our guidelines considering the Apfel score. Regarding the patients who experienced PONV, we concluded that in 72% an adequate prophylactic scheme was used. Only in two cases of PONV there was an inadequate prophylaxis, but surprisingly in both of these cases there was an excessive use of anti-emetics.

Conclusion: The present study evaluated the incidence of PONV in the population admitted to the PACU and the prophylactic therapy administered in the operating room to prevent PONV. We concluded that there is a significant variety in the prophylactic schemes used in our centre, although there are guidelines and risk scores that we can rely upon. It was also made clear that in some cases, even when an appropriate prophylaxis is administred, PONV still develops. This leads us to think that other factors not included in the Apfel score may carry a significant impact in the development of PONV. It is important that we evaluate our practices, so that we can improve them, in order to provide better care to our patients.

### 01AP14-8

# Can we predict when a patient regains consciousness by estimated effect-site concentration of propofol at loss of response in TIVA?

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Background: We previously showed that we could estimate required concentration of propofol for maintenance of anesthesia from the effect-site concentration (Ce) of propofol at loss of response (Ce-LOR). Iwakiri H et al. showed that Ce-LOR and Ce at recovery of response (Ce-ROR) were similar in volunteer study. Then we made a hypothesis that we also could predict Ce at recovery of response (Ce-ROR) from Ce-LOR in surgical patients. Then we compared Ce-LOR and Ce-ROR in surgical patients under total intravenous anesthesia. We also investigated the influence of opioid concentration at recovery of response.

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) and Ce-LOR was determined. Anesthesia was maintained by propofol and remifentanil. For transitional opioid, fentanyl 0.1 mg was administered near the end of surgery. We defined Ce-Opioids as the sum of Ce of fentanyl (Ce-Fen) and Ce of remifentanil (Ce-Remi) at recovery of response. We compared Ce-LOR and Ce-ROR. We also compared the difference of Ce-LOR and Ce-ROR, and Ce-Opioids.

Results and Discussion: Average of Ce-ROR was 1.61±0.55 μg/mL (Mean±SD)

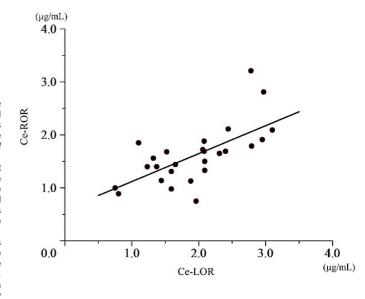
and slightly but significantly lower than that of Ce-LOR; 1.94 $\pm$ 0.66  $\mu$ g/mL. The correlation coefficient between Ce-LOR and Ce-ROR was 0.62. And Ce-Opioids had little influence on the difference of Ce-LOR and Ce-ROR.

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**Conclusion**: Although Ce-ROR was fairly well correlated with Ce-LOR, we could not precisely predict when a patient regains consciousness from Ce-LOR. Furthermore Ce-Opioids had little influence on the relation between Ce-LOR and Ce-ROR. **References**:

1. Anesth Analg 2005;100:107-10, J Anesth 2017;31:502-9



#### 01AP14-9

# Methylene blue for vasopressor amine non-responsive vasoplegic syndrome after dopamine-producing ganglioneuroma resection: a case report

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Background: Vasoplegic syndrome (VS) is an entity characterized by uncontrolled vasodilation and shock despite administration of large doses of vasopressors (1,2). Since description in 1997, diverse drugs have been undergoing clinical trials to find alternatives when everything else has failed (1). Recent reports and studies using methylene blue (MB) are promising. MB has even been nicknamed "The Magic Bullet for Vasoplegia" in an "Anesthesia & Analgesia" review article of 2016 (2).

Case Report: A 41-year old man was diagnosed with an extremely rare retroperitoneal dopamine-only-producing ganglioneuroma and scheduled for surgery under general balanced anesthesia. Alpha and beta blockade was achieved preoperatively using phenoxybenzamine and propranolol. Surgery was uneventful until 20 minutes after vein ligation. Monitored with pulse pressure contour analysis of hemodynamic parameters (ProAQT(R)), marked hypotension due to a profound decrease in indexed vascular resistances (ISR) was observed - 400 dyn.s/cm5. m2 (1700 - 2400) -. There was no response to dopamine (10 mcg/Kg/min) and noradrenaline (60 mcg/min). MB was administrated and resulted in an immediate normalization of ISR and blood pressure, as well as withdrawal of all vasopressor support 10 minutes after MB bolus.

**Discussion**: Reports showing MB is a successful resource when vasopressors fail are being increasingly published (1,2). There is only one similar case of MB administration after alpha blockade (3). MB inhibits nitrous oxide (NO) synthesis and activity, rendering vessels unresponsive to NO and increasing ISR (1,2). There is still debate about when, how, and how much MB should be given, and if outcomes improve. But MB is undoubtfully emerging as a valuable resource in shock when no alternatives are found (2).

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   Nasr, A. Use of methylene blue in pheochromocytoma resection: case report.
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VS is an entity characterized by profound hypotension despite intravenous administration of large doses of vasopressors.

MB increases blood pressure and can be a suitable drug when everything else have failed, possibly improving outcomes.

# 01AP14-10 Improving the management of perioperative anaphylaxis; Thinking inside the box

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**Background:** Little is known about Perioperative Anaphylaxis (PA) in the UK. The 6th national audit project (NAP6) is the first comprehensive review of PA with core results awaited. We present an audit of NHS Lothian PA database from 6/3/2015-15/8/17 following introduction of anaphylaxis boxes (AB). We compare the results with those of an audit preceding AB introduction.

**Methods:** The database prospectively records the following information from PA events occurring in NHS Lothian: date of reaction, symptoms, treatment, tryptase levels, date and results of allergy testing. Data was compared with results of a 4-year PA retrospective case note audit at Royal Infirmary of Edinburgh completed in 2014

Results: 33 events of PA were recorded (incidence 1:3949). The most common life-threatening features were hypotension (82%) and bronchospasm (70%). Angioedema (6%) and cardiac arrest (3%) were rare. Erythema was often associated (79%) but urticaria was present in only 24%. IV adrenaline was administered in 73% of cases; average dose of 593mcg (10-3150mcg). Secondary management (steroid, antihistamine) was given in 76% and tryptase series taken in 79% of cases. All patients were referred for specialist allergy investigation and testing complete in 85%. Of the triggers identified muscle relaxants (67%) and antibiotics (33%) were most common.

**Discussion:** Our AB are designed to provide an anaesthetist with everything they would need to manage, investigate and refer PA. Since AB introduction we have seen improvements compared with our initial audit findings; including an increase in compliance with secondary management (56% to 76%), in completion of the tryptase series (67% to 79%) and notably an increase in the completion of testing (11% to 85%). Our incidence of PA is considerably higher than reported elsewhere¹. However, NAP6 baseline survey results recently suggest the incidence in the UK may be even higher; 1:1556¹. If the incidence found in the NAP6 core project correlate with the baseline survey it may be there is still significant under investigation in NHS Lothian.

**Conclusion:** We have shown that introduction of AB improves management of PA. At present only 37% of UK anaesthetists have access to AB¹ and our results would support their introduction as a potential recommendation from NAP6. **References:** 

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# 01AP14-12

# The predictive performance of propofol target-controlled infusion during CO2 pneumoperitoneum in patients in the head down position

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Background and Goal of Study: Propofol clearance is reduced when the hepatic blood flow (HBF) is decreased, which can be caused by pneumoperitoneum in patients in the head down position (HDP) [1]. This may alter the pharmacokinetics of propofol and worsen the predictive performance of target-controlled infusion (TCI). We investigated the predictive performance of propofol TCI during CO2 pneumoperitoneum in patients who underwent robotic-assisted radical prostatectomy in the head down position.

Materials and Methods: This study was approved by institutional review board and registered at the UMIN-CTR(UMIN000011268). Fifteen male patients received propofol TCl using the Diprifusor model. Propofol concentrations were measured at seven time points: T1) 15 min after anesthesia induction; T2) before the insufflation; T3), T4), and T5) 15, 60, and 90 min, respectively, after insufflation in the HDP; and T6) and T7) before and 15 min after the release of pneumoperitoneum in the HDP, respectively. The predictive performance of TCl was evaluated by calculating the performance errors (PE; [measured – predicted/predicted) in propofol concentrations for each data point. Overall PE values were analyzed using a repeated-measures one-way analysis of variance (ANOVA) and multiple comparisons (Holm's method). A value of P < 0.05 was considered significant. Furthermore, median PE (MDPE) and median absolute PE (MDAPE) [2] were calculated as measures of bias and accuracy, respectively.

Results and Discussion: A total of 104 blood samples were analyzed. ANOVA revealed significant differences in overall PE values. The multiple comparison analysis showed a significant difference in PE values between time points T4 and T5. The predictive performance of propofol TCI during pneumoperitoneum in the HDP was acceptable when the MDPE and MDAPE were -1.5% and 18.8%, respectively. Theoretically, the propofol concentrations could be approximately twice as those targeted in TCI due to the reduced HBF. In this study, the anesthesia procedure properly maintained the blood pressure, and thus the HBF may have been maintained.

**Conclusion**: The prediction performance of propofol TCI during CO2 pneumoperitoneum was acceptable in patients in the HDP. **References:** 

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## 01AP15-1

# Propofol in patients with established Brugada Syndrome. Preliminary results of a randomized controlled trial

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Background and Goal of Study: Brugada Syndrome (BrS) is a distinct syndrome with a typical electrocardiographic (ECG) pattern of coved-type ST segment elevation in the right precordial leads from V<sub>1</sub> to V<sub>3</sub> and a complete or incomplete right bundle branch block (1). Clinical symptoms may vary due to incomplete penetrance, from syncope to cardiac arrest. Evidence about the alluded proarrhythmic effect from propofol in such patients is lacking. Although a causative relation between propofol and BrS is non-existent, it is currently recommended with a class IIa level as a drug to be avoided (2). The primary goal of our study was to analyze if any ST-segment changes occurred after induction of anesthesia with propofol in patients with established BrS. Secondary goal was to register rhythm abnormalities and clinical outcome.

Materials and Methods: Data was prospectively collected from 2012 up to 2017. Eighty patients with BrS, requiring surgery under general anesthesia, were randomly assigned in two equal groups. Induction of anesthesia was performed with propofol in one group and etomidate in the control group. An ECG was acquired before and after induction of anesthesia. All ECG's consisted the standard twelve leads but also the intercostal 3rd and 4th leads which are more sensitive for diagnosing ST-segment changes in BrS. Two cardiologists blinded for the induction agent, analyzed the ECG's.

Results and Discussion: None of the patients induced with propofol had significant ST-segment changes, nor did arrhythmias occur during the surgical procedure. All patients were safely discharged one or two days later. Prospective studies with continuous propofol infusion, for anesthetic or sedative purposes, are necessary to further evaluate the safety of propofol.

Conclusion: Propofol does not induce arrhythmic changes at clinically used induction doses up to 3 mg.kg<sup>-1</sup>, and therefore still considered as a safe induction agent for patients with established BrS.

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# 01AP15-2

References:

Comparison of the incidence rate of postoperative nausea and vomiting between sevoflurane anesthesia with continuous propofol infusion and total intravenous anesthesia in gynecological laparoscopic surgery

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Background and Goal of Study: It is well known that the higher prevalence of postoperative nausea and vomiting (PONV) among patients for whom volatile anesthetics are used in maintenance of general anesthesia compared with those for whom total intravenous anesthesia (TIVA) is used. This trend may be caused by the emetic effect of inhalational anesthesia and the antiemetic effect of propofol. The aim of this study was to evaluate the hypothesis that, when using propofol in combination with inhalational anesthesia, the incident rate of PONV would be reduced to the same level as with TIVA.

Materials and Methods: A prospective randomized controlled trial was conducted with 72 patients aged 20 to 65. They underwent laparoscopic surgery for benign gynecological disease from August 2016 through February 2017. This research was approved by the Ethics Committee and is registered in UMIN. Patients who provided written informed consent were randomly allocated to a TIVA group (group T, n=36) or sevoflurane/propofol group (group SP, n=36). After epidural anesthesia, general anesthesia was performed. For maintenance of anesthesia, group T received propofol and the bispectral index (BIS) was adjusted to around 40-60. For group SP, patients received anesthesia using 0.8% sevoflurane and propofol at a 1.2 μg/ml target plasma concentration in a target-controlled infusion pump. We analyzed the PONV incidence rates in both groups. Comparisons were done using the chi-square test for categorical variables. The Mann-Whitney U test or t-test was used for numerical variables.

Results and Discussion: The demographic data showed no significant difference between the groups. There was no significant difference in the PONV incidence

between groups T and SP (27.8% vs. 33.3%, p=0.691). Nor was there a significant difference between the total PONV scores of groups T and SP (median: 0, IQR: 0-1 vs. median: 0, IQR: 0-2, p=0.643) and whether an antiemetic drug was used (22.2% vs. 22.2%, p=1.000).

**Conclusion:** By adding propofol infusion to sevoflurane anesthesia, the incidence of PONV may be reduced to the same level as with TIVA.

#### 01AP15-3

# A new rapid method of Ion Mobility Spectrometry to measure blood propofol concentrations in patients during

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Background and Goal of Study: Due to the technical and methodological problems, none of the methods published so far is ready for clinical routine application. In this study, the new ion mobility spectrometer<sup>(1)</sup> (IMS, measurement within 1 minute without any pre-treatment) was used to directly quantify propofol in the whole blood. we used the new IMS to find the difference between the measured and predicted blood propofol concentrations during TCI in endoscopic retrograde cholangio pancreatography (ERCP).

Materials and Methods: We studied 28 patients scheduled for ERCP under total intravenous anesthesia using the Marsh model Propofol was infused to achieve target effect compartment concentrations from 1.5 μg ml¹ to 3.5 μg ml¹ and remifentanil was kept at a constant speed of 2.5 μg kg¹ h¹. measured concentrations (Cm) were analysed by IMS and compared with concentrations predicted (Cp) displayed by the TCl system. Agreement between Cm and BIS was determined by regression analysis.

**Results and Discussion**: We found there was negative correlation in statistics between venous propofol concentrations and BIS (R=-0.456, P<0.001), while other previous researches showned no obvious relationship between artery propofol concentrations and BIS. The measured concentrations tended to be higher than predicted concentrations especially after stoping propofol infusion

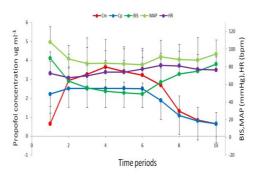


Figure 1. Monitoring of propofol concentrations measured by IMS (red dots), propofol concentrations set by TCI (blue dots), and BIS index values (green dots). Data are shown as mean ± SD. BIS, Bispectral index; IMS, ion mobility spectrometry; SD, standard deviation of the mean; TCI, target controlled infusion.

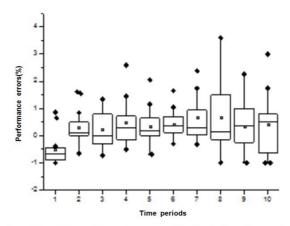


Figure 2.Box and whisker plots of performance error (%) related to different time periods. The horizontal line within each box is the median; lower and upper boundaries are the 25th and 75th percentiles; vertical whiskers extend over the range; dots show outliers. Time periods: T1: 1minutes after infusion start; T2: 10 minutes after infusion start; T3:15 minutes after infusion start; T6: 20 minutes after infusion start; T5: 25 minutes after infusion start; T6: 30 minutes after infusion start; T7: 1 min after stoping infusing; T8: 5min after stoping infusing; T9: 10min after stoping infusing; T9: 10min after stoping infusing; T1: 10min after sto

Conclusion: The new IMS could be applied to measure the propofol concentrations as a point-of-care mornitor in ERCP anesthesia.

References:

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### 01AP15-4

## Is ropivacaine a non-cardiotoxic local anesthetic? Study of the frequency-dependent cardiotoxicity of ropivacaine in an experimental porcine model

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**Background and Goal of study:** Ropivacaine (R) is considered a less cardiotoxic local anesthetic (LA) in comparison to others. However, clinical reports have been described, in which its accidental administration has caused severe arrhythmias, ventricular tachycardia and even cardiac arrest. The cardiotoxicity of R is related to the inhibition of the fast inward current during the depolarization of cardiac cells. Studies in vitro have shown that R toxicity increases in a use-dependent tendency. Our aim was to characterize an in vivo model to evaluate cardiotoxicity of R.

**Material and methods:** Eight anesthetized and instrumentalized pigs were studied. Three quadripolar were positioned into the high right atrium, the right ventricular apex, and to the His bundle recording area. After a period of stabilization pacing was performed at a current strength of 30 mA with a programmable stimulator. Right ventricular pacing was performed for at least 10 beats at a cycle lengths of 400 and 500 ms. This pacing protocol was performed immediately before and at 1, 5, 10, 15 and 30 minutes of the administration of R (6 mg/kg in two animals and 5 mg in 6 animals). Statistics: Analysis of variance for repeated measures

**Results:** Two animals, which received 6 mg/kg of R, died due to severe hypotension. The rest of the animals received 5 mg/kg. Plasma R levels ranged between 7,940-5,450 ng/dl from 5 to 30 min respectively. Ropivacaine induced an intense toxicity effect in sinusal rhythm as well as in stimulated rhythm. After R administration there was an important prolongation in QRS interval in sinusal rhythm: from 67±9 to 97±18 ms; p=0,0001; ( $\Delta$  45%) and at paced cycle length of 400 ms: from 99 ±6 ms to 355±73 ms; p=0,0001); ( $\Delta$  258%) (Figure). Ten minutes after R administration, still persisted and intense increment up to 90% in stimulated QRS, however, QRS interval in sinusal rhythm showed values in normal range (82 ±6 ms).

Conclusions: R has been associated with a huge cardiotoxic effect that has been shown with fast frequencies of stimulation. This experiment has unmasked a hidden cardiotoxic phenomenon that persists intensely even after 10 minutes since the administration of the drug. These findings suggest that after an accidental R dose precaution measures should be maximized as well as avoiding sympathetic simulation until cardiotoxicity parameters are completely restored.

# 01AP15-5

# The age-related EEG at 1 MAC inhalational anesthetics during general anesthesia

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Background and Goal of study: The characteristics of electroencephalogram (EEG) under general anesthesia depend on age. It was reported that the frequency of elderly patients is less than that of younger patients. Some reports described age-related differences in EEG. However, they provide stable concentration of inhalational anesthetics, although minimum alveolar concentration (MAC) changes according to patient's age. In this study, we investigated the age-related difference in the EEG with MAC of 3 inhalational anesthetics prospectively.

**Methods:** Patients (ASA-PS: I-II, 0-90yrs) were divided into three groups; children group (1-15 yrs), adult group (16-59yrs) and elderly group (60-90yrs). Each group was divided into 3 subgroups by inhalational anesthetics; sevoflurane, isoflurane and desflurane. Anesthesia was maintained with 1 MAC of inhalation anesthetics; sevoflurane, isoflurane or desflurane. During stable condition before the start of surgery, the raw EEG signal was recorded for 5 minutes. BIS value, frequency and amplitude were also recorded.

Results and discussion: A total of 180 patients were included; 60 in children group, 60 in adult group and 60 in elderly group. Each group was divided into 3 subgroups by inhalation anesthetics; sevoflurane, isoflurane and desflurane. Each subgroup includes 20 patients. In the case of sevoflurane, mean BIS value, frequency (Hz) and amplitude (micro-V) were 50.0±9.0, 17.2±2.1 (Hz) and 32.1±5.8 (micro-V) in children group, 35.5±10.4, 12.0±2.0 (Hz) and 16.5±4.2 (micro-V) in adult group and 42.6±6.5, 13.5±1.9 (Hz) and 12.3±4.1 (micro-V) in elderly group. These parameters were significantly higher in children group than those in adult and elderly group, mean amplitude decreased according to the age probably due to the decrease of active neurons. On the other hand, mean frequency was higher in elderly group than that in adult group, which might result in higher BIS

value in elderly group. Similar results were obtained in isoflurane and desflurane. These results suggest that current MAC value might be insufficient for evaluation of anesthesia depth.

**Conclusion:** Age-dependent change of EEG, decrease in amplitude, was observed in three inhalational anesthetics at 1 MAC. On the contrary to previous reports, unexpectedly, BIS value and frequency showed higher tendency in elderly group than that in adult group.

## 01AP15-6

### The effect of intravenous S-ketamine on the minimal alveolar concentration of Sevoflurane

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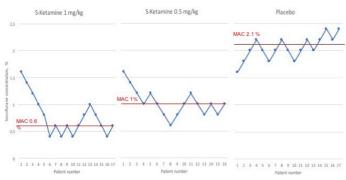
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Background and Goal of Study: S-Ketamine is commonly used to reduce opioid consumption during general anaesthesia. Ketamine has been described to reduce the minimum alveolar concentration (MAC) of volatile anaesthetics in animals. However, it is not yet determined if this is also the case in humans. We investigated whether administration of S-ketamine decreases the MAC of sevoflurane in patients undergoing elective surgery.

Materials and Methods: This prospective, double-blinded, study was performed at the Medical University of Vienna after ethics committee approval. ASA 1-3 patients between 30-65 years of age requiring anesthesia for elective surgery with a skin incision of at least 3cm at the trunk were enrolled. Anaesthesia was induced using multiple deep breath inhalational technique with 8% sevoflurane, followed by insertion of a laryngeal mask. After induction of anaesthesia, sevoflurane concentration was decreased to a predefined level and held constant for at least 15 minutes. Subsequently, a bolus of either S-ketamine 1 mg kg¹ (high dose group) or S-ketamine 0.5 mg kg¹ (low dose group) or placebo (0.9% saline, placebo group) was administered, 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), from which the MAC of sevoflurane was calculated applying Dixon's "up-and-down" method. Differences in MAC values between groups were analyzed using unpaired t-tests. In addition, adverse events such as halluzinations and awareness were recorded.

Results and Discussion: Fifty patients (mean age 51±8 years) were included. The MAC of sevoflurane was 0.6±0.1% (95%Cl 0.4-0.7%) in the high dose group, 1.0±0.1% (95%Cl 0.8-1.1%) in the low dose group, and 2.1±0.1% (95%Cl 2.0-2.2%) in the placebo group. The MAC of sevoflurane in the high dose and the low dose group differed significantly from the MAC of sevoflurane in the placebo group (P<0.01). No adverse events were recorded.

**Conclusion**: Our study suggests that s-ketamine, given in clinically used doses, significantly decreases the MAC of sevoflurane without any increases in adverse events.



### 01AP15-7

Effects of dantrolene on calcium-induced calcium release from the sarcoplasmic reticulum in human skeletal skinned fibers

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Background and Goal of Study: Dantrolene (Dan) is the only drug available to treat malignant hyperthermia (MH) crisis, a pharmacogenetic disorder caused by increased calcium (Ca) release from the sarcoplasmic reticulum (SR) via ryanodine receptor 1 (RYR1). The Ca-induced Ca release (CICR) rates from the SR were

found to be accelerated in the skeletal muscles of MH patients1). The effects of Dan on CICR in skinned fibers are controversial<sup>2/3</sup>, and have not been studied in the skeletal muscles of MH patients. We investigated the effects of Dan on the CICR rate in the skeletal muscles of patients predisposed to MH.

**Materials and Methods**: Muscle samples were obtained, with prior written consent, from 11 individuals to determine their predisposition to MH. The CICR rates were measured in chemically skinned fibers achieved by Endo's method. Calcium ions [Ca²¹] at five different concentrations (0, 0.3, 1.0, 3.0, and 10  $\mu$ M), were used to induce Ca stimulation via RYR1. The effects of Dan-treatment (50  $\mu$ M) on CICR rates were assessed at five different Ca²¹ concentrations, under magnesium-free conditions, at 20°C. The values are expressed as mean  $\pm$  SD. A paired t-test and a regression analysis were performed for statistical analysis. Significance was determined at p<0.05.

Results and Discussion: Ten of the 11 individuals were diagnosed with predisposition to MH, based on the accelerated CICR rates. Their CICR rates were increased by 2 to 8-fold compared to the normal rate. Dan-treatment significantly decreased the CICR rates at  $\text{Ca}^{2+}$  concentrations of 0.3 (p=0.0087), 1.0 (p<0.0001), 3.0 (p=0.0001), and 10 (p=0.0006) μM. The relative CICR rates (post- to pre- Dan-treatment) were 0.95±0.18, 0.79±0.22, 0.67±0.087, 0.74±0.11, 0.73±0.13 at  $\text{Ca}^{2+}$  concentrations of 0, 0.3, 1.0, 3.0 and 10 μM, respectively. CICR rates, both pre- and post- Dan-treatment, exhibited a significant correlation (r=0.989; p<0.0001, slope=0.754; p<0.0001) (Fig 1). It was therefore assumed that applying 50 μM Dan would decrease the CICR rates by 0.754-fold. The inhibitory effect of Dan on CICR may contribute to the suppression of myoplasmic elevation of  $\text{Ca}^{2+}$  in MH crisis. Conclusion(s): We conclude that Dan is effective in the treatment of MH crisis via

direct inhibition of Ca release from the SR and reduction of Ca<sup>2+</sup>.

References (optional):

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### 01AP15-8

# Propofol attenuates osteoclastogenesis by lowering RANKL/OPG expression ratio in Mice Osteoblast

Lee D. 1, Kim E.

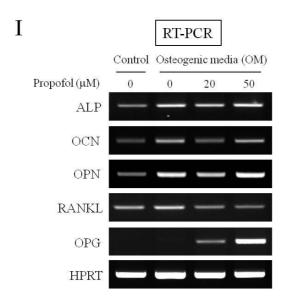
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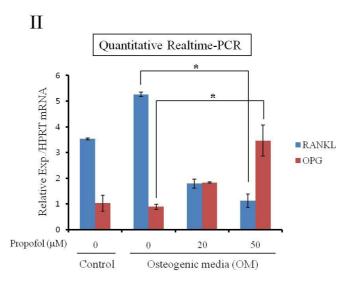
Background and Goal of Study: Bone remodeling plays an important role in the bone healing process; for example, following fracture. The relative expression ratio of the receptor activator of nuclear factor kappa B ligand (RANKL)/ osteoprotegerin (OPG) controls osteoclast differentiation, thereby playing a pivotal role in the regulation of bone remodeling. Propofol, a widely used anesthetic agent in orthopedic procedures, is considered to possess potential antioxidant properties owing to its structural similarity to  $\alpha$ -tocopherol. Antioxidants are known to enhance bone healing. Accordingly, in the present study, we aimed to investigate osteoblastic differentiation and RANKL/OPG expression following propofol administration, in order to assess the potentially beneficial effects of this drug on the bone remodeling process, using calvarial primary osteoblasts from newborn mice.

Materials and Methods: Calvarial pre-osteoblast cells were cultured in media containing clinically relevant concentrations of propofol, and cytotoxicity, effects on cell proliferation, osteogenic activity, and osteoclastogenesis were examined

Results and Discussion: The present findings indicated that propofol did not exert cytotoxic effects or alter cell proliferation in primary calvarial osteoblasts. Further, propofol did not affect osteoblast differentiation. The RANKL/OPG ratio was found to be decreased following propofol administration, and osteoclastogenesis was significantly reduced, indicating that propofol attenuated the osteoclastogenesis-supporting activity of osteoblasts

**Conclusion:** The results demonstrate that propofol, at clinically relevant concentrations, exerts beneficial effects on bone remodeling by attenuating osteoclastogenesis via suppression of the RANKL/OPG expression axis.





## 01AP15-9

# Responsivity of extrasynaptic GABA<sub>A</sub> receptors to different anesthetics determines tonic inhibition in the thalamus

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**Background and Goal of Study**: Potentiation of GABA action is a common characteristic of different anesthetics. Beside the phasic inhibition mediated by synaptic GABA, Receptors (GABA,R), extrasynaptic GABA,R containing the  $\delta$ -subunit (GABA,R $\delta$ ) give rise to tonic inhibition by ambient GABA. Since  $\delta$ -selective agonists possess hypnotic effects, extrasynaptic GABA,R $\delta$  attracted attention as a target for anesthetics. The thalamus has been identified as a critical site for anesthetic action and expresses GABA,R $\delta$  in the ventrobasal thalamus (VB) but not in the nucleus reticularis thalami (NRT). The aim of this study is to investigate the mode of action of different anesthetics in VB and NRT with respect to their influence on tonic inhibition.

**Materials and Methods**: Whole-cell patch-clamp recordings were performed in acute mouse brain slices. Synaptic and extrasynaptic GABA-mediated currents were investigated in the presence of methohexital, propofol and the  $\delta$ -selective agonist gaboxadol.

Results and Discussion: Immunohistochemical staining verified the differential expression of GABA, R\u03d5 in VB and NRT. While the VB exhibited high levels of GABA, R\u03d5, the NRT was devoid of a GABA, R\u03d5 signal. Accordingly, gaboxadol significantly shifted the holding current in VB, but not NRT neurons. Methohexital induced a prominent holding current shift in VB neurons similar to gaboxadol. In contrast, propofol application showed only a small effect on holding currents in both VB and NRT neurons. Taken together, our results demonstrate the differential effects of these anesthetics on tonic inhibition in the thalamus.

**Conclusion**: The  $\delta$ -selective agonist gaboxadol exhibits strong effects on tonic currents in VB in contrast to propofol, which is more selective for the  $\beta_3$ -subunit. The exact mode of action and subunit specificity of methohexital is unknown. Our data indicate that methohexital significantly affects tonic inhibition in the thalamus, thus suggesting a certain  $\delta$ -selectivity. However, whether the methohexital effect on tonic currents is associated with a reduced seizure threshold – which has been clinically observed – needs to be further studied.

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### 01AP15-10

# Behavioral Effects of Chronic Exposure to Trace Concentrations of Isoflurane in Mice

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Background and Goal of Study: Acute exposure to isoflurane is documented to cause cognitive and behavioral impairment in both animals and human studies. Occupational exposure to trace concentrations of isoflurane occurs in operating rooms, recovery rooms, dental operatories and veterinary facilities. The purpose of this experimental work is to determine if chronic exposure to trace concentrations of isoflurane can result in effects resembling those of acute exposure in anesthetic

concentrations or not.

Materials and Methods: 56 male albino mice were divided into 4 groups (14 mice each). Control group (G1) received 3 L/min 100% O2 8 h daily for 8 weeks, then exposed to behavioral study (Morris water maze, T maze, open field and rotarod) immediately 8 weeks after exposure and after another 8 weeks in an ordinary environment. Isoflurane groups (G2, G3, and G4), received 32ppm, 16ppm and 8ppm in 100% O2 8 h a daily for 8 weeks and then exposed to behavioral study as control group.

Results and Discussion: Chronic exposure to trace isoflurane resulted in long-term/reference memory impairment and impairment in non-spatial working memory in a dose dependant manner. While anxiety and exploratory activity were not affected also motor learning and coordination were not affect.

**Conclusion(s)**: Conclusion: Chronic exposure to trace concentrations of isoflurane could affect some behaviors while leaving others intact. This provides an evidence of drawback effect of isoflurane on some brain functions in trace concentrations found in the operating rooms.

#### 01AP15-11

# Lipid emulsion has no effect on the hemodynamic cardiovascular toxicity of ropivacaine. Study in an experimental porcine model

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Background and Goal of Study: Experimental studies have shown that intralipid (IL) is effective in reversing local anesthetic cardiac toxicity. The so-called "lipid sink" effect is suggested to be the basic mechanism of this treatment and its efficacy varies depending on the physico-chemical properties of the local anesthetics. Ropivacaine (R) is considered a less cardiotoxic agent in comparison with other anesthetics. However, several case reports in which significant cardiac side effects have occurred after R administration. Limited studies have evaluated the efficacy of IL in the reversion of the hemodynamic effects of R.

Material and methods: Eleven Large-White anesthetized pigs were studied. The animals were randomly assigned to two groups: control group (C-group, n=5) and intralipid group (IL-Group, n=6). A 5-French catheter (PiCCO, Pulsion Medical Systems AG) was inserted through the femoral artery (FA) to record mean aortic pressure, cardiac output (measured by transpulmonary thermodilution), LVdP/dtmax, and systemic vascular resistance index. After instrumentation and monitorization, a R bolus of 5 mg.kg-1 was administered. Hemodynamic data: Heart rate (HR); mean arterial pressure (MAP); cardiac index (CI); maximal first derivative of left ventricular pressure (LVdP/dtmax) and systemic vascular resistance index (SVRI) were measured at baseline, after R administration and at 1, 5, 15 and 30 min after IL (1.5 mL/kg followed by an infusion of 0.25 mL/kg/min). In C-group a saline infusion was administered instead of IL. Statistical analysis: Mann-Whitney test and Wilcoxon test as appropriate.

Results: Plasma R levels ranged between 7,940 to 5,450 ng/dl from 5 to 30 min respectively. Ropivacaine induced a significant decrease in MAP ( $\Delta$  13%), CI ( $\Delta$  28%), LVdP/dtmax ( $\Delta$  41%) and in SVRI ( $\Delta$  16%) without significant differences between groups. There were no significant differences between lipid infusion and saline in the recovery of the hemodynamic parameters previously altered by ropivacaine through any timepoint of the experiment.

**Conclusion:** In the present study the lipid emulsion did not enhance hemodynamic recovery in pigs intoxicated with ropivacaine. More research is warranted to define the role of intralipid on ropivacaine cardiac toxicity.

### 01AP16-1

# Incretins and the anaesthetist: a systematic review

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**Background and Goal of Study**: Glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic peptide (GIP) are incretin hormones. By lowering blood glucose in a glucose dependent manner, incretin-based therapies represent a novel and promising tool for the management of diabetes mellitus and hyperglycaemia in the perioperative period. We performed a systematic review of the literature for a full scope of current applications of incretins in the perioperative and critical care setting.

Materials and Methods: We searched MEDLINE, the Cochrane Library, and EMBASE databases for all randomized clinical trials using exogenous Glucagon-Like Peptide 1 (GLP-1), GLP-1 receptor agonists, exogenous glucose-dependent insulinotropic polypeptide (GIP), and dipeptidyl peptidase –IV inhibitors) as therapeutic interventions in patients during surgery or critical illness. Outcomes of interest included plasma glucose levels, frequency of hypoglycaemia and exogenous insulin requirements.

**Results and Discussion**: Of the 1047 articles found during the initial literature search, 34 fulfilled criteria for full text review and 18 were subsequently included in

the qualitative review. Quantitative summary of glycaemic control was unfeasible. Qualitatively, of the 17 studies reporting on glycaemic control, 15 observed an improvement, defined as lower glucose concentrations in twelve studies and as reduced insulin requirements (with similar glucose concentrations) in three studies. Due to heterogeneity, meta-analysis was only possible for the outcome of hypoglycaemia. This revealed an incidence of 7.4% in the incretin group vs. 6.7% in the comparator group (p = 0.96).

Conclusion: In small single-centre studies incretin-based therapies appear to improve glucose control without increasing the incidence of hypoglycaemia. While it is far too early to recommend the clinical use of GLP-1 based therapies, these preliminary data are promising and future studies employing larger sample sizes are keenly awaited.

#### 01AP16-2

## A study on the other kinds of diabetes mellitus in the perioperative period

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**Background and Goal of Study**: Diabetes mellitus (DM) is often treated as a uniform disease in the perioperative period. While most patients have type 2 DM, a minority of cases is due to type 1 DM or a specific cause such as pancreatitis or DM induced by long-term corticosteroid use. We studied the prevalence of these other forms of diabetes in our tertiary teaching hospital anesthesia practice, and describe their associated perioperative glucose control.

**Materials and Methods**: All patients with DM coming to our preoperative anaesthesia clinic between January 2014 and October 2015 were screened for the inclusion in a trial for type 2 DM (NCT02036372). During this screening, patients with other than type 2 DM were prospectively registered. We retrospectively collected data on glucose control from the electronic health records of these patients.

**Results and Discussion**: In the study period a total of 22,329 patients were operated on. We collected 258 patients who had non-type 2 DM. Incidences and perioperative glucose control are presented in table 1.

**Conclusion**: To this date, there were few data on the occurrence of non-type 2 DM in the perioperative period. While groups are small, the difference in glucose control is notable. Potentially, patients with other types of diabetes are vulnerable to dysregulation and complications in the perioperative period, which should be taken into account by the treating anaesthetist.

**Table 1.** Perioperative incidence, HbA1c, and glucose concentrations of non-type 2 DM. Values are medians with IQR. \*Kruskal-Wallis test used.

Type of Diabetes	Incidence (/10.000)	Preoperative HbA1c (mmol/mol)	Preoperative glucose (mmol/l)	Postoperative glucose (mmol/l)
Type 1	69	65 (55 – 76)	9.7 (7.3 – 13.8)	11.6 (8.4 – 15.7)
Pancreas insufficiency	16	60 (45 – 72)	8.2 (6.9 – 10.5)	10.8 (9.5 – 13.7)
Corticosteroid-induced	9	43 (41 – 55)	6.7 (5.4 – 8.2)	11.0 (7.9 – 16.9)
Diabetes gravidarum	14	41 (34 – 45)	7.3 (4.9 – 9.2)	6.1 (5.3 – 7.7)
p value*		< 0.001	< 0.001	< 0.001

## 01AP16-3

# Current perioperative management of patients with diabetes mellitus in Dutch hospitals

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**Background and Goal of Study**: Evidence regarding the optimal treatment of patients with diabetes mellitus in the perioperative period is scarce and variable. We surveyed diabetes protocols in Dutch hospitals hypothesizing that these would show considerable variability, reflecting the diverse literature on this topic.

Materials and Methods: We contacted all hospitals in the Netherlands by phone and (e-)mail to request their perioperative treatment protocol for patients with diabetes mellitus. In addition, we sent out a survey to gather information on preoperative preparation, diabetes medication management, glucose measurements and glucose targets potassium co-administration and blood sugar control-strategies

Results and Discussion: Out of the 80 hospitals in the Netherlands, 72 responded to our request (response rate: 90%). We received 55 protocols, 17 hospitals answered the questions in our survey. The median upper glucose target was 10 mmol I-1 (range 6-20), whereas the median lower target was 4 mmol I-1 (range 2-8). Long acting insulin is reduced by 25-50 % on the day before surgery in 26 hospitals (38%) and continued in full dosage in the others. On the day of surgery, insulin is stopped in 42 hospitals (60%), in 6 (9%) insulin is continued as normal, and in the remaining 13 (22%) the insulin dose is reduced by 25-66%. The glucose measurement interval varies between 1-6 times per hour, or is left to discretion

of the anaesthesiologist. Intraoperatively, forty-nine hospitals (70%) prescribe a glucose infusion (2-10 g h-1), 46 (66%) also administer continuous insulin (0.5-3 IE h-1), and 23 (33%) co-administer potassium (0.8-6 mmol h-1).

**Conclusion**: We found a large variability between hospital protocols for perioperative diabetes mellitus management. This reflects the variability of literature and paucity of evidence on perioperative diabetes management and stresses the need for clinical research on this topic to improve clinical guidelines.

### 01AP16-4

Evaluation of the immune-endocrine response in surgical patients undergoing desflurane-nitrous oxide or desflurane-nitrous oxide free anaesthesia

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Background and Goal of Study: Literature is scarce in relation to possible effects of the association between the gaseous nitrous oxide (N<sub>2</sub>O) and the halogenated desflurane on the immune-endocrine response in surgical patients. We hypothesised that N<sub>2</sub>O associated with desflurane would increase the inflammatory and neuroendocrine effects when compared to the use of desflurane alone. The primary aim of this study was to compare the effects of anaesthesia maintained with desflurane associated or not with N2O on inflammatory and neuroendocrine hormone biomarkers and the second aim was to assess whether there were changes in the respective biomarkers within each group during and after surgery. Materials and Methods: After approval from the local Ethical Committee and Brazilian Clinical Trial Registry, this prospective study was conducted in 40 ASA physical status I adults who underwent septoplasty and were randomly assigned in two groups to receive desflurane anaesthesia (n = 20) or desflurane anaesthesia associated with 60% of N<sub>2</sub>O (n = 20). Blood samples were collected before anaesthesia (baseline). 1.5 h after anaesthesia induction, and on the first day after surgery. Inflammatory markers (interleukins IL-6, IL-8 and IL-10, and high sensitivity C-reactive protein - hs-CRP) and adrenocorticotropic (ACTH), cortisol and prolactin hormones were analysed in serum while gene expression of prommatory markers (NF-kB, IL-6 and COX-2) were evaluated in peripheral blood cells by real-time quantitative polymerase chain reaction.

Results and Discussion: There were no significant differences between groups regarding demographic, intraoperative, inflammation and hormonal data (P > 0.05). The results also showed that in both anaesthetic techniques there were significant increases of systemic intra-operative prolactin and post-operative pro-inflammatory mediators IL-6 and hs-CRP.

**Conclusions:** Contrary to our hypothesis,  $N_2O$  associated with desflurane did not impair the inflammatory and endocrine response when compared to patients who received only desflurane. Thus, both anaesthetic techniques were similar regarding immune-endocrine effects by leding to prolactin change during anaesthesia and pro-inflammation status after surgery in healthy patients who underwent minimally invasive surgery.

Acknowledgements: FAPESP (grant #2013/16842-0) and CNPq supported this study.

# 01AP16-5

# Dopamine-secreting ganglioneuroma: anaesthetic management of a rare entity with an atypical presentation

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**Background:** Ganglioneuromas are rare benign tumours originating from the neural crest tissue. [1] Ganglioneuromas are slow-growing usually asymptomatic tumours. [1-2] 30% of these tumours secrete catecholamines; but exclusively dopamine-secreting ganglioneuromas, besides being extremely rare, lack the classical presentation of sympathetic activation. [1-2.3] We report the case and perioperative anaesthetic management of a 41-year-old man with a dopamine-secreting ganglioneuroma presenting with paroxysmal hypertension.

Case Report: A 41-year-old man was diagnosed with an exclusively dopamine-secreting retroperitoneal ganglioneuroma during a workup for a 6-month history of hypertensive crisis. After consultation with a multidisciplinary team, the patient was scheduled for *en bloc* resection under general balanced anaesthesia. Preoperative control of arterial pressure was achieved with amlodipine/valsartan, phenoxybenzamine and propranolol. After tumour ligation, profound hypotension developed and was successfully treated with dopamine, noradrenaline and methylene blue. The patient was extubated at the end of the surgery. Postoperative period was uneventful, the patient being discharged at 5th PO day. To the current day, the patient remains asymptomatic with normal blood pressure and dopamine

**Discussion**: Dopamine-secreting ganglioneuromas presenting with hypertension are rare entities, with only 2 cases reported in the literature<sup>[1,2]</sup>.

There is no consistent approach to these rare tumours. Similar to noradrenaline/adrenaline secreting tumours, we considered the primary goal the provision of stable hemodynamics during all perioperative period.

1.Dopamine-secreting adrenal ganglioneuroma presenting with paroxysmal hypertension attacks. Saudi Med J 2008;29:122-125

2.Adrenal ganglioneuroma in a patient presenting with severe hypertension and diarrhea. Koch C. et al. Endocrine-Related Cancer 2003;10:99-107

3.Dopamine-Secreting Giant Adrenal Ganglioneuroma: Clinical and Diffusion-Weighted Magnetic Resonance Imaging Findings. JBR–BTR 2014;97:109-112 Learning points: Ganglioneuromas are rare clinical entities with little written in the literature regarding its management.

Facing a cathecolamine-secreting tumour presenting with hypertension, dopamine excess should be investigated.

We suggest that management of dopamine-secreting ganglioneuromas presenting with hypertension be similar to that of noradrenaline/adrenaline-secreting ones.

## 01AP16-6

# Opioid reduced anesthesia and continuous blood glucose monitoring during an insulinoma removal: a case report

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**Background**: Perioperative blood glucose monitoring and infusion of 5% glucose are the most common way to prevent experiencing hypoglycemic crises.

Case Report: We report a 53 year old female patient with insulinoma and a history of Epilepsy which have worsened from the beginning of the insulinoma manifestation experiencing hypoglycemic crises and also a status epilepticus, 4 times in the last year. The value of the glycemia prior to induction in general anesthesia was 2 2mmol I. We started an intravenous infusion of 10% Glucose 4ml/kg hourly to prevent worsening of the hypoglycemia. Our patient received 2mg Midasolam, 100mcg Fentanyl, 70mg of Lidocaine and 100mg of Propofol for induction while muscle relaxation was provided with 50mg Rocuronium. Sevoflurane with MAC of 1.0 was used for maintaining anesthesia. Before the incision, the patient received 50mg of Ketamine. After the incision glicemia was 15,9mmol/l and the rate of 10% Glucose infusion was lowered to 2ml/kg/h. In analgesic aim the patient received continous infusion of Magnesium Sulphate 10mg/kg/h, 100mg Ketoprofen and 2.5g Metamizole Sodium and 9ml of 0.25% Bupivacaine epiduraly. Surgical excision of the suspected mass was made as well as ex tempore. The pathologist has confirmed insulinoma existence. Blood glucose levels post excision and after awaking of anesthesia were normal. Blood glucose levels were monitored every hour during the PACU stay without presence of hyperglycemic rebound

**Discussion**: Friser first described hyperinsulinism during anesthesia and the intraoperative and postoperative episodes of hypoglycemia responding to rapid administration of glucose intravenously (1). Using continuous intravenous infusion of 10% glucose and maintaining blood glucose levels between 100-150mg/dl has shown as a safe approach for intraoperative management in a patients for insulinoma removal. During intraoperative management we used an opioid reduced anesthetic technique and sevofluran which suppresses spontaneous release of insulin and prevents hyperinsulinemia.

# References

1.Burch PG, McLeskey CH. Anesthesia for patients with insulinoma treatment with oral diazoxide. Anesthesiology. 1981 Oct;55(4):472-5. PubMed PMID: 6271026

**Learning points:** Opioid reduced anesthesia combined with sevoflurane and epidural analgesia can be used as a suitable safe technique for intaoperative management during insulinoma removal. Blood glucose level monitoring every 15 minutes intraoperatively is essential.

## 01AP16-7

# Rapid Sequence Induction in France in 2016: a national survey

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Background and Goal of Study: The rapid sequence induction (RSI) of general anesthesia (GA) in full stomach situation is used to avoid aspiration. Excepted in the particular situation of GA performed outside of the operation room, there is no French guidelines about how to perform an ISR, that could lead to wide variability in practices. This survey aimed to collect data about the practice of the RSI in France. Materials and Methods: This national electronic survey was conducted between April and June 2016, to anesthesiologists- intensivists, intensivists and emergency physicians of the 32 University Hospitals and Regional Hospitals of France. After approvement, the head of each department diffused an e-mail with a link to an electronic form to all practitioners.

The form included  $3\vec{7}$  closed anonymous questions. 5 practitioners tested the form before his diffusion and answered it in 5 to 7 minutes.

Results and Discussion: 57 of the 155 heads of department contacted accepted to participate. 2111 practitioners from 26 hospitals should have received the form. 402 (19%) of them have answered. Among the 402 responders 309 (77%) were senior practitioners, 96 (23%) junior; 236 (59%) were anesthesiologists, 26 (6%) intensivists and 140 (35%) emergency physicians.

398/402 (99%) practitioners said to perform RSI. 177/398 (44%) practitioners used the Sellick maneuver (SM) during RSI. 132 of 185 practitioners (71%) thought there

was no scientific proof of SM utility, 65 (35%) thought the SM inefficient and 61 (33%) thought the SM increases the risk of difficult airway.

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	Aneshtesiologists (n=234)	Intensivists n= 25	Emergency Physicians n=139	Total n=398
Sellick maneuver	114 (49%)	6 (24%)	57 (41%)	177 (44%)
Muscle relaxant use Always	192 (82%)	19 (76%)	118 (85%)	329 (83%)
Suxamethonium	230 (98%)	21 (84%)	139 (100%)	390 (98%)
No morphinomimetics use	85 (36%)	17 (68%)	107 (77%)	209 (53%)
Etomidate Propofol	125 (53%) 191 (82%)	20 (80%) 8 (32%)	136 (98%) 3 (2%)	281 (71%) 202 (51%)

The practice of RSI is not homogeneous among French practitioners. Mainly, the practice depends on the practitioner speciality. With little morphinomimetics and SM, French practices are close to German ones, when Americans and British use more SM and morphinomimetics before laryngoscopy.

**Conclusion**: Actualized guidelines adapted to current practices and specific clinical situations are needed.

# 01AP16-8 PERFORMING ABDOMINAL WALL BLOCKS: before or after the surgery?

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**Background and Goal of Study:** ERAS programs (Enhance Recovery After Surgery) are based on the reduction of surgical aggression in patients, and have already been proved to be safe and efficient as medical treatments. In order to achieve a good pain control with less opioids, it is necessary to define a specific protocol of multimodal analgesia. Abdominal wall blocks are a key part of them, but there is no evidence of the best moment to perform it: before or after the surgery.

**Materials and Methods:** We collected all the laparoscopic patients submitted to colorectal surgery with an ERAS program between January and November 2017. The study includes two groups of ERAS: in group A, we performed abdominal wall blocks before surgery incision. In group B, abdominal wall blocks were performed after surgical incision. Group A (80 patients) had an average age of 68 ± 13 years, 60% of men and average length of stay of 7.61 ± 4.38. Group B (10 patients) had an average age of 67 ± 7.02, 80% of men and average length of stay of 5.7 ± 1.49. The blocks performed in the first group were TAP block (transverses abdominal plane block) (86.2%), subcostal TAP block (6.2%) and rectus sheath block (7.5%). In the second group were performed TAP block (70%), subcostal TAP block (10%) and rectus sheath block (20%). More than 90% of blocks were performed with levobupivacaine 0.33% in both groups.

We measured VAS score and morphine consumption in the day of surgery and postoperative days 1 to 3. Nausea, vomiting, length of stay and paralytic ileus were also recorded.

**Results and Discussion:** VAS scores in the day of surgery and days one, two and three in group A are:  $1.94 \pm 1.94$ ,  $2 \pm 1.82$ ,  $1.54 \pm 1.58$ ,  $1.20 \pm 1.15$ . In group B VAS scores are:  $1.13 \pm 1.81$ ,  $2.61 \pm 2.18$ ,  $2.84 \pm 3.22$ ,  $1.14 \pm 1.56$ .

Morfine consuptiom (mg) in group A in days 0, 1, 2, 3, is:  $1.75 \pm 3.47$ ,  $1.41 \pm 3.54$ ,  $0.69 \pm 2.74$ ,  $0.29 \pm 1.39$ . In group B, morphine consumption is:  $2.89 \pm 4.26$ ,  $1.11 \pm 3.14$ ,  $0.88 \pm 1.74$ ,  $0.44 \pm 1.33$ .

Postoperative nausea / vomiting and ileus rates were 15,2% and 16.4% in the first group, while in the second group there were no cases of either of these complications.

**Conclusion:** It seems that there is no big difference in VAS and morphine consumption performing abdominal wall blocks pre or post surgery incision. Nausea, vomiting and ileus incidence cannot be absolutely reliable due to the small sample of group B. Bigger well designed studies should be carried out for evidence.

### 01AP16-9

# The effect of preoperative anxiety and depression on postoperative pain and analgesic consumption in breast cancer surgery

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**Background and Goal of Study**: Cancer patients with preoperative anxiety and depression can have more intense postoperative pain. The aim of this study was to investigate the relationship between the level of their anxiety and depression in the preoperative period and the pain level in the postoperative period and analgesic requirement, in a sample of Indian patients.

Materials and Methods: After obtaining institutional review board and ethical committee approval this prospective study was conducted in 200 elective surgical adult female patients with carcinoma breast. Patients with psychiatric illness were excluded. Anxiety and depression were assessed preoperatively with generalised anxiety disorder (GAD-7) and patient health questionnaire (PHQ-9). All patients underwent surgery under standardised general anaesthesia. Post operative pain was assessed by numerical rating scale for 24 hrs. Post-operative analgesia was addressed with fentanyl and diclofenac.

Results and Discussion: Age, duration of surgery and socioeconomic status didn't affect postoperative pain. In the study population 13% had anxiety alone (A), 9.5% of patents depression alone (D), 61% had both (B) and 16.5% had neither (N) Patients who had anxiety as well as combined anxiety-depression had significantly higher pain scores compared to patients with no anxiety (p<0.001). Average fentanyl use was 91µg in (A), 65µg in (D), 118 µg in (B) and 57 µg in (N). Fentanyl use was significantly higher in (A) and (B) compared to (N) (p<0.001). Average diclofenac use was 81 mg in (A), 55 mg in (D), 106mg in (B) and 34mg in (N). Diclofenac use was significantly higher in (A) and (B) compared to (N) (p<0.001). Depression and anxiety had significant correlation as 82% of patients with depression had anxiety In patients with no depression, 63.5% of them did not have associated anxiety (p<0.001). Correlating anxiety scores (GAD-7) anxiety had high positive correlation with depression with r=0.605 (p <0.001) and pain scores with r=0.607 (p<0.001). Conclusion: There is a high incidence of anxiety and depression in patients scheduled for breast cancer surgery and they are independent risk factors of postoperative pain and analogsic consumption. Majority of these patients presented with combined anxiety-depression which resulted in increased pain and analgesic use. Therefore preoperative anxiolytics and antidepressants may reduce postoperative opioid requirement and may reduce cancer recurrence

#### 01AP16-10

# Anaesthesia for electroconvulsive therapy: retrospective analysis over a two-year period at a Portuguese hospital

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Background and Goal of Study: Modified electroconvulsive therapy (ECT) is an effective treatment for some psychiatric disorders and it is used globally. There is no standardized guidelines about anaesthesia for ECT and the European research in this area is scarce. ¹The purpose of this study was to analyse the ECT sessions over a two-year period at a Portuguese hospital and determine procedural complications and predictors associated with them.

Materials and Methods: We retrospectively reviewed clinical records of all patients submitted to ECT from January 2015 to December 2016 at Postoperative Anaesthesia Care Unit (PACU) at our hospital. Information collected was about demographics data, comorbidities, ASA status, ECT data, length of stay in PACU, medications administered, complications and their management. Descriptive statistics were performed and comparisons were made using chi-square test, T-test and Mann-Whitney U test. Statistical significance was defined as p<0.05.

Results and Discussion: We included 106 ECT sessions, which corresponded to 10 patients. Half of the patients were female, mean age was 55,6 ±3,1 years and all of them were classified as ASA III. Half of them were unemployed or retired. Hypertension (90%) and dyslipidemia (80%) were the most common comorbidities. Major depression (80%) was the main psychiatric disorder founded. Each patient was submitted to a mean of 10,6±2,2 sessions. Median PACU stay was 80 minutes. In all sessions, propofol and suxamethonium were used. Complications occurred in 16 sessions: bradycardia (8), facial flush/ sweating(5), tachycardia(3), post-ECT seizure(1), agitation/disorientation(1) and bite of lips(1). We found statistical differences between the group of patients with and without complications: age(p=0,017), frequency of stimulus(p=0,009) and seizure duration(p=0,013). Although 15,1% of procedures had complications, all of them were solved spontaneously or with medication, they did not increase length of stay in PACU (p=0,208) and there were no severe events, which confirms the safety of these sessions

Conclusions: Patients submitted to ECT who are more likely to have complications are older, have lower frequency of stimulus and have longer seizure duration. Anaesthesia for ECT can be managed with clinical surveillance, close monitoring and, if needed, additional medication. The occurrence of complications do not seem to interfere with patient's outcome.

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## 01AP17-1

# RCP AS A SURGICAL AGGRESSION INDICATOR: Are there differences due to the ERAS protocol?

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Background and Goal of Study: ERAS programs (Enhance Recovery After Surgery) are based on the reduction of surgical aggression in patients and have been proved to be safe and efficient medical treatments. Moreover, their use has shown a decrease in morbidity, mortality, clinical complications, duration of stay and hospital economical costs. One of the most common indicators of surgical aggression and inflammation used nowadays is the C-reactive protein (CRP). The aim of this study is to evaluate the variation of postoperative CRP serum levels in an ERAS group (group A) versus a non-ERAS historic group (group B).

**Materials and Methods:**We collected 165 patients submitted to colorectal surgery with an ERAS program (group A), with a mean age of  $66.25 \pm 12.96$  years, a physiological and surgical CR-POSSUM 10.97  $\pm 6.73$  and  $8.74 \pm 1.82$  points respectively. The control group, not ERAS (group B) includes 66 patients, whose mean age is  $64.80 \pm 15.54$  years, with physiological and surgical CR-POSSUM  $9.03 \pm 2.67$  and  $7.44 \pm 0.86$  points respectively.

We measured CRP serum levels on the first, third and fifth postoperative days in both groups

**Results and Discussion**: Average CRP in days 1, 3 and 5 post-surgery in group A are: 63.33 ± 40.76, 69.69 ± 53.08 and 45.36 ± 49.41.

Average CRP in days 1, 3 and 5 post-surgery in group B are:  $87.34 \pm 40.47$ ,  $93.37 \pm 64.24$ ,  $72.12 \pm 103.74$ .

**Conclusion**: It seems that ERAS programs can be effective in the reduction of the surgical aggression and the inflammation produced by it. Bigger studies should be carried out for evidence.

#### 01AP17-2

# Rol of Opioid Receptor mu 1 (OPRM1) expression in the colorectal cancer progression

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Background and Goal of Study: Opioids are a cornerstone in the management of perioperative pain in oncologic patients, but evidence suggesting that are involved in tumor growth and metastasis. Nowadays no study have evaluated Opioid Receptor mu 1 (OPRM1) expression in colorectal tissue samples. This study assessed by inmunohistochemical analysis the expression of OPRM1 in colorectal cancer samples versus adiacent nontumorous tissues.

Materials and Methods: Preliminary study in parafined colorectal cancer samples.

OPRM1 expression was assesed by immunohistochemical staining in primary colorectal cancerous surgical

Results and Discussion: Ten sample tissues were evaluated as a preliminary approach. Opioid Receptor mu 1 (OPRM1) expression was high in cancerous tumor compared with their adjacent nontumorous tissues. Further studies are needed to evaluated their impact on clinical outcome.

**Conclusion**: Opioid Receptor mu 1 (OPRM1) expression is high in colorectal cancer than in their adjacent nontumorous tissues.

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# 01AP17-3

# Anaesthesia-related mortality in Sub-Saharan African countries. A quantitative systematic review

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Background and Goal of Study: Anaesthesia-related mortality in developing countries has previously been estimated based on data from studies that are indexed in medical databases such as PubMed.1 We set out to estimate anaesthesia-related mortality in Sub-Saharan African countries based on systematically searched studies from both medical databases and the grey literature.

Materials and Methods: A systematic research of studies from Sub-Saharan African countries (with the exception of South Africa), reporting on dichotomous anaesthesia-related mortality data (i.e. the number of deaths with a denominator) was done in medical databases (PubMed, Cochrane, Web of Science, Embase) to April 2017. We also searched the grey literature including Google, African medical journals that are not indexed in medical databases, reports from African National Congresses on obstetrics or surgery, and medical theses. Anaesthesia-related mortality was defined as reported in the individual reports. No restriction on publication date, language, or type of surgery was applied.

Results and Discussion: From 2112 retrieved reports, 170 (1,054,364 patients) were included: 103 reports (median size, 882,734 patients; range 7 to 91,032) were from medical databases and 67 reports (average size, 171,630 patients; range 16 to 45,974) from the grey literature. In studies retrieved from medical databases, average mortality rate was 5.4/10,000, in the grey literature it was 21.3/10.000 (weighted mean of overall anaesthesia-related mortality, 8/10,000).

Conclusion: Anaesthesia-related mortality in Sub-Saharan African countries is high. Mortality rates as reported in the literature indexed in medical databases is only about one fourth of the mortality rates derived from the grey literature. Is likely that previously published estimates largely underestimated the true burden of anaesthesia-related mortality in Sub-Saharan African countries.1

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#### 01AP17-4

# Characterization of adult patients underwent orthopedic surgery in a tertiary hospital – a retrospective review

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Background and Goal of Study: Nowadays orthopedic surgery is becoming more complex and more frequent. Some of its specific features come from a wide range of ages of its patients: from healthy young people with sports injuries to elderly dependent patients with multiple comorbidities. Therefore, it is important to know the characteristics and specificities of this population in order to optimize its perioperative approach.

The aim of this study is to characterize the patients admitted in a tertiary hospital for orthopedic surgery, analyzing their comorbidities, anesthetic management and the type and time length of surgery.

Materials and Methods: A retrospective analysis was carried out by reviewing

Materials and Methods: A retrospective analysis was carried out by reviewing clinical data of 487 patients underwent elective and urgent orthopedic surgery, in our hospital. No exclusion criteria were defined. A retrospective and descriptive analysis was performed.

Results and Discussion: In the studied group the average age was 67,1 ± 19,8 years and 61,8% were female. The majority of patients were classified as ASA II (49,9%) and III (36.6%). Cardiovascular disease was the most prevalent pathology (51.8%) followed by endocrine-metabolic (46.8%), psychiatric (12,5%), respiratory (10,5%) and neurologic (9,4%) problems. According to the type of surgery 74,7% were related to the lower limb, 18,7% to the upper limb, 6,6% to the spine and 6,6% to the bone tumors. Most of the procedures were within an average duration of one a two hours (61,2%) and were performed electively (59,5%). The anesthetic technique was as follows: 74,3% general anesthesia, 15,2% spinal anesthesia, 4,1% combined anesthesia, 3,7% peripheral regional anesthesia and 1,4% monitored anesthesia care.

In addition, we noticed that in our institution: the most frequently urgency procedures refers to fractures of the femur, and it is in these procedures, where the patients with worse physical condition are found; surgery for bone tumors has the longest average duration; regional anesthesia techniques are most often performed for lower limb procedures.

Conclusion(s): The elderly patients and the patients proposed for tumor surgery are those who present a greater anesthetic challenge due to comorbidities and surgical aggressiveness, respectively. Despite the existence of comorbidities delaying surgical procedures related to trauma is associated with poor results. Regional anesthesia is associated with a fewer odds of adverse outcomes, and should be an option whenever possible.

#### 01AP17-5

Perioperative risk factors for intraoperative hypothermia in patients undergoing elective surgery at National Referral Hospital in Bhutan: A prospective observational study

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Background and Goal of Study: Intraoperative hypothermia is common in patients undergoing surgery and is related to various adverse consequences. Bhutan is a high altitude country with average of 2600 meters above sea level. Patients undergoing surgeries may be more vulnerable to intraoperative hypothermia at this altitude. Thus, we conducted this study to identify the incidence and risk factors of intraoperative hypothermia (core body temperature <36°C) in patients undergoing elective surgery lasting more than 30 minutes.

Materials and Methods: A prospective observational study was conducted at the Jigme Dorji Wangchuk National Referral Hospital in Bhutan between August to October 2017. Fourteen risk factors were studied including age, sex, body weight, body mass index, preoperative body temperature, preoperative blood pressure and heart rate, type of case (inpatient or outpatient), type and duration of surgery, type and duration of anesthesia, operating room temperature and infusion of un warmed intravenous fluid. Core temperature was measured with tympanic membrane thermometer and esophageal probe. Risk factors for intraoperative hypothermia were determined using multivariate logistic regression model.

Results and Discussion: Data were obtained from 174 patients with mean age of 41.5 ± 15.8 years (range 18-75 years), ASA 1 (57%) and 2 (43%), underwent elective surgery with duration of 65.5 ± 46.4 minutes and duration of anesthesia 71.3 ± 48.8 minutes. Mean preoperative body temperature was 36.45±0.34°C. The mean operating room temperature was 23.0±1.4°C. The incidence of intraoperative hypothermia was 47.1% (82 of 174). Multiple logistic regression showed the risk factor for intraoperative hypothermia were duration of anesthesia (odds ratio (OR) 2.6 (95% confidence interval (CI) 1.39-4.87) and preoperative heart rate<80/minute (OR 0.49 [95% CI 0.26-0.93]).

Conclusion: Incidence of intraoperative hypothermia in patients undergoing elective surgery lasting longer than 30 minutes was 47% and risk factors were duration of anesthesia and preoperative heart rate. Thus, every patient undergoing elective surgeries should be evaluated preoperatively for these risk factors and requires continuous body temperature monitoring during the intraoperative period.

## 01AP17-6

# The effects of prewarmed endotracheal tubes and 2% lidocaine jelly on postoperative sore throat

Airway, Risk, Equipment, tubes tracheal

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Background and Goal of Study: Sore throat is one of the common complication after surgery under general anesthesia requiring tracheal intubation. However, the way to attenuate POST which is widely accepted single intervention, has not been existed. Smooth passage of tracheal tube through the pharynx may be useful to decrease POST. We presume that the combination of physical (thermal softened tube) and pharmacological (lidocaine jelly) intervention together for smooth passage is better than single intervention alone about reducing POST.

Materials and Methods: In this prospective, double-blind, single-center, randomized controlled trial, 144 patients aged 20 -70 years who were classified as ASA physical status I-III scheduled for laparoscopic surgery as an elective procedure, were enrolled. Computer-generated codes were used randomly group assignment. Group A, Room temperature ETT with saline; Group B, Room temperature ETT with lidocaine jelly; Group C, thermal softened ETT with saline; Group D, thermal softened ETT with lidocaine jelly. ETT used in Groups C and D was softened by warming at 40°C.

By using direct question, the incidence of POST was collected. The degree of sore throat severity was measured using visual analogue scale (VAS). Any other postoperative complications and perioperative consumption of analgesic drugs were checked.

Results and Discussion: The overall incidence of POST was different among four groups (P<0.05). Group D had significantly lower overall incidence of POST compared with Groups A (54.3% vs. 79.4%, P=0.027), B (54.3% vs. 81.8%, P=0.015) and C (54.3% vs. 82.9%, P=0.01). But there was no significant difference in the incidence and severity of POST at all time points. The incidence of hoarseness was similar among groups (P=0.715). And no dysphagia occurred.

Conclusion: In conclusion, the overall incidence of POST was significantly lower in the combination of thermal softened tube and lidocaine jelly intervention together than either conventional tube or lidocaine jelly alone for reducing overall incidence of POST. However, there were no differences in the other results such as incidence of POST at any time point, severity of sore throat, incidence of hoarseness and adverse effects.

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#### 01AP17-7

C-Reactive Protein (CRP) as a marker of the surgical stress reduction in elective colorectal surgery according to age (<70 and ≥70 years old): a prospective cohort study

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Goal of Study: Hospitalization and surgery affect the normal homeostasis. This process is called Systemic Inflammatory Response (SIR). One of the markers of SIR is CRP. The aim of the study is to evaluate the effectiveness of different variables (an Enhanced Recovery After Surgery (ERAS) protocol, laparoscopic surgery, and postoperative Clavien Dindo complications) in relation to reduce the SIR to surgery using an objetive marker as CRP in the first (POD1), second (POD2) and third (POD3) postoperative day according to age (<70 and ≥70 years old), and to compare it between the two groups.

Materials: We enrolled the first 121 consecutive patients that underwent elective colorectal surgery with an ERAS protocol (from May 2016 to January 2017; ERAS group), and compared them with 135 consecutive patients that had undergone surgery prior to the implementation of the program (from January to December 2015; preERAS group), and we divided them over and under the age of 70 years old. We made a univariate analysis to compare the CRP values in POD1, POD2, and POD3 between preERAS/ERAS group, laparoscopic/open surgery and the presence or not of postoperative Clavien Dindo complications according to the age. SPSS software (version 20.0) was used for statistical analysis. Chi-square, Fisher exact test and the Student t test were applied as appropiate. Results were considered statistically significant when p value was 0.05.

Results and Discussion: The groups were well-balanced and no statistical differences between them were found in terms of age, sex, ASA, diagnosis, TNM stage in colorectal cancer, preoperative hemoglobin or the length of surgery. The compliance with the ERAS protocol was 75.2% in <70 years old, and 74.7% in ≥ 70. CRP value was always lower in the group operated according to an ERAS protocol, but in <70 it was only statistically significant in POD2, while in ≥70, it was significant in POD 1-2-3. Laparoscopy reduced the CRP value in a statiscally significant way in POD1-2-3 in <70, but only in POD1 in ≥70. The presence of complications increased the CRP value in POD2-3 in <70 and in POD1-2-3 in ≥70.

Conclusion: The use of an ERAS protocol in elective colorectal surgery decreases the SIR to surgery in the postoperative period, mainly in ≥70 years old, measured according to CRP values. Laparoscopy and the absence of postoperative complications are also associated with a lower SIR. More studies are needed to contrast these results.

## 01AP17-8

Factors affecting postoperative analgesic requirements in patients undergoing laparoscopic surgery for benign gynaecological diseases

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Background and Goal of Study: Despite the small size of the incisions, laparoscopic gynaecological surgery can still cause severe postoperative pain in some patients [1]. However, what determines the intensity of postoperative pain in those patients remains elusive. The goal of this retrospective study was to determine the factors affecting postoperative analgesic requirements in patients undergoing laparoscopic surgery for benign gynaecological diseases.

Materials and Methods: After approval by the institutional review board, the medical records of patients who underwent laparoscopic surgery for benign gynaecological disease under general anaesthesia from January 2014 through December 2016 were reviewed to collect patients' profiles (age, body mass index (BMI) and ASA physical status), intraoperative variables (duration and type of surgery, intraoperative fentanyl and remifentanil doses, use of intraoperative analgesics, such as acetaminophen, diclofenac, flurbiprofen, and wound infiltration of local anaesthetics) and use of rescue analgesics over 24 h after surgery. We performed univariate and multivariate logistic regression analyses with the stepwise selection technique to explore predictive factors of frequency of use of rescue-analgesics.

Results and Discussion: All patients received continuous fentanyl infusion. Fentanyl in bolus form (20 µg) was given as a rescue analgesia. Other analgesics such as flurbiprofen, diclofenac, acetaminophen, pentazocine and ibuprofen were also given. Based on 183 patient records, 152 (83.0%) patients received rescue analgesics at least once. The median number of rescue analgesics given was three (the 25% and 75% percentile were 1 and 5, respectively). Among explanatory variables analysed, age, BMI and hysterectomy were significantly associated with moderate use of analgesics (≥ 3 times). Age (OR: 0.95, 95%CI: 0.91-0.99, p=0.02) and BMI (OR: 1.18, 95%CI: 1.06-1.32, p<0.01) were significantly correlated with frequent use of analgesics (≥ 5 times). The other variables were not related to the frequency of rescue analgesics. These data indicate that younger age and higher BMI are independent predictors of frequent analgesia requirements.

Conclusion: More aggressive intra- and post-operative analgesia should

be considered for younger patients and patients with higher BMI undergoing laparoscopic surgery for benign gynecological disease.

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#### 01AP17-9

Assessment of hemodynamic variables during modified electroconvulsive therapy using a non-invasive hemodynamic monitor

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Background and Goal of Study: Modified electroconvulsive therapy (MECT) is a common therapy for mental illnesses. Although MECT is known to remarkably increase mean blood pressure (MBP), little is known about the effects of MECT on cardiac output (CO) and systemic vascular resistance (SVR). The ClearSight System® (CS) provides continuous non-invasive measurement of hemodynamic parameters including MBP, CO, and SVR. Thus, in order to elucidate the mechanisms of hemodynamic changes induced by MECT, we used the CS during MECT under general anesthesia.

Materials and Methods: After approval of the Ethics Committee of our institution, written informed consent was obtained from each patient enrolled in this study (n=20). MBP, HR, CO, and SVR were continuously measured every 20 seconds by the CS. Central venous pressure was assumed to be 5 mmHg in all patients. After preoxygenation, general anesthesia was induced with propofol (1.0 – 2.0 mg/kg). After confirmation of loss of consciousness, a tourniquet around the right arm was pressurized to 250 mmHg. Thereafter, succinylcholine (0.6 – 1.0 mg/kg) was administered. After fasciculation had disappeared, MECT stimulus was applied. Bag-mask ventilation was restarted and continued until the patient resumed spontaneous ventilation. One-way analysis of variance was used to compare the differences in parameters. A p-value less than 0.05 was considered to be significant. Data are presented as means ± SDs.

**Results and Discussion**: The hemodynamic changes during MECT are shown in the figure. The CS successfully evaluated the hemodynamic parameters in all patients. MBP significantly increased from  $82 \pm 4$  to  $102 \pm 15$  mmHg after MECT stimuli (p < 0.01). SVR significantly increased from  $1660 \pm 661$  to  $2304 \pm 1081$  dyne-sec-cm-5 (p < 0.01). On the other hand, MECT did not significantly affect CO or HR. There were no patients with hypertension defined as MBP greater than 140 mmHg or hypotension defined as MBP less than 60 mmHg.

**Conclusion**: The CS revealed that MECT induces acute hemodynamic responses. Our results suggest that the increase in MBP after MECT is attributed to an increase in SVR, not to an increase in CO.

#### 01ΔP17-10

Tongue bite injury associated with transcranial electric stimulation motor-evoked potential monitoring during carotid endarterectomy

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Background: Although motor evoked potentials (MEPs) are an established practice option for monitoring during surgeries risking motor injury in the brain<sup>1</sup>), bite injuries are a disturbing complication of transcranial electric stimulation MEPs monitoring<sup>2</sup>. Here we report a case of significant tongue injury associated with MEP during carotid endarterectomy (CEA).

Case Report: A 74-year-old, ASA physical status II, male with hypertension and a history of cerebral infarction underwent CEA. Induction was accomplished with propofol and fentanyl, and intubation was facilitated with rocuronium. Anesthesia was maintained with propofol and remifentanil infusion. Neurophysiological monitoring with somatosensory and motor evoked potentials was performed throughout the surgery. We noticed tongue injury on the left side after the surgery and required otolaryngologic consult and suturing.

**Discussion:** One of risk factors for tongue injuries during MEPs is prone position during spine surgery<sup>3)</sup>. In this case the patient's position was supine. His head was tilted to the left and the spiral tube was secured on the left side. His tongue slid in between the molars and then was bitten. Compression hemostatis was not enough to stop bleeding because the patient took anti-coagulant agents and suturing procedures were required. Bite injuries and severe bleeding might occur if the patients take anti-coagulant agents. It is important to use soft bite blocks in order to avoid bite injuries in such patients.

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Learning points: Even if the patients' positions are supine, tongue bite injuries could occur during MEPs. The risk of bite injuries from MEPs stimulation might be low and this risk is outweighed by the potential benefit of MEPs. In the case of the patients who take anti-coagulant agents in order to lower the risk of injuries, the placement of bite blocks should be encouraged.

### 01AP17-11

The relationship between duration of postoperative oxygen administration and postoperative nausea and vomit in patients undergoing laparoscopic gynecological surgery

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Background and Goal of Study: From previous studies, intraoperative high oxygen concentration does not affect postoperative nausea and vomit (PONV). However, we admitted some cases whose PONV were suppressed as oxygen was supplied. We hypothesized that longer postoperative oxygen administration reduces PONV. We investigated whether the duration of post-postoperative oxygen supply affects PONV for patients under laparoscopic gynecological surgery.

Materials and Methods: We randomly assigned 1338 patients undergoing laparoscopic gynecological surgery to 1 hour group (1H) with 1 hour oxygen administration postoperatively or 5 hours group (5H) with 5 hours administration and tested whether the duration difference affects PONV occurrence. Intra-operative anesthetic management was basically total intravenous anesthesia under 40-60% oxygen concentration with intravenous dexamethasone as an antiemetics and intravenous fentanyl-based patient-controlled analgesia for postoperative pain relief. Brief volatile anesthetics was accepted if necessary. For statistical analysis, student t test is used for continuous variables and Fisher's exact test or chi-square test for nominal variables. A p<0.05 was considered statistically significant.

**Results and Discussion**: 516 patients are in 1H and 534 patients in 5H after 288 patients dropout. Nausea emerged at 40.8% and 45.1% for 1H group and 5H group respectively (p=0.135). Vomit occurred at 17.8% and 22.8% (p=0.0383). Both early(1-5h) PONV and late (after 5h) PONV tend to be higher in 5H group, especially vomit on late phase (16.1% vs 20.7%, p=0.0462).

**Conclusion(s)**: Longer oxygen administration may bring higher PONV incidence, especially in vomiting. Further investigation will be required.

#### 01AP17-12

Upper versus lower body forced-air warming to prevent hypothermia during thoracoscopic surgery in the lateral decubitus position: a randomised controlled trial

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Background and Goal of Study: In the supine position, forced-air warming is more effective on the lower body than on the upper body to prevent intraoperative hypothermia. However, it is unknown in the lateral decubitus position. We thus compared forced-air warmings on the upper and lower bodies in the lateral position. Materials and Methods: Patients were randomised to receive forced-air warming on the upper body or lower body during thoracoscopic surgery in the lateral position. We measured the nasopharyngeal temperature at 0, 30, 60, 90, and 120 min after lateral positioning during surgery and the infrared tympanic membrane temperature at 0, 30, 60, 90 and 120 min after surgery. Patients received both upper and lower body warmings at a temperature of <35.5°C. The primary outcome was the incidence of intraoperative hypothermia with a temperature of <36.0°C.

Results and Discussion: Intraoperative hypothermia was less frequent with the upper-body warming than with the lower-body warming [21/62 vs 35/61, risk ratio (95% CI) 0.6 (0.4–0.9), P=0.011]. The intraoperative temperature was higher with the upper-body warming than with the lower-body warming at 30 (P=0.002), 60 (P<0.001), and 90 (P<0.001) min after lateral positioning, and the postoperative temperature was higher at 0 (P<0.001) and 30 (P=0.001) min after surgery. Fewer patients received both upper and lower body warmings in the upper-body warming group than in the lower-body warming group during surgery (1 vs 7, P=0.032).

Conclusion: Forced-air warming was more effective on the upper body than on

**Conclusion**: Forced-air warming was more effective on the upper body than on the lower body to prevent hypothermia during thoracoscopic surgery in the lateral decubitus position.

# **Ambulatory Anaesthesia**

#### 02AP01-1

Preoperative tests audit in outpatient's surgery in Santa Creu i Sant Pau Hospital. Cross-sectional study

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Background and Goal of Study: Complementary tests request in preoperative period should be based on clinical indication and the follow-up of specific guidelines. We perform this study to compare the degree of adherence to guidelines for preoperative testing of the National Institute for Clinical Excellence (NICE)¹in our outpatient surgery unit.

Materials and Methods: Cross-sectional study. We studied a retrospective cohort of 468 patients visited in the preoperative unit for outpatient surgery except for ophthalmological surgery. Epidemiological characteristics, morbidities, surgical complexity and complementary tests are analyzed using statistical software SPSS v21 and compared with the NICE guidelines. Results are presented in integer numbers and percentages

**Results and Discussion**: Patients are classified according to the ASA physical status in (ASA I 29.8%, ASA II 60.4%, ASA III 9.8%), and surgical complexity (grade 1 35.5%, grade 2 64.5%).

Of the total number of patients had requested; 77.3% renal function and electrolytes, 93.1% a complete blood count (CBC), 88.6% a coagulation test, 73.7% an electrocardiogram (ECG) and 72% a chest X-ray.

When this data is crossed with NICE guidelines, of all blood analysis requested; 32% of the CBC, 92% of coagulation test and 24% of renal function and electrolytes were not indicated, also for 40% of ECG and 61% of chest X-ray performed.

Assessing the morbidity and surgical complexity of outpatient surgery patients, when compared to the NICE guidelines there is an excess of complementary studies, due to a routine request. The extension of the preoperative study should be based on the anesthesiologist's criteria and the clinical indication. An indicated test is one that is required by specific clinical features or preexisting medical conditions.

Conclusion: Routine testing should be abandoned in favor of selective ordering according to contemporary guidelines. There is a potential improvement in the efficiency of the preoperative process that goes through the awareness of the equipment and a stricter protocol for complementary tests request. These data indicate a considerable potential for improvement in process quality and cost reduction by using structured preoperative assessment with the implementation of protocols based on guidelines.

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## 02AP01-2

Metamizole versus Ibuprofen at home after day surgery: a double-blind randomised controlled non-inferiority trial

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Background and Goal of Study: Non-Steroidal Anti-Inflammatory Drugs (NSAID's) and paracetamol are the cornerstone of pain treatment after painful day surgery. Nevertheless, NSAID's are not always sufficiently effective, have numerous contraindications, and consequently are not suitable in up to 25% of all patients. Metamizole is a non-opioid compound with a favourable gastro-intestinal, cardiovascular and cerebrovascular profile compared to NSAID's. Hence, our aim is to assess if a combination of metamizole and paracetamol (MP) is non-inferior to a combination of ibuprofen and paracetamol (IP) to treat pain at home after painful day surgery.

**Materials and Methods**: Two hundred patients undergoing elective hemorrhoid surgery, arthroscopic shoulder or knee surgery or unilateral inguinal hemia repair in day setting were randomized to receive either MP (n=100) or IP (n=100). Patients in the MP-group were instructed to take metamizole 1gr orally 3 times a day for 4 days and those in the IP-group, ibuprofen 600mg orally 3 times a day for 4 days. All patients were treated with paracetamol 1gr orally 4 times a day during the entire study period. Average postoperative pain intensity was assessed at postoperative day (POD) 0, 1, 2 and 3 using a Numeric Rating Scale (NRS) by telephone call. A difference in mean average pain NRS-score between MP and IP of 1 point or less is considered non-inferior. The outcome measure is analyzed on a intention-to-treat (ITT) basis.

Results and Discussion: After enrolment of 200 patients, 4 patients were excluded in the ITT analysis: 3 patients did not receive the allocated intervention and one patient was excluded because of excessive preoperative opioid use. Average pain intensity scores were respectively 3.6 in the MP group versus 3.57 in the IP group on POD 1 and 3.22 versus 3.27 on POD 2 with a mean difference and 95% Cl of 0.032 (-0.647;0.710) and - 0.050 (-0.758;0.658). Consecutively MP is considered non-inferior to IP at POD1 and 2. Before discharge and at POD 3, our results were inconclusive since the average pain intensity scores were respectively 3.03 versus 2.49 with a mean difference of 0.541 (-0.189:1.270) and 3.18 versus 2.95 with a

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mean difference of 0.236 (-0.540;1.011).

**Conclusion**: Our results suggest that the analgesic efficacy of MP is similar to IP for pain treatment at home after painful day surgery. We suggest MP to be a valuable alternative for IP in patients with a contraindication for NSAID.

### 02AP01-4

# Determination of the minimum local anesthetic dose (MLAD) of spinal chloroprocaine for inguinal herniorrhaphy in ambulatory surgery, preliminary results

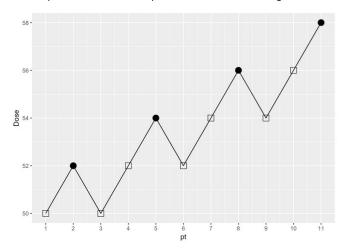
Parashchanka A.<sup>1</sup>, Hofman S.<sup>1</sup>, Coppens M.<sup>1</sup>, Wyffels P.<sup>1</sup>, Wouters P.<sup>1</sup>, De Hert S.<sup>1</sup>

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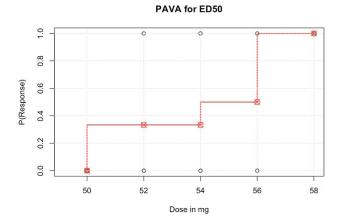
Background and Goal of Study: Spinal anesthesia for inguinal hernia repair in day surgery requires a use of short-acting local anesthetics. Chloroprocaine is a well-known local anesthetic with a beneficial pharmacodynamic/-kinetic profile which is proved to be suitable in ambulatory surgery. The primary goal of this study was to determine of the minimum local analgesic dose (MLAD or ED50) of chloroprocaine with 2.5 µg of sufentanil administered intrathecally for inguinal herniorrhaphy in outpatients.

Materials and Methods: After ethical committee approval and written patient informed consent, 12 patients were recruited. The intrathecal dose was administered by means of a combined spinal-epidural technique (CSE) at the L3-4 or L4-5 intervertebral space. The initial spinal dose of chloroprocaine 1% was determined at 50mg and the testing interval set at 2 mg. The analgesic efficacy was considered successful when a bilateral sensory block above or at the T6 dermatome and a score lower than 30mm on a 100 mm visual analogue pain scale at the beginning of surgery were achieved. In case of insufficient analgesia 3% chloroprocaine was administered epidurally. The up-down sequential allocation method has been chosen for the study setup and statistical analysis of the results.

**Results and Discussion**: 11 patients were finally included in the analysis. The updown sequence of doses of chloroprocaine is demonstrated in Figure 1.



Using the isotonic regression estimator method, the ED50 (95% CI) of spinal chloroprocaine 1% was calculated to be 56 ( 52-58 ) mg. Figure 2 shows the PAVA-adjusted dose response curve.



**Conclusion**: The presented results suggest a minimum local analgesic dose (MLAD or ED50) of 1% chloroprocaine for hernia repair in outpatients at 56 mg. Further research is required to determine the full-dose response curve of spinal chloroprocaine

### 02AP01-5

# Time to return of gastric myoelectrical activity after bolus doses of short-acting opioids

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Background and Goal of Study: Opioids affects gastric motility and studies have shown that the normal slow-wave peristaltic activity of 3 cycles per minute (cpm) gets impaired (1). The interference with gastric motility might cause nausea, vomiting and prolonged time until postoperative beginning of oral intake. The aim of the study was to investigate time to the return of normal gastric activity after administration of short-acting opioids used in the perioperative setting.

Materials and Methods: 20 voluntary healthy subjects were included in this prospective observational study. Subjects were examined with electrogastrography (EGG), a non-invasive method to study gastric myoelectric activity. After 20 minutes of baseline registration, fentanyl 1µg/kg (n=10) or alfentanil 5µg/kg (n=10) was given as an intravenous bolus dose and the EGG-registration continued until return of normal activity. Dominant EGG frequency was obtained in overlapping 10-minute intervals and time until return of normal (baseline) activity was identified.

Results and Discussion: The dominant frequency before administration of opioids were regarded as normal with 2,93 cpm (±0,19) in the fentanyl group and 2,98 cpm (±0,21) in the alfentanil group. 10 minutes after the administration of opioid, there was a significant change in both series in EGG-activity with great variations in the individual responses. In most subjects, the main effect was an uncoordinated activity without any detectable dominant frequency. The EGG was not affected at all in 1 subject in the fentanyl group and 2 subjects in the alfentanil group. The median time until return of normal EGG-activity was 40 min (15-60) in the fentanyl group and 20 min (10-45) in the alfentanil group.

Conclusion: Gastric activity was affected by fentanyl and alfentanil. The gastric effect was short-acting as a normal EGG-activity was observed in all subjects within one hour. In the doses given, the time until return of normal gastric activity seems to follow the pharmacokinetic profile of the opioids.

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 Wallden et al. Effects of fentanyl on gastric myoelectrical activity: a possible association with polymorphisms of the mu-opioid receptor gene? Acta Anaesthesiol Scand. 2008;52(5):708-15.

#### 02AP01-6

# Prevalence of postoperative nausea and vomiting: the reality of our Ambulatory Surgery Unit – retrospective analysis

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**Background and Goal of Study**: Postoperative nausea and vomiting (PONV) are the commonest complications after ambulatory surgery, affecting 30 to 70% of patients after general anesthesia.

PONV highly affect quality of life, causing great discomfort and unsatisfaction among patients, resulting in prolonged post-anesthesia care unit (PACU) stay and unanticipated hospital admission, that may significantly increase the overall health care costs.

The goal of PONV prophylaxis is therefore to decrease the incidence of PONV and thus patient-related distress and reduce health care costs.

Our goal was to perceive the prevalence of PONV in our Ambulatory Surgery Unit, as well as to recognize whether PONV prophylaxis, according to PONV risk factors, and PONV treatment were adequate.

Materials and Methods: A brief questionnaire, filled by the nursing staff, was applied to all patients submitted to surgery in our unit between the October 16th and November 16th, 2017, in a total of 212 patients. 49 questionnaires lacking data were rejected. A total of 153 questionnaires were used.

Results and Discussion: According to Apfel's simplified risk score for PONV in adults, only in 53.59% of patients the PONV was adequately administered, however, the great majority of patients had no episodes of PONV, those occurring in only 7.8% of patients. Among patients who had at least an episode of PONV, only 16.6% had inadequate PONV prophylaxis.

The most commonly used drug was dexamethasone (4mg IV), followed by ondansetron (4mg IV) and droperidol (0.625-1.25mg IV).

Among the patients who presented with PONV in the PACU, only 25% received adequate treatment, as the majority of patients were medicated with metoclopramide IV, leading to subsequent PONV episodes in 41.6% of these patients.

Conclusion(s): The overall prevalence of PONV in our Ambulatory Surgery Unit is low, although adequate PONV prophylaxis is lower than expected. Interestingly, the great majority of patients who suffered PONV had previous adequate PONV prophylaxis.

The treatment of PONV in the PACU was improper in the vast majority of cases, leading to subsequent

#### 02AP01-7

# One-month quality of the recovery trajectory after painful day surgery: a prospective cohort study

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Background and Goal of Study: A major disadvantage of the ambulatory setting is related to the absence of postoperative surveillance by professionals. The latter implicates that the individual patient has to assess, without any support, if his or her Quality of Recovery (QOR) is normal or not. Unfortunately, there is rather limited information on procedure-specific QOR after day surgery in a more protracted perspective. It is of major importance to study QOR profiles after different types of day surgery. This knowledge would allow to discriminate between a normal and pathological health trajectory. Therefore, we aimed to assess and compare 4-week QOR profiles of 4 complex day surgery procedures.

Materials and Methods: Two hundred patients undergoing elective hemorrhoid surgery (n=50), unilateral inguinal hernia repair (n=50), arthroscopic shoulder (n=50) and knee surgery (n=50) in day setting were enrolled. QOR was measured by the Functional Recovery Index (FRI), at baseline (preoperative) and at days 1, 2, 3, 4, 7, 14 and 28 postoperatively by telephone call. The FRI is a validated, questionnaire-based instrument specifically designed to assess post-discharge recovery after day surgery in three domains: pain and social activity, lower limb activity and general physical activity.

Results and Discussion: FRI scores per type of surgery are presented in Figure 1. Compared to baseline, all 4 types of day surgery were associated with a better mean FRI 4 weeks after surgery. Worst FRI scores on the 28th postoperative day were noted after arthroscopic shoulder surgery.

Conclusion(s): Our results suggest that each type of day surgery has its own unique QOR trajectory. New strategies for pain therapy at home should be developed based on this unique procedure-related QOR trajectories. And this in particular for those procedures with the worst FRI scores such as ambulatory arthroscopic shoulder and knee surgery and hemorrhoid surgery, each within their own specific time frame.

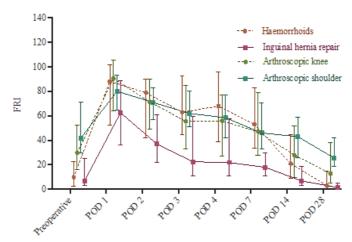


Figure 1: Median and interquartile range of FRI total scores.

Y-axis: FRI from 0 (completely recovered) to 140 (no functional recovery at all). X-axis: POD (Postoperative day)

#### 02AP01-8

# Four-week profile of pain at movement after painful day surgery: a prospective cohort study

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Background and Goal of Study: Driven by economical motives, governments encourage performing more complex and painful surgical procedures in an ambulatory setting. Adequate pain treatment at home however is a principal endpoint after day surgery. An optimal characterization of the acute pain trajectory over the first postoperative month after such procedures is a prerequisite for the development of future preventive, procedure-specific pain-treatment schedules. Therefore, we aimed to assess and compare 4-week pain profiles of 4 painful day surgery procedures.

Materials and Méthods: We analysed data from a cohort of patients who participated in a randomized trial investigating postoperative pain medication. Two hundred patients undergoing elective hemorrhoid surgery (n=50), arthroscopic shoulder (n=50) or knee surgery (n=50), or unilateral inquinal hemia repair (n=50) in day setting were enrolled. All

patients undergoing shoulder surgery received an interscalenic block. All patients were treated with paracetamol, an NSAID or metamizole and tramadol as needed during the first 4 postoperative days. Pain medication therapy after this period was subscribed by the surgeon. Postoperative pain intensity at movement was assessed at postoperative day (POD) 0, 1, 2, 3,4,7,14 and 28 using a Numeric Rating Scale (NRS) by telephone call.

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Results and Discussion: Four patients were excluded from analysis: 3 patients underwent a bilateral inguinal hernia repair and one patient was immediately excluded because of excessive preoperative opioid use. During the first 3 POD's, 5 patients were lost-to-follow-up. From POD 3 tot POD 28, another 19 patients were lost-to-follow-up. Mean pain at movement scores per type of surgery are presented in Figure 1. Arthroscopic shoulder surgery was found to be most painful over the whole trajectory. Inguinal hernia repair and arthroscopic knee surgery were least painful.

**Conclusion**: Our results suggest that each type of day surgery has its own unique postoperative pain trajectory. New strategies for pain therapy at home should be developed, in particular after ambulatory arthroscopic shoulder surgery and hemorrhoid surgery.

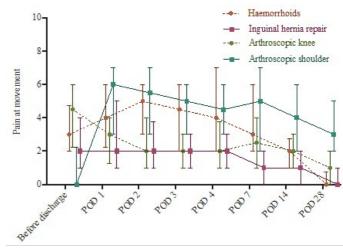


Figure 1

#### 02AP01-9

# Bronchial thermoplasty under conscious sedation in the ambulatory bronchoscopy procedure room

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**Background**: Bronchial thermoplasty (BT) is an emerging bronchoscopic treatment for patients who suffer from refractory asthma [1]. It involves delivery of radio frequency thermal energy to the airway walls with a Bronchial Alair TM probe, to reduce smooth muscle mass. The procedure is divided into three sessions, each an hour long, interspersed with three weeks.

The complexity of these patients and the limited literature available for BT [2] makes it challenging for the anesthesiologist.

Case Report: The patient is a 59-year old man with severe refractory asthma.

After verifying stable disease [3], the patient received 50 mg/d oral prednisone during the three days before the procedure, the day of the treatment and the first post-procedural day to minimize inflammation.

In the bronchoscopy room, after standard monitoring and peripheral cannulation, 0,15 ml/kg nebulized salbutamol and antisialogogue premedication with 0.4 mg glycopyrrolate was administrated. Subsequently, topical anesthesia was performed with lidocaine 1.5-2% from the supraglottic region down to the bronchial tree, with a maximum dose of 8 mg/kg if necessary.

To ensure comfort and immobility of the patient, a conscious sedation was maintained combining TCI of propofol 2  $\mu$ g/ml and remifentanil 0.15  $\mu$ g/kg/min, with supplemental oxygen.

The procedure was completed with no incidents, and the patient was discharged from hospital after 24 hours. At 12 months, the mean rate of severe exacerbations was reduced by over 90%.

**Discussion**: The severity of BT patients requires an individual evaluation to determine the suitability. A conscious sedation can reduce stimuli that may induce bronchospasm. Premedication with corticosteroids is essential to reduce the peribronchial edema. We preferred glycopyrrolate over atropine because it offers a superior antisialagogue effect and less tachycardia. **References**:

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3. Mayse, M.L. et al. Clinical pearls for bronchial thermoplasty. J. Bronchology Interv. Pulmonol. 14,115-123(2017).

Learning points: The success of our case is based on an adequate patient selection and preoperative preparation. It required an optimal local anesthesia under conscious sedation to ensure patient comfort and immobility, minimizing airway manipulation.

## 02AP01-10

# Levels of Nitrous Oxide Exposure during Use of a New Application System in Healthy Male Volunteers

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Introduction: A mixture of 50% nitrous oxide and 50% oxygen is widely used during short surgical procedures. However, some very severe side effects are related to long term exposure to nitrous oxide (e.g. in intensive care or hospital personnel). In Austria, the professional use of anesthetic gases is controlled via the MAK-value (maximum working place concentration), which consists of a short-term limitation (400ppm) and a long-term limitation (100ppm).

Methods: The application system (Excidio ™, Linde Group) is designed to eliminate nitrous oxide from the room air efficiently, by means of a scavenging system. The aim of the study was to investigate whether the Austrian work place concentrations for nitrous oxide are exceeded. 36 male healthy volunteers were included in this study. Volunteers were requested to inhale nitrous oxide via face mask for 15 minutes. Nitrous oxide concentration was analyzed during and after inhalation at 2 measurement points in 15cm and 1m distance from the nose of the volunteer by a continuous gas analyzer.

**Results:** The current study showed that nitrous oxide levels using the new application system partially exceeded the Austrian short-term limitation of 400ppm (29.4% of all volunteers) in 15cm distance to the face mask, which is the working area of medical personnel. 43.3% of all volunteers exceeded the long-term limitation of 100ppm at 15 cm distance from the face mask. On average, the long-term limit was exceeded for 6 minutes and by a median of 77 ppm (IQR 26-171).

**Conclusion:** As there is no clear evidence what the toxic levels of nitrous oxide in clinical practice are, the clinical significance of these findings is open to interpretation. Further studies are needed to test this system in patients under real life working conditions.

# 02AP02-1

A novel modified nasal PAP mask assembly maintained spontaneous ventilation and oxygenation in a morbidly obese patient with severe obstructive sleep apnoea and asthma during ambulatory hysteroscopy and D&C under spinal anaesthesia

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**Background**: Patients under regional anaesthesia often receive IV sedation and  $O_2$  via nasal cannula. Over-sedation and/or airway obstruction may cause desaturation. A novel nasal PAP mask assembly was shown to maintain spontaneous ventilation and oxygenation in obese patients under sedation. <sup>1-5</sup> We report its use in a morbidly obese OSA patient under spinal anaesthesia.

Case Report: A 56 y/o female, 163 cm, 124 kg, BMI 47, with HTN, NIDDM, OSA on CPAP, asthma presented for hysteroscopy and D&C. She was anxious due to two previous anaesthesia complications. She reported "a near respiratory arrest" under propofol sedation for colonoscopy and required assisted mask ventilation which resulted in aspiration pneumonitis. She also developed respiratory failure and required re-intubation after knee arthroscopy. She had severe orthopnoea and a Mallampati Class IV airway. Spinal anesthesia was attempted with a 25G pencil-point needle in sitting position. However, she developed vasovagal reaction with bradycardia and lightheadedness. After her symptoms were resolved, spinal anaesthesia was performed in LLD position with 22G cutting needle with 1.6 cc of 0.75% bunivacaine.

A modified infant mask with a fully inflated air-cushion was secured over her nose with elastic head straps and connected to the anaesthesia machine via a breathing circuit. She was breathing comfortably with 8 cm H<sub>2</sub>O nasal CPAP by adjusting APL valve with 4 L O<sub>2</sub>/min.



She maintained spontaneous ventilation and 98-100% SpO<sub>2</sub> throughout hysteroscopy and D&C in lithotomy position. She was elated that the procedure was completed without any complication.

Discussion: This modified nasal PAP mask assembly maintained spontaneous ventilation and oxygenation in a morbidly obese patient during hysteroscopy/D&C under spinal anaesthesia. This avoids the need to intubate the patient to maintain a patent airway and post-extubation complications.

References:

1 www.TSFMask.com

2.SAMBA 28th AM. 2013:

3.SASM 3rd AM, 2013;

4.67th PGA, 2013;

5.ASA AM, 2015

**Learning points**: 1. How to modify a paediatric mask to fit the nose and construct the nasal PAP mask assembly in <2 min. 2. How to adjust APL valve to provide optimal CPAP.

## 02AP02-2

Postherniorrhaphy urinary retention after general and spinal anesthesia in an ambulatory setting (observational prospective study)

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Background and goal of study: Inguinal herniorrhaphy is one of the most common operations performed in an ambulatory setting and is associated with urinary retention (RU). The aim of the study was to compare the effect of general anesthesia versus spinal anesthesia (hyperbaric prilocaine 2% 40-60mg) on this complication.

Materials and Methods: After obtaining local ethics committee approval and written consent, 113 patients, older than eighteen years old, ASA physical status I -III were studied about postoperative urinary retention and the need of bladder catheterization after unilateral inguinal herniorraphy. Other measurements were: vesical residual volume after spontaneus micturition before surgery (VVr0), time since spinal or general anesthesia till micturition (tm1), vesical volume before (VV) and after (VVr1) the first postoperative micturition. 65% of the patients were anesthetized by spinal anesthesia (AR group) and 35% by general anesthesia (AG group).

Results and Discussion: There were not statistically significant differences with ASA, age, sex, height, weight, urological background and VVr0 between AR and AG groups.

There were statistically significant differences regarding to tm1, VV and VVr1. They were bigger in AR group but there was not statistically significant difference in time to discharge from the recovery room.

1 patient in each group had the need of bladder catheterization. 1 patient in AR group was diagnosed with a bladder diverticulum and was catheterized at the end of the surgery. All three were discharged home. 1 patient in AG group was hospitalized cause difficulties in micturition. Conclusions:

-Spinal anesthesia with short acting local anesthetic like 2% hyperbaric prilocaine is a good alternative to general anesthesia in outpatient surgeries associated with RU like herniorraphy.

-Spontaneous micturition before surgery, restrictive intravenous fluid therapy and ultrasound scanning of the bladder are essentials to avoid bladder distention and facilitate discharge.

## 02AP02-3

The impact of superficial peroneal, deep peroneal and posterior tibial ultrasound block on patients' satisfaction undergoing hallux valgus surgery in ambulatory

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Background/Goal of Study: The benefits of ambulatory surgery are widely known and justify the progressive increase in surgeries performed in this setting, in Portugal >60%. However, pain control after discharge is mandatory. The growing use of ultrasound blocks (USb) reflect its importance as part of an opioid-sparing strategy with better outcomes. Several analgesic schemes have been adopted in hallux valgus surgery (HVs) such as popliteal USb, which despite is an effective alternative, it's not absent of risks, like gait impairment due to motor block. The USb of the superficial peroneal (SP), deep peroneal (DP) and posterior tibial(PT) allow consistent and lasting analgesia. The objective of this study is verify if the USb of the SP, DP and PT is an effective and safe option, evaluating the analgesic efficacy in the first 24h postop and satisfaction of the patients submitted to ambulatory HVs Materials/Methods: A retrospective analysis of patients underwent HVs between January and November 2017, under general balanced anaesthesia (induction:fentanyl 3mcg/kg and propofol 2mg/kg, maintenance:desflurane) combined with USb SP, DP and PT (total 10ml of ropivacaine 0.75%). Analgesia was assured with paracetamol and ketorolac, prophylaxis of PONV was performed with dexamethasone and ondansetron. The ambulatory analgesia was paracetamol, tramadol and ibuprofen. Patients were evaluated until discharge and contacted by telephone on the D2 postop. Pain was evaluated in the first 24hours (numeric pain scale), satisfaction of pain control and overall satisfaction (Likert scale 4points)

Results/Discussion: 23 patients underwent HVs in ambulatory setting under the described anaesthetic technique, of which 10 responded to the postop survey. There were no complications or need for rescue analgesia in the PACU. 70% of patient were ASA2 with a mean age of 56 years. Data analysis revealed a mean maximum pain score of 3(0-10) in the first 24hours. The degree of satisfaction with pain control was on average 3,9(0-4). The overall satisfaction was 4(0-4) and when asked all patients would choose for ambulatory surgery again

Conclusion: The USb of SP, DP and PT seems to be an effective analgesic alternative. It's a distal block, less likely to complicate and not associated with motor block, which leads to high satisfaction rates among patients undergoing ambulatory HVs. However, more studies will be needed to prove the promising results presented and define the ideal analgesic strategy

## 02AP02-4

# Trismus in ambulatory setting: a clinical case

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Background: This is a case report of unsuspected difficult endotracheal intubation (ETI) secondary to difficulty in mouth opening of an anesthetized adult. First defined as reduced opening of the jaws specifically caused by mastication muscles spasm, trismus currently refers to limited mouth opening from any etiology, being encountered with increasing frequency in clinical practice. [1] Most of the earlier reports describe temporomandibular dislocation (TMD) in patients who have had past history of joint dysfunction or clicks. However, sometimes it may occur even in normal TMJ. [2]

Case Report: À male patient, 62 years-old, was proposed to hydrocele repair in ambulatory setting. Previous medical history included smoking and saphenectomy. Preoperative airway evaluation didn't anticipate a difficult intubation (mallampati class 2, no restriction in mouth opening or cervical mobility) and was graded ASA II. After pre-oxygenation, intravenous (IV) fentanyl and propofol were administered. An attempt to open the patient's mouth was made after 1 min but the teeth were closely approximated, and the mouth could not be opened. A second attempt 1 min later by the senior anesthesiologist and after proper anesthesia depth verification also failed to open the mouth. After failure to intubate, the patient was ventilated through mask ventilation. Considering that fiberscope and video laringoscope weren't readily available, the surgery was called-off and the patient was awakened. Discussion: This case report illustrates a potential hazard in airway management during general anesthesia (GA). In severe trismus, it is difficult or even impossible to insert a laryngoscope, an endotracheal tube or an laryngeal mask between the teeth. [2]The anterior translation of the TMJ is important in mouth opening. The recommended jaw-thrust maneuver to overcome the locked-jaw and obstruction were ineffective in this case.

#### References:

 Truotong, A.T., et al. Retromolar flexible fiber-optic orotracheal intubation: A novel alternative to nasal intubation and tracheostomy in severe trismus. WOL, 2014; 423-424.

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**Learning points**: Ensuring airway protection during GA is the cornerstone of anesthesia practice. This case illustrates that trismus could happen without warning or and can lead to potential life-threatening situations.

#### 02AP02-5

# A specific clinical pathway improves efficiency of ambulatory surgical centers

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Background and Goal of Study: Ambulatory surgery is gaining popularity. In that setting, lean management methodology has the potential to improve patients' turnover. In this perspective, at our institution, a specific circuit (SC) has been set up for ambulatory hand surgery patients. Compared to conventional circuit (CC), patients in SC receive a specific information leaflet, stay in armchairs instead of beds, are cared by a specific nurse, are given meals adapted to unassisted patients and receive postoperative instructions by the surgeon at the end of surgery before exiting operating room (OR). The objective of this study was to evaluate the effects of this approach on patient cycle.

Materials and Methods: For this retrospective cohort study, we used data from 30 SC patients undergoing hand surgery under axillary blockade. To exclude risks of confounding factors, we also used data from 60 patients of CC matched for age, type of anesthesia and expected duration of surgery. Additional data collected included ASA score, time of appointment, arrival and initiation of care in unit, expected duration of surgery, arrival in and exit from OR time, time of meeting hospital discharge criteria (HDC), of surgical postoperative instructions and hospital discharge. For statistical analysis, Student-t test, Mann-Whitney test or chi-2 were used when appropriate. p<.05 was considered significant.

Results and Discussion: Salient results are shown in Table.

	CC n=60	SP n=30	p-value
Lenght of stay(LOS)(min)	335[288-408]	261[230-305]	<.001
Delay between exit of OR and HDC(min)	22[15-54]	13[9-27]	.01
Number of patients receiving surgical instructions before HDC(%)	14(23)	30(100)	<.001
Waiting time for surgeon after HDC(min)	30[0-70]	0[0-0]	<.001
Exit delay after HDC(min)	75[51-120]	55[30-72]	.03

No difference was found for ASA score, delay for care in unit, duration of surgery and time between arrival in hospital and OR. **Conclusion**: Introduction of SC reduces LOS in ambulatory hand surgery under axillary blockade. An important factor allowing reduction of LOS is reduced delay for receiving postoperative surgical instructions.

## 02AP02-6

# Unanticipated admission after ambulatory surgery: 10 year retrospective audit

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Background and Goal of Study: Outpatient surgery is increasing in variety and number and is accepting higher risk patients. It's important to assess the unplanned admission rate to improve the quality of ambulatory surgical units. The goal of this study is to determine the number and reasons of unanticipated admissions in our surgical day care unit, to improve quality of care and avoid adverse events in the future.

Materials and Methods: A retrospective clinic audit of all unanticipated admissions over a 10-year period to was done. Ambulatory surgical unit (ASU) records and IBM SPSS statistics 22 were used. Unanticipated admission is defined as unplanned admission after a day procedure, excluding prior discharge. Variables recorded: demographic data, American Society of Anaesthesiology (ASA) physical status classification, type of surgery and anaesthesia, procedure duration and reasons for hospital admission.

Results and discussion: Over the 10-year period, 210 unplanned admissions were registered after ambulatory surgery, out of a total of 51097 patients operated in our ASU (0,41%). 55% were female and general anaesthesia was used in 68,6%. Patient median age was 58 years, with 30% of patients over 65 years. ASA physical status classification was II/III in 65,7/14,8%. Procedures were from the following surgical specialties: general surgery 40,9%, gynaecology 20,5%, ophthalmology 10%, orthopaedics 8,6%, gastroenterology 8,6%, urology 6,2% and others 5,2%. Gynaecology had the highest (1,66%) relative rate of admission, followed by general surgery 1,08%, neurosurgery 1,05% and urology 0,98%. Surgical procedures among admissions were cataract surgery (17%), inguinal hernia repair (16%), and hysteroscopy (4,8%). Procedure median duration was 48 minutes. Most admissions were surgery related (59%) with the major reasons being a more extensive surgery than planned and surgical complications, followed by anaesthesia related issues (24,3%), where pain was the major reason and social/miscellaneous reasons (16,7%). In most cases, hospital stay was 2 days.

**Conclusion:** Our unplanned admission rate was 0,41%, which is lower than rates reported in the literature (<2%). This result further supports that ambulatory surgery is a safe practice. It's essential to monitor unplanned admission rates to maintain a high quality of care, ensuring cost efficiency and patient satisfaction.

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#### 02AP02-7

# Postoperative nausea and vomiting in outpatient surgery: incidence and risk factors - audit

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Background and Goal of Study: Nausea and vomiting are one of the most frequent postoperative complications in Outpatient Surgery and an important factor in life quality after discharge. Previous literature show an incidence of postoperative nausea and vomiting (PONV) in 33-36% of outpatients, and in 72% of them only occur after discharge. The aim of this audit was evaluated the incidence of PONV in the recovery room, at 24 hours and 72 hours after discharge, compare its incidence according to literature and study risk factors not included in the Apfel Score.

**Methods**: Prospective audit, performed in June and July 2017, in an outpatient surgery unit of a tertiary center. Paediatric patients were excluded. Validated RF included in Apfel Score were registered (female, non-smoking status, previous history of PONV and motion sickness, opioids in the perioperative period) and other possible FR described in the literature (body mass index, use of halogenated or nitrous oxide, type of surgery and duration of anaesthesia). Data collected: Electronic Clinical Process and patient call at 72 hours. Statistical analysis using IBM SPSS® 22, p <0.05 considered significant.

**Results and Discussion**: 880 patients were included. PONV incidence: Recovery room - 4.2% (n = 33); 24 hours postoperative - 9.7% (n = 70); 72 hours postoperative - 7.6% (n = 54). From the analysis of the variables not included in the Apfel Score, the duration of anaesthesia > 120 minutes was identified as RF, but only in the recovery room (p=0.006). The remaining variables did not show any relation with the incidence of this complication, in any period studied.

Conclusions: PONV incidence in this population was lower than described in the literature. This result of a correct evaluation of high risk patient and the systematic use of two anti-emetic drugs, regardless PONV risk, in our institution. In this population, 17.3% (n = 134) had PONV after discharge (24 hours and 72 hours), problem that cares our attention and should be a priority for the anaesthesiologist. Remaining variables did not show any influence on the occurrence of PONV, except duration of anaesthesia > 120 minutes. Action plan: current protocol should be revised in order to include this new RF and to optimize PONV prophylaxis.

#### 02AP02-8

# Efficacy of intraarticular levobupivacaine combined with multimodal analgesia for postoperative pain following temporomandibularjoint arthroscopy

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Background and Goal of Study: Temporomandibular joint (TMJ) arthroscopy represents a form of minimally invasive surgical treatment in patients suffering from internal derangement of the TMJ1 Insufficient postoperative pain relief is one of the main reasons for prolonged hospitalization and delay in early rehabilitation. Multimodal analgesia (MMA) provide potent and synergistic effects The analgesic effect of intraarticular levobupivacaine in TMJ arthroscopy has not been studied yet. We designed an observational study to evaluate the efficacy and safety of intraarticular levobupivacaine combined with multimodal analgesia in the management of postoperative TMJ pain in a 24-hour period.

Materials and Methods: This prospective and observational study approved by the Local Ethics Committee, was designed to recruit 30 consecutive patients underwent TMJ arthroscopy. All patients were informed and written consent was obtained. Preoperatively, patients were instructed in the use of a 100 mm visual analogue scale (VAS) to measure pain. The inclusion criteria were adult patients with ASA 1-2. Patients with additional pathology and those with allergy to one of the study drugs, were excluded. Data were analyzed using the SPSS for Windows software nackane

Results and Discussion: To date, a total of 9 patients were assessed. There were 2 male and 7 female with overall median ages of 42 (range 24–62). 3 patients had bilateral temporomandibular joint disease (TMD) (33,3%) and 6 were affected unilaterally (66,70%) The median pain scores at hour, 4, 6, and 24 were 2, 4, 3, 3 respectively after mandibular opening Only two patients needed supplementary analgesia NSAIDS. There were no complications, no nausea or vomiting. All patients were discharged from hospital 24 hours after surgery

Conclusion: Post-operative pain after surgical procedures may be exacerbated by inflammation, edema at the surgery site. According to our preliminary results we could suggest that intraarticular levobupivacaine with multimodal analgesia is an effective analgesic treatment reducing perioperative opioid administration References:

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#### 02AP02-9

Postoperative quality of recovery (QoR-15) after ambulatory laparoscopic cholecystectomy in patients with deep neuromuscular block. A prospective cohort study

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Background and Goal of Study: Laparoscopic cholecystectomy (LC) is one of the most common procedures performed worldwide. Deep neuromuscular blockade (NMB) and low-pressure pneumoperitoneum, have recently been shown to improve surgical working conditions associated with a positive effect in recovery, reducing postoperative pain. Most studies evaluating recovery after LC, have ignored quality of recovery (QoR) from the patient's perspective. We aimed to evaluate the QoR of patients undergoing CL in whom deep NMB was performed as part of the anaesthetic management.

Materials and Methods: After IRB approval 75 patients scheduled for CL (ASA I-III), 51 ± 14 years old were enrolled. The anaesthetic protocol included multimodal analgesia (NSAIDs, wound infiltration with local anaesthetics, low doses of fentanyl), prophylaxis of postoperative nausea and vomiting and dexamethasone. Deep NMB was instituted during pneumoperitoneum (posttetanic count (PTC) of 1 or 2) and was maintained until the end of the surgery. The NMB was reversed at the end of the intervention with sugammadex at a dose of 4mg/kg, confirming the adequate recovery before extubation. The A recovery questionnaire was performed: QoR -15; maximum score of 150, before and 24 h after surgery.

Results and Discussion: Five patients had an unpredicted admission, all of them due to surgical complications. Median pain score in PACU was 3.5 (interquartile range of 2 to 5); and 2 (interquartile range of 1 to 3) at 24 h after surgery. Six patients (8%) presented mild nausea in PACU and none at 24 h. The overall QoR-15 data decreased moderately at 24 h after surgery (Preoperative: median of 149 and interquartile range of 146-150; postoperative: median of 141 and interquartile range of 132- 146); P <0.0001. The percentage of decrease in QoR-15 in relation to baseline values was 7%. The most affected parameters were in the emotional component, physical comfort and the presence of mild pain.

**Conclusion(s)**: The application of a deep NMB in patients undergoing ambulatory LC provided an excellent postdischarge quality of recovery, with minimal pain and nausea in the early postoperative period.

# 02AP02-10

# Avoiding a broken heart during anestesia - Management of Takotsubo Cardiomyopathy

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**Background**: Takotsubo myocardiopathy is a rare condition usually triggered by a stressful event. It is characterized by an acute onset that frequently mimics STEMI in the absence of coronary disease. Patients are often postmenopausal women. According to systematic reviews the recurrence rate of this condition is between 1.5-1.8%, and patients have a higher risk for major cardiac event, stroke or transient ischemic attack

Case Report: A 75 year-old female patient, ASA III, was scheduled for a flexible video bronscoscopy to study a mass in the upper left lobe. She was diagnosed with Takotsubo Cardiomyopathy 2 months ago, had hypertension, diabetes mellitus type 2, dislipidemia and hypothyroidism. Upon arrival to the hospital, the patient was anxious, tachycardic (heart rate HR 90-110 bpm) with high blood pressure (systolic blood pressure SBP>160 mmHg). She received pre-medication with 2mg i.v. midazolam 30 minutes before the procedure, remained monitored and accompained by a nurse until the procedure, when another 2mg i.v. midazolam were administered. The exam lasted for 30 minutes, was performed under general anesthesia, using a laryngeal mask, with bolus of i.v. alphentanyl (total: 0.5mg) and propofol (total: 250mg). The procedure was uneventful, the patient remained hemodinamically stable, HR between 60-80 bpm, SBP<150 mmHg. Before removing the laryngeal mask, 60mg i.v. lidocaine was admnistered. After the exam, the patient remained monitored in a recovery room for about 3 hours before discharge.

**Discussion**: There is a lack of information about peri- and intraoperative management of patients with a previous diagnose of Takotsubo Syndrome. The main concern during this procedure was avoiding stressful events, careful electrocardiographic monitoring and assuring uneventful recovery before discharge. Due to the short duration of the procedure, intermittent propofol bolus was preferred over continuous perfusion.

Learning points: Avoidance of stressful events and hemodynamic stability seems to have a major role in the in the perioperative management of these patients. Despite the low incidence and recurrence of TCM, anesthesiologists should be aware of this syndrome.

# Regional Anaesthesia

## 03AP01-1

# Blocking of the abdominal transverse plane (tap block) guided by ecography after the cesarea

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Background and Goal of Study: TAP block is a method to provide postoperative analgesia in lower abdominal surgery. With this work we evaluated the postoperative analgesic efficacy of ultrasound-guided TAP block in patients undergoing cesarean delivery using the Phannenstiel incision.

Materials and Methods: We developed a prospective and randomized clinical study in which 30 patients undergoing caesarean section, elective or emergency, were randomly divided into two groups. Both groups received 0.5% hyperbaric bupivacaine anesthesia and fentanyl. One group underwent ultrasound guided TAP block, while the other group did not receive a block. An attempt was made to assess the need for rescue analgesia; compare times to the performance of analgesic rescues; and compare the scores of postoperative pain to movement and at rest, using the Numerical Scale, at the first and second hour after the conclusion of the procedure between both groups.

**Results and Discussion**: Compared to the control group, the TAP block reduced the need for postoperative analgesic rescues (72% vs. 32%) and the numerical scale scores in the pain assessment. Median (min.- max.) At hour: at rest 0 (0-5) vs 0 (0-1) and at movement 2 (0-7) vs 0 (0-2) and at two hours postoperatively: at rest 3 (0-10) vs 0 (0-6) and at movement 5 (0-10) vs 3 (0-9) (p <0.001).

Conclusion: Regional anesthesia techniques (such as TAP Block) have a potential that still needs to be developed. The ultrasound guided TAP block, as part of a multimodal analgesic regimen, provided superior analgesia than a standard intravenous analgesic regimen after performing a cesarean section.régimen de analgesia endovenosa estándar tras la realización de una cesárea.

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## 03AP01-2

# Erector spinae plane block for mastectomy and reconstructive surgery

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Background: Avoiding severe pain after mastectomy and reconstructive surgeries may prevent the development of chronic pain syndromes¹. Multimodal analgesic techniques including plane blocks like pectoral nerve (PEC), serratus or abdominal blocks are well described. Local anaesthetics (LA) placed in these planes may contaminate surgical sites. We describe a novel regional anaesthetic technique with catheters placed in the erector spinae plane (ESP) at the relevent transverse processes (TP)² in three cases of mastectomy with reconstruction. This technique provided effective analgesia at both the operative and donor sites.

Case Report: The first case involved a lady scheduled for left mastectomy with lateral intercostal perforator artery (LICAP) flap. She had general anaesthesia and standard PEC (1 and 2) and Serratus Anterior plane block performed after induction. She had a single shot ESP block performed at the TP5 as rescue analgesia four hours after surgery. Her dynamic pain score decreased from 7/10 to 0 immediately after the rescue block. The second case had an ESP catheter sited at the level of TP2 to avoid contamination of the latissimus dorsi muscle flap with LA after induction. This patient too reported complete pain relief immediately after a bolus of local anaesthesia the next day. The third case had bilateral ESP cathethers sited after induction for right mastectomy, removal of pectoral muscle and implant and free flap from the contralateral thigh. The catheters were sited at the level of TP4 for the mastectomy and TP9 for the donor site. The catheters were removed on post-operative day 3.

**Discussion**: Bilateral/unilateral ESP catheter placement is a safe, less invasive and simpler block that offers prolonged analgesia without haemodynamic compromise as compared to established epidural or paravertebral blocks. The ESP block cover an extensive area with a single catheter sited between 2 distant sites. It is a useful addition to the opioid-sparing and multimodal analgesic method.

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**Learning points:** Simpler, less invasive and effective regional technique in multimodal analgesia for breast reconstructive surgery.

### 03AP01-3

# Comparison of 2 types of ultrasound guided nerve blocks in patients undergoing breast cancer surgery under opioid free anaesthesia. A Randomised study

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Background and Goal of Study: Having demonstrated that PECS (Pectoral block) based anesthesia without opioids decreases analgesic requirement, pain scores, stay in recovery room and PONV compared to conventional general anesthesia in patients undergoing modified radical mastectomy and axillary dissection (MRM-AD) we wished to compare PECS vs Paravertebral Blocks (PVB) in an opioid free, nerve block based anesthesia regimen. Outcomes of interest were post operative analgesic requirement, duration of analgesia, PONV and satisfaction of patient and surrecons

Materials and Methods: This randomised double blind study involving 58 adult ASA I-III patients posted for MRM-AD in a 500 bedded university hospital. After randomization and allocation concealment patients were induced with propofol and maintained on spontaneous ventilation with isoflurane (0.8- 1.0 MAC) through i-gel. Ultrasound guided PECS or paravertebral blocks (0.1% lignocaine+0.25% bupivacaine+1 mcg /kg dexmedetomidine, 30ml) were administered. Post operative pain scores, non opioid analgesic requirement over 24 hours, PONV, satisfaction of surgeon and patient were measured.

**Results**- Between the two groups, there was no difference in demographics, ASA status, location and volume of breast tumour excised or the duration of surgery. The time from block to incision was significantly more in the PV group (p = 0.01). There was no difference between the two groups in terms of intra and post operative hemodynamic or block characteristics; the median VAS scores for pain at rest or during shoulder abduction was similar in both the groups.

**Discussion-** Both the blocks resulted in prolonged analgesia and reduced post operative requirement of analgesics. Unlike the results of Wahba et al and Kulhari et al (Pecs block was superior) we found no difference in block characteristics.

**Conclusion:** Both Pecs and Paravertebral blocks result in prolonged analgesia and decreased requirement of non-opiate analgesics when administered in a opioid free regimen. Pecs block is associated with less time to incision. Incidence of PONV and complications are low. Benefits of routine use of these blocks to avoid opioid related complications may be studied futher.

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# 03AP01-4

# The investigation of correlations o pain scoring systems used in evaluating analgesic effects after abdomen operations

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**Background and Goal of Study:** It was planned to investigate the correlation of Numerical pain scale (NRS) and Prince Henry pain scale (PHPS) scoring systems used to assess postoperative pain levels.

Materials and Methods: Seventy-five patients who underwent unilateral inguinal hernia repair from ASA I-III over the age of 18 years were included in the study. Transversus Abdominis Plan (TAP) Block was applied to each patient at the end of the operation for standard postoperative analgesia following standard general anesthesia. Demographic data of the patients and postoperative 0., 2., 4., 6., 8., 12.hour nausea at time, presence of vomiting, need for additional analgesia, NRS and PHPS values were compared.

Results and Discussion:Demographic characteristics of the cases (Table 1.) and postoperative analgesic usage times (Table 2.) are also seen. Nausea was observed in 20% (n=15) and vomiting in 2.7% (n= 2). There were statistically significant difference between NRS values and PHRS at 0., 2., 4., 6., 8. and 12. hours (respectively p = 0,001, p <0,01, Figure 1., p = 0,001, p <0,01, Figure 2.). The relationship between the two pain scores was assessed by Spearman's correlation analysis and ICC, and the relationship between the two pain scores was found statistically significant in both cases. PHPS scores of the cases were found at time 0 (r = 0,773; p <0,01) among the NRS scores; 2nd hour (r = 0,711; p <0,01); At 4th hours (r = 0.725; p <0,01); At 6th hours (r = 0,640; p <0,01); Positive correlations were found statistically significant at 8th hour (r = 0,786; p <0,01) and 12th hour (r = 0,743; p <0,01) (Table 3.).

**Conclusion(s)**: PHPS also provides an effective assessment, such as NRS, in assessing pain after abdominal operations. We believe that PHPS can provide a more objective assessment especially during the early postoperative period. However, larger, heterogeneous sampling studies are needed.

#### Acknowledgements:

Table 1: Distribution of descriptive properties

Table 2. Usage of analgesics according to postoperative time

## 03AP01-5

# Transmuscular quadratus lumborum muscle block in nephrectomy: an opioid free anaesthesia

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**Background**: Laparoscopic radical nephrectomy is the preferred method for renal cancer and is usually performed on patients with several comorbidities. Opioids are preferable not to be used on them. Transmuscular quadratus lumborum (TQL) block could be a good alternative for pain control in these situations even allowing an opioid free anaesthesia.

Case Report: A 77-year-old man with very severe COPD, obesity and aorta aneurysm was diagnosed with left renal tumour. Surgeons proposed him a unilateral laparoscopic nephrectomy and we offered him to add a regional anaesthesia technique to the regular general management on preanesthetic evaluation. He agreed and signed the informed consent.

We performed a unilateral US-guided TQL block under minimal sedation with midazolam and remifentanyl before general anaesthesia as Børglum J described¹. We used a 90 mm 20-gauge Quincke needle and levobupivacaine 0.5% (20 mL) with mepivacaine 2% (10 mL) as local anaesthetic (LA). We injected, in-plane and in a single puncture, LA between quadratus lumborum muscle and psoas muscle (thoracolumbar fascia) guided by US with a 5-2 MHz probe, avoiding to exceed toxic dose.

A 2-hour surgery was performed with no hemodynamic instability suggesting intraoperative pain. Main incision was 5 cm long and no LA infiltration was needed. Postoperative pain was controlled by non-opioid analgesia. Patient remained at hospital for 72 hours and opioids were not required during the whole hospitalization. **Discussion**:

Despite minimal invasive approach, opioids are usually needed for nephrectomy pain control<sup>2</sup>. Nevertheless, we avoided all opioid side effects and worsening of patient's previous conditions thanks to this technique.

TQL block relieves pain when abdominal surgery is performed due to sympathetic block of thoracolumbar nerves and gives a widespread anaesthesia from T4 to L1. Therefore, TQL block should be considered when performing nephrectomies or similar surgeries.

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#### Learning points:

- Despite minimal invasive approach, nephrectomies are painful surgeries.
   Patients with comorbidities such capper or COPD should be proposed for
- Patients with comorbidities such cancer or COPD should be proposed for pain control alternatives.
- 3. TQL block provides enough analgesia and only non-opioid analgesics are needed.

# 03AP01-6

# Quadratus lumborum block for laparoscopic inguinal hernia repair: case series

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Background: The incidence of postoperative complications increases with the uncontrolled pain in abdominal surgeries. One of the most recent effective pain management for these procedures is the quadratus lumborum block (QLB). Blanco first described it in 2007 and it has been performed as a perioperative pain control in pediatrics, pregnant and adults. With the purpose of reducing hospital time, financial costs and to maintain effective treatments, the aim of this case series is to discuss the QLB-type II technique as a regional anesthesia for laparoscopic inquinal hernia repair.

Case Report: Four patients were submitted to QLB-type II for totally extraperitoneal laparoscopic inguinal hernioplasty. They were sedated with fentanyl 1.0-1.5 mcg/kg and continuous infusion of propofol. In sequence, they had the contralateral site blocked by semilunar (SML) technique for insertion of the optic surgical trocater. The blockages were guided by ultrasound of high-frequency linear probe and provided with ropivacaine 0.5%(ROP) using a Whitacre needles. The multimodal analgesia was conducted with magnesium sulfate 40mg/kg and ketamine 0.2mg/kg. Case 1: Male, 50 years old, 78 kg, ASAIII, 25mL of ROP for QLB and 10mL for SML. Case 2: Male, 42 years old, 64kg, ASAII, 20mL of ROP for QLB and 10mL for SML. Case 3: Female, 47 years old, 50 kg, ASA I, 20mL of ROP for QLB and 10mL for SML. Case 4: Male, 14 years old, 60kg, ASAI, 18mL of ROP in each side for bilateral QLB. All patients evolved with no complications or pain complaints postoperatively and they were discharged from hospital 6 hours after the surgery.

postoperatively and they were discharged from hospital 6 hours after the surgery. **Discussion**: In the QLB, the local anesthetic is distributed adjacent to the anterolateral border of the quadratus lumborum muscle. The advantages of this technique include the reliable distribution in the abdominal cavity, the wide sensory blockage (T6-L1) and visceral and abdominal wall analgesia. In addition, the QLB can be recommended to reduce the necessity of general anesthesia and to be used as the main component of multimodal analgesia postoperatively.

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**Learning points**: The QLB has the potential to reduce the hospital time, the financial costs and to provide effective analgesia for abdominal surgeries. There are few randomized trials and no study reporting complications associated with the QLB.

#### 03AP01-7

Analgesic effects of ultrasound-guided Serratus anterior Plane Block after Video Assisted Thoracoscopic Surgery (VATS) Lobectomy: a comparative study

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Background and Goal of Study: Regional anesthesia contributes to early rehabilitation after video assisted thoracoscopic surgery (VATS) lobectomy, by decreasing postoperative pain and reducing morphine-induced adverse effects [1]. Several techniques may be used but there is no gold standard for VATS. Ultrasound-guided Serratus anterior plane block (SAPB) has recently been described for pain control after thoracotomy [2] or multiple ribs fractures [3]. We aimed to assess the effectiveness of SAPB associated to morphine patient controlled intravenous analgesia (PCIA) compared to PCIA alone on postoperative analgesia after VATS lobectomy.

Materials and Methods: This retrospective comparative study included the patients undergoing elective VATS lobectomy under minithoracotomy between January 2016 and May 2017. The patients were divided into two groups: SAPB group (ultrasound guided SAPB + PCIA) and control group (PCIA alone). The primary objective was to assess cumulative morphine consumption during the first 24 postoperative hours. Secondary objectives included pain score (assessed at rest and cough), time to first analgesic request, duration of the recovery room stay and morphine-induced adverse effects (PONV, pruritus).

Results and Discussion: Data from 129 were analyzed (SAPB group, n=55; control group, n=74). The mean (±SD) cumulative morphine consumption during the first 24 postoperative hours was significantly lower in SAPB group (19.8 ±11.9 vs 31.0 ±11.3 mg, P<0.0001) [Fig1]. Postoperative VAS pain scores at rest were also found to be significantly lower in SAPB group during the first 6 postoperative hours (P<0.05) [Fig2]. SAPB prolonged median time to first analgesic request [30 min (15-57.5) vs 10min (5-20) in the PCIA group, P=0.03], but not the duration of stay in the recovery room. There were no significant difference concerning PONV and pruritus between the two groups.

Conclusion(s): SAPB combined with morphine PCIA led to a reduction in total postoperative morphine consumption and provided better analgesia after VATS lobectomy during the first 6 postoperative hours compared to PCIA alone. The use of a catheter might contribute to prolong analgesia. Further prospective studies are therefore required.

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## 03AP01-8

# Post-operative analgesia with continuous erector spinae plane block

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Background and Goal of Study: The thoracic erector spinae plane block was first described by Forero et al in September 20161. In their article, the authors presented the possibility of using this block as an option for the control of thoracic neuropathic as well as post-operative thoracic pain. Since then, there have been reports in the literature about the successful use of this block for other surgical procedures, both as a single-shot and as a continuous technique. Even though it is a recent block, it appears to be versatile and to have some benefits, namely reduction of complications and side effects. The purpose of this study was to review the patients in whom a continuous erector spinae block was performed.

Materials and Methods: We performed a retrospective analysis of the clinical process of the patients who received a continuous erector spinae block for post-operative analgesia, as well as the records from the Acute Pain Unit, from September to November of 2017. The statistical description was done with SPSS (version 23), according to the type of variable.

Results and Discussion: We analyzed 16 patients (5 female and 11 male) and the mean±SD of age was 57,3±21,1 years. These patients went through procedures from general surgery (50%), plastic surgery (12,5%), thoracic surgery (25%) and orthopedics (12,5%). Most blocks were performed at a mid-thoracic level, except for the ones for orthopedics (total hip replacement and osteosynthesis of femoral fracture) which were done at the L4 level. The patients received a bolus that varied between 20 and 30ml of ropivacaine in an anesthetic concentration. After the surgery, most patients (75%) received a bolus of 10ml of ropivacaine 0,2% every 2 hours. The median (IQR) duration of catheter use was 2,5 (1) days. The pain level during the first three post-operative days (according the visual analogic scale), varied from 0 to 1,5 at rest and 2,5 to 4,6 with movement. During this period,

there were 2 patients who presented with nausea and/or vomiting and 1 patient with paresthesia.

**Conclusion**: This analysis shows that post-operative analgesia with continuous erector spinae plane block can be an option for various surgical procedures. Taking into account its apparent good analgesic efficacy, it could be an alternative to neuraxial blockades, with potential advantages regarding complications, side effects and interference with anticoagulant medication. **References:** 

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### 03AP01-9

A comparison of perioperative analgesic effects of preemptive subcostal transversus abdominis plane (TAP) block and Paracetamol for percutaneous nephrolithotomy

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Background and Goal of Study: Percutaneous nephrolithotomy (PCNL) is minimally invasive surgery performed for kidney stones with surgical insertions at the upper abdominal wall. Transversus abdominis plane (TAP) block is widely used for abdominal surgery analgesia, but this block wasn't investigated for PCNL. The aim of our study was to compare analgesic efficacy of iv Paracetamol and subcostal TAP block for PCNL.Primary outcome of our study was Morphine consumption at 48th hour after the surgery. Secondary outcomes were perioperative fentanyl consumption; postoperative Verbal Analog Scale and additional analgesic drug requirement

Materials and Methods: Patients who were scheduled for elective percutaneous nephrolithotomy were randomized into two groups: Group TAP and Group IV. General anesthesia was induced with propofol 2 mg/kg, fentanyl 1 mcgr/kg and rocuronium 0,6 mg/kg and maintained with sevoflurane 2% in 40%:60% oxygen/ air mixture and fentanyl 0,5 mcgr/kg and rocuronium 10 mg, if necessary. Unilateral Transversus abdominis plane block was performed with total of 30 ml volume of local anesthetic solution (20ml Bupiyacaine 0.125% and 10ml Lidocaine 1%) after intubation but before surgery to the Group TAP patients. Paracetamol 1 gr, iv was given to the Group IV 20 minutes before the end of the surgery. Also 100mg Tramadol,iv was administered 20 minutes before the end of the surgery to the both groups. Morphine iv patient controlled analgesia was applied to both groups. Perioperative fentanyl consumption; postoperative Verbal Analog Scale, morphine consumption and additional analgesic drug requirement were determined. Data of perioperative complications and adverse effects were also collected. Chi square with Yates correction and Mann Whitney U tests were used for statistical analysis. Results and Discussion: Eighty patients with ASA I-III status and age of 18-70 were assessed for enrollment. One patient enrolled for Group TAP developed septicemia at the recovery room so that patient was excluded from the study Data of 79 patients was collected for statistical analysis. Morphine consumption at 48th hour after the surgery was lower at Group TAP (20mg vs 28,5mg; p=0,022) Perioperative fentanvl consumption was lower at Group TAP (1,5mcg/kg vs 2 mcg/  $ka \cdot n < 0.001$ 

**Conclusion(s)**: Morphine consumption at 48th hour and perioperative fentanyl consumption was lower at subcostal TAP block group compared to iv paracetamol group for percutaneous nephrolithotomy.

#### 03AP01-10

# Investigation of Postoperative Analgesic Efficacy of Transversus Abdominis Plane (TAP) Block After Inguinal Hernia Surgery

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Background and Goal of Study: Transversus abdominis plane; An anatomical cavity between the facial muscles of the internal oblique muscle and transversus abdominis muscles and afferent spinal nerves that provide sensory innervation of the abdominal wall. Blockage of the nerves in the area of transversus abdominis is an effective component of postoperative multimodal analgesia after abdominial surgery. The purpose of this study is to observe the effect of the transversus abdominis plane (TAP) block on inguinal hernia surgery on postoperative analgesic consumption and Visuel Analogue Scale (VAS) scores.

Materials and Methods:The results of 97 patients with elective unilateral inguinal hernia surgery between the years of 05.2016-05.2017 and aged between 18-80 and ASA score I-III with and without unilateral TAP block in the preoperative period for postoperative pain treatment were analyzed retrospectively by file scanning we evaluated. Thirty-three patients who received only pre-unionized TAP blocks for postoperative pain treatment were treated with TAP Block group (Group T), only NSAID group (Group N) with preinsonic Nonsteroid Anti-Inflammatory Drug (NSAID) 31 patients were treated as combined group (Group K) Only 20 mL of bupivacaine 0.25% solution and USG-guided TAP block were included in the study in the pre-incision period. Postoperative pain severity was assessed by VAS scores. Nausea score

values showing nausea levels of the patients within 24 hours and vomiting were recorded. At the end of the 24th postoperative period, patient controlled analgesia and tramadol consumption were also evaluate.

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Results and Discussion: There was no significant difference between the groups in terms of age, gender and ASA scores when the groups were compared. AllVAS values recorded at 0, 1, 2, 4, 12 and 24 hours are in the NSAID + TAP group; Were significantly lower than NSAID-administered groups and only TAP-administered groups. In addition, postoperative tramadol consumption was significantly lower in the combined group compared to the other two groups.

Conclusion: Implementation of TAP block alone in inguinal hernia operations failed to provide adequate postoperative analgesia; But it has been concluded that multimodal analgesia of the TAP block may be an effective component when combined with NSAIDs

# 03AP02-1

The effect of ultrasound-guided popliteal block combined proposed target-controlled infusion on postoperative pain control after ankle and foot surgery

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Background and Goal of Study: Moderate to severe postoperative pain is not uncommon after foot and ankle surgery. Popliteal sciatic block (PSB) could provide sufficient anesthesia and reduces postoperative pain. The purpose of this study is to determine the effectiveness of PSB plus sedation on ankle and foot surgery when compared to general anesthesia plus opioids.

Materials and Methods: Patients were randomly allocated into PSB group (n=32) or GA group (general anesthesia, n=35). The PSB group received ultrasound-guided PSB properatively. Propofol target-controlled initiasion (TCI) was kept in PSB group to provide moderate sedation during entire operation. The GA group were induced with propofol followed with sevoflurane inhalation (2~4%). Laryngeal mask airway was inserted after achieving adequate anesthetic depth. Intraoperative opioids (morphine or fentanyl) was delivered for both groups when necessary. The demographic data, anesthetic parameters, and postoperative recovery (pain intensity, adverse events, analgesics use and satisfaction) were all recorded.

Results and Discussion: PSB group depicted better postoperative recovery profile than GA group. In PSB group, less patients required intra-operative opioids (p<0.001). Postoperative pain intensity was significantly lower in PSB group than GA group when arrival at post-anesthesia careunit (p<0.01). In postoperative anesthesia care unit (PACU), less patients required postoperative opioids in PSB group than GA group (p<0.001). Less postoperative nausea vomiting was noted in PSB group when compared to GA group (p=0.03).

Conclusion: Ultrasound-guided popliteal sciatic block reduced postoperative pain and adverse events in patients undergoing ankle and foot surgery than general anesthesia.

## 03AP02-2

Comparison of femoral block (FB), femoral + sciatic block by posterior route (FCB) and epidural block (EB) in the control of acute postoperative pain after knee arthroplasty

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Background and Goal of Study: Arthrosis is a degenerative disease that damages the cartilage, bone and synovial membrane of the joint, and that is accompanied by pain and inability for physical activity. Total knee arthroplasty (TKA) is a surgical procedure that consists of replacing the injured or degenerated joint surfaces with an artificial joint (prosthesis). This type of surgery has severe postoperative pain in 60% of patients and moderate in 30%. An effective analgesic control not only guarantees the comfort of the patient, but allows an early ambulation and initiation of physiotherapy, thus accelerating recovery and reducing hospital stay, thus reducing the risk of postoperative complications such as thromboembolic disease or infections nosocomial. The appearance of frequent adverse effects with the use of intravenous opioids, have justified the use of locoregional techniques in recent years and have provided a new alternative in the treatment of acute postoperative pain.

The aim of our study was to compare the efficacy and safety of different regional analgesic techniques for the control of acute postoperative pain, such as femoral block (FB), combined femoral block with posterior sciatic block (BF) and epidural block (EB) after ATR surgery.

Results and Discussion: A prospective observational study was conducted in which 30 patients undergoing TKA from June 2016 to May 2017 were included. In all patients, the anesthetic technique used in the operating room was an intradural anesthesia with 0.5% hyperbaric bupivacaine between 11 and 13 mg + fentaline 10 -20 mcg. After the surgical intervention and once the anesthetic motor block was recovered, the epidural infusion was started through the placed catheter or the

peripheral nerve block was performed by neurostimulation and echoguiding.

Conclusion: Peripheral nerve blocks are an equally effective alternative in terms of the quality of analgesia provided in the postoperative period with the advantage of producing fewer side effects. In our study, the association of a sciatic block to the femoral block is related to a lower painful intensity and lower opioid consumption in the postoperative period of TKA compared to the isolated femoral block. In addition, these regional blockades, in turn, have fewer adverse events and are less severe than the epidural block group.

#### 03AP02-3

Liposome bupivacaine in ankle blocks decreases opioid consumption compared to bupivacaine alone or general anesthesia after corrective osteotomy for hallux valgus

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Background and Goal of Study: Corrective osteotomy for hallux valgus is a common outpatient surgery, often accompanied by severe and sustained postoperative pain. Efforts to improve postoperative pain management have increased opioid prescriptions that can lead to tolerance, worst treatment outcomes, addiction and overdose deaths. Nerve blocks have been used to reduce pain, but have a limited duration of effect. A novel formulation of liposome bupivacaine injectable suspension has been FDA approved for infiltration during surgery, but is not yet approved for use in nerve blocks. The primary objective of this study was to determine whether a mixture of bupivacaine liposome injectable suspension + bupivacaine HCI in ankle blocks decreases postoperative pain and opioid consumption after corrective osteotomy compared to bupivacaine HCI alone or general anesthesia (GA).

Materials and Methods: After EC and FAGG approval (EUDRACT 2016-000961-22), 40 subjects scheduled for hallux valgus repair were randomized to receive ultrasound-guided ankle blocks of the posterior tibial and deep peroneal nerves with a mixture of bupivacaine 0.5% (2.5 mL) and liposome bupivacaine suspension 1.3% (5mL) per nerve (n=12), bupivacaine 0.5% alone (7.5 mL) per nerve (n=14), or GA (n=14). All groups received multimodal analgesia consisting of IV dexamethasone, ketorolac, acetaminophen and opioids. Onset and duration of blockade and pain scores were assessed up to 7 days after surgery. Worst pain in the first postoperative week was analyzed with adjustment over time by generalized estimating equations (GEE). Total opioid use in the first postoperative week was analyzed by 1-way ANOVA.

**Results and Discussion**: Ankle blocks significantly reduced pain scores in the first postoperative week (GEE p=0.016). Mean total opioid consumption was highest in the general anesthesia group (48 mEq), and lowest in the liposome bupivacaine mixture group (8 mEq) (p < 0.001). Mean total opioid consumption was also lower in the bupivacaine alone group compared to the general anesthesia group, however, the difference failed to reach the Bonferroni-corrected level of statistical significance (28 mEq, p = 0.116).

**Conclusion**: Addition of liposome bupivacaine to bupivacaine in ultrasound guided posterior tibial and deep peroneal nerve (ankle) blocks reduced pain and mean opioid consumption after corrective osteotomy for hallux valgus.

# 03AP02-4

The addition of an adductor canal block to local infiltration analgesia following total knee arthroplasty delays the attainment of physical therapy milestones

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Background and Goal of Study: Prior studies and retrospective data have suggested an additive analgesic effect of adding an Adductor Canal Blockade (ACB) to Local Infiltration Analgesia (LIA) compared to LIA alone. We endeavored to determine whether Physical Therapy (PT) milestones were reached faster with ACB + LIA vs. LIA alone.

Materials and Methods: Following IRB approval, ASA I-III patients scheduled for unilateral primary TKA were randomized to receive either ACB or a sham ACB (saline) in addition to the routine LIA administered by the surgeon. Exclusion criteria included chronic pain and substance abuse. Anesthetic (spinal) and postoperative pain management were standardized. ACB was performed at the mid-thigh level with 30 mL of 2.5 mg/mL bupivacaine with 1:200K epinephrine. LIA was performed by the surgeon using bupivacaine, ketorolac, epinephrine and morphine, as well as liposomal bupivacaine.

Data collected included passive and active ROM knee flexion and extension, quadriceps strength, bed mobility skill, transfer skill, 2-minute walk test, and pain complaints via VAS before, during and after physical therapy sessions, as well as total distance ambulated on the day of surgery as well as the first and second third post-operative days, ability to climb stairs, and readiness for discharge.

**Results and Discussion**: Preliminary results of 51 patients out of 150 planned to be enrolled are reported. While pain scores, measured as an AUC for the initial 48 hours, was not different between groups  $(198 \pm 75 \text{ vs. } 196 \pm 79)$ , total distances

ambulated and 2-minute walk tests suggested that the group that received the ACB in addition to LIA achieved less on PT at each of the time points than the group that received LIA alone (total distances ambulated: DOS:  $109 \pm 94$  vs.  $132 \pm 85$  ft; POD1am:  $75 \pm 106$  vs.  $287 \pm 78$  ft; POD1pm:  $100 \pm 141$  vs.  $255 \pm 50$  ft; POD2am:  $125 \pm 177$  vs.  $215 \pm 50$  ft; 2-minute walk test: DOS:  $55 \pm 51$  vs.  $74 \pm 58$  ft; POD1am:  $20 \pm 14$  vs.  $139 \pm 134$  ft; POD1pm:  $45 \pm 64$  vs.  $140 \pm 99$  ft; POD2am:  $75 \pm 107$  vs.  $128 \pm 83$  ft).

While we were surprised to see that, contrary to our expectations and to prior publications, patients who received a block were able to walk less at every one of the time points that the patients who received LIA alone, we will complete the study and investigate the possible causes for this discrepancy.

**Conclusion(s)**: While these preliminary results remain to be confirmed, these data suggest that LIA alone is preferable to ACB + LIA.

# 03AP02-6

Prolonged motor and sensory block following single injection ultrasound guided Fascia Iliaca Compartment Block with ropivacaine 0.2%

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**Background**: Fascia Iliac Compartment Block (FICB) has been recently introduced as a procedure for postoperative pain control after hip replacement surgery!. For this block few data are available about duration of sensory and, possibly, motor block. We report 2 cases of unespectedly prolonged motor and sensory block following a longitudinal suprainguinal FICB.

Case Report: Case 1. A 67 year-old man scheduled for right hip replacement with lateral approch received a light spinal anesthesia with 12 mg plain levobupivacaine. in the recovery room the patient received an ultrasound guided right suprainguinal longitudinal FICB with 30 ml ropivacaine 0.2%2. At the postoperative visit 24 hours after surgery the patient showed a right side paralysis of quadriceps muscle with inability to rise the stright leg and also hip flexion weakness, impairing early fisiotherapy and recovery. Sensory cold test revealed a deep sensory block in the femoral nerve and femoral cutaneous nerve distibution. The motor block and sensory block slowly recovered in the subsequent hours, being complete at 48 hours from local anesthetic injection. Case 2. A 62 year old man undergoing right hip replacement surgery in the morning under spinal anesthesia was selected to receive aultrasound guided longitudinal FICB as a part of postoperative pain control program. The block was performed in the recovery room after the patient had recovered from low dose 10 mg levobupivacaine spinal anesthesia. 30 ml ropivacaine was injected underneath the fascia iliaca with a suprainguinal approach<sup>2</sup> and with the help of ultrasound. 24 hours later the patient showed extreme quadriceps muscle weakness and as well as sensory block in the femoral supply. The motor block along with sensory block resolved completely after 40 hours after local anesthetic injection

**Discussion**: The FICB reduces analgesic requirements after total hip replacement but few data are available in the literature regarding intensity and duration of possible motor blockade. The fascia iliaca compartment may act as a reservoir of local anestetic prolonging not only the useful sensory analgesia but also prolonging undesired motor block

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Learning points: Low local anesthetic concentrations and volumes are advised to avoid undesired prolonged effects of FICB

## 03AP02-7

Peripheral nerve block anaesthesia is superior to spinal anaesthesia regarding postoperative pain control in primary ankle fracture surgery: results from the randomised "AnAnkle Trial"

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**Background**: Peripheral nerve blocks (PNB) are widely used for anaesthesia and postoperative pain control in orthopaedic limb surgery. However, little is known about the pain profile in acute fracture surgery and rebound pain following PNB might outweigh the benefits of longer analgesia. "AnAnkle Trial" aimed to investigate the effect of PNB anaesthesia compared with spinal anaesthesia (SA) on postoperative pain in acute ankle fracture surgery.

**Methods**: Randomised, open label trial on adult patients undergoing ankle fracture surgery. The study underwent ethical approval and GCP audit. Participants were randomised to PNB anaesthesia or SA. PNBs were ultrasound guided, popliteal sciatic and mid-femoral saphenous blocks with ropivacaine. SAs were unilateral with hyperbaric bupivacaine. The postoperative regimen was paracetamol,

ibuprofen and patient controlled i.v. morphine (PCA).

Patients registered pain scores on a numeric rating scale 0-10 (NRS) every three hours for 27 hours and PCA use was registered. The primary endpoint was the pain intensity and opioid consumption (PIOC) score calculated by ranking both the NRS area under the curve (AUC) and total morphine 0-27h across both groups. PIOC is the sum of deviation from the mean rank in both parameters, equalling between -200% and +200%. Effect size is calculated as the probability of having a better PIOC with PNB compared with SA (p'). NRS AUC and total morphine were analysed separately as secondary endpoints.

Results and Discussion: We included 150 patients. The groups were comparable regarding comorbidity, preoperative pain scores and baseline characteristics. Conversion to general anaesthesia was necessary in five patients with PNB and none with SA (not significant). PIOC was significantly lower in the PNB group (median -26.5% vs. +54.3%, p<.001) with a probability of a better PIOC with PNB of p'=74.8% (67.0-82.6, 95%CI). The secondary endpoints also yielded significant reductions in the PNB group. The PNBs provide excellent analgesia and longer duration than SA and both PIOC and secondary outcomes revealed a clear benefit with the PNBs. However, the post-block pain levels and opioid need in the PNB group also indicate a considerable rebound pain when the PNBs subside.

**Conclusions**: PNB anaesthesia is efficient for ankle fracture surgery and provides superior postoperative pain control compared with SA. However, the rebound pain following cessation of the blocks warrants attention in clinical practice.

### 03AP02-8

Three regional blocking methods assessment in arthroscopic anterior cruciate ligament reconstruction

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Background and Goal of Study: Arthroscopic anterior cruciate ligament reconstruction (ACLR) is associated with moderate to severe postoperative (POP) pain with opioid requirement that may lead to discharge delay. Both, femoral (FNB) and subsartorial saphenous nerve block (SNB), have shown to be effective in pain management, with no significant differences. Furthermore, the addition of obturator nerve block to the adductor canal block (SNB+O) would improve its efficacy.

This study aim is to assess the association between POP pain and three different types of regional nerve blocks (FNB, SNB, SNB+O), opioid requirement and length of stay at recovery-room.

**Materials and Methods**: Observational, analytic, retrospective study of a patient cohort undergoing ACLR, who received three types of peripheral ultrasound-guided blocks from October 2016 to November 2017 at the Hospital Italiano de Buenos Aires. Data were obtained from electronic records.

POP pain was defined as a Verbal Rating Scale (VRS)  $\geq$  4. VRS was measured at three times: immediate POP period (VRS 0), one hour after surgery (VRS 1) and at discharge (VRS D). Opioid requirement was defined as the need of opioids (tramadol and morphine) in the intra- and postoperative period. To evaluate the association between the type of block and the presence of pain, a multiple logistic regression was performed, adjusting for confounders, and crude and adjusted ORs (Cl95%) were expressed. Level of significance of less than 5% was considered. The data were analyzed with STATA13.

**Results and Discussion**: A hundred and forty-five (ASA I-III) patients who received three types of peripheral ultrasound-guided blocks (FNB n=48, SNB n= 32, SNB+O n=65) were included.

No significant differences regarding opioid requirement among block groups (p=0.371) were observed, as well as with length of stay (p=0.19).

Furthermore, no significant differences among the three types of blocks and VRS 0 (p>0.05) were found (FNB: OR=1 Cl95% 1, SNB: OR=1.07 Cl95% 0.40-2.87 p=0.88, SNB+O OR=1.27 Cl95% 0.56-2.89 p=0.56). Same results were obtained for OR adjusted by confounders (sex and opioid requirement).

**Conclusion**: No association was observed between the type of block and the presence of POP pain. There were no differences in opioid requirement or length of stay at recovery-room.

# 03AP02-9

Injection inside vs outside the paraneural sheath of nerve for ultrasound-guided popliteal sciatic block

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Background and Goal of Study: To compare the blockage effects and complications between the injection inside and outside the paraneural sheath of nerve for ultrasound-guided popliteal sciatic block, providing theoretical evidence for its clinical use.

Materials and Methods: Sixty patients undergoing selective or emergency ankle fracture surgery were randomized to either injection inside the paraneural sheath of nerve group (IPS) or injection outside the paraneural sheath group (OPS), ultrasound-guided popliteal sciatic block was performed using 0.5% ropivacaine 20 ml through a lateral approach. All surgeries were finished under subarachnoid anesthesia. Two groups were compared for injection- related indexes, time to complete block, duration of sensory and motor block, and postoperative analgesic effects, as well as the first time for seeking opioids postoperatively and the total

usage of sulfentanyl in different time intervals.

Results and Discussion: Duration (OPS 4.5±1.1min vs IPS 3.6±1.0min P=0.001) and number of injection (OPS 4.3±1.0 vs IPS 2.9±1.1 P<0.01) were significantly decreased in group IPS as compared with group OPS, but numeric rating scale score and patient's satisfaction did not significantly differ. Compared with group IPS, the patients in group OPS required a significantly longer period to achieve complete block (OPS 28.6±3.0min vs IPS 19.3±3.9min P<0.01), in which group 2 cases had not obtaining complete block within 30 min after injection. The group OPS also had shorter sensory (OPS 18.3±3.7h vs IPS 21.3±5.3h P=0.015) and motor blockage (OPS 13.9±2.9h vs IPS 16.2±4.2h P=0.021) and lower postoperative weakness score (OPS 1.0[0.75-2.0]vs IPS 2.0[1.0-3.0] P=0.004). No significant differences were shown between two groups in the first time seeking sulfentanyl postoperatively or the total use of opioids in different time intervals (P>0.05). Opioids were used in neither groups in the first 12 hours following the surgery.

Conclusion: Although both ultrasound-guided popliteal sciatic block with

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**Conclusion:** Although both ultrasound-guided popliteal sciatic block with subepineurial injection and with intrathecal injection have the same analgesic effect, but the former provides faster and longer sensory and locomotor blockage and avoids the use of opioids in the first 12 hours following the surgery.

## 03AP02-11

Adductor Canal Block with IPACK block (Interspace between Popliteal Artery and Capsule of Posterior Knee) VS Lumbar Epidural for postoperative analgesia in Total Knee Arthroplasty: effect in quality of postoperative analgesia and in immediate physical rehabilitation

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**Background and Goal of Study**: Total knee arthroplasty (TKA) surgeries increased significantly over time and can involve severe postoperative pain. Postoperative analgesia should minimize postoperative pain and improve functional outcomes, allowing a faster recovery and rehabilitation. Although there are many techniques used for controlling pain there has been no consensus about which strategy is better.

The aim of our study was to compare the quality of postoperative analgesia, opioid consumption and time until gait beginning in patients who underwent primary TKA and had either Adductor Canal Block (ACB) with IPACK block or Lumbar Epidural for postoperative analgesia.

Materials and Methods: We retrospectively analyzed records from patients who underwent a primary TKA between January 2017 and April 2017.

A total of 72 patients were eligible. All the patients had a subarachnoid anesthesia as the main anesthetic technique. For the postoperative analgesia, as part of a multimodal aproach, in 42 patients (n=42) were placed a Lumbar Epidural with a local anestethic (LA) bolus regimen and 30 patients (n=30) received a single-shot ACB+IPACK block with LA.

We compared postoperative pain VAS scores and need for supplemental opioid at PACU discharge and at 8-hour intervals for 48 hours. We also compared the time until gait beginning. We used t-student statistic model of SPSS 17.

**Results and Discussion**: There were no significant demographic differences between groups regarding age, sex, ASA physical status classification and body mass index (p>0.05).

There were no significant differences in the postoperative pain VAS scores and in the number of patients who needed additional intravenous opioid bolus at every point evaluated (p>0.05).

However, all the patients in the ACB+IPACK block group started walking 24 hours after surgery – 83 % (n=25) in the first 12 hours – and in the epidural group all the patients only begun walking 24 hours after surgery – 31% (n=13) after 24 hours and 69% (n=29) after 36 hours (p<0.001)

**Conclusion**: These results demonstrate that a single-shot ACB+IPACK block appears to provides equivalent analgesia to Lumbar Epidural in patients undergoing primary TKA, promoting improved physical therapy performance and possibly earlier hospital discharge.

# References:

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### 03AP03-2

Efficacy of thoracic paravertebral nerve block for patients who undergo video-assisted thoracoscopic surgery-randomised controlled trial

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Background and Goal of Study: Thoracic paravertebral nerve block (TPVB) has been reported to be as effective as thoracic epidural analgesia in perioperative pain management for the thoracic surgery. However, there were a few reports, which investigated the analgesic efficacy and the safety for the TPVB for the thoracic surgery. In this time, we investigated the analgesic efficacy of the TPVB in video-assisted thoracoscopic surgery compared with the thoracic epidural analgesia.

Materials and Methods: Eighty adult patients for video-assisted thoracoscopic surgery were randomly allocated to receive either the combination of general anesthesia and TPVB (T group, n=40) or the combination of general anesthesia and epidural anesthesia (E group, n=40). Primary outcome measure was the number of additional fentanyl injections during the first 24 hours after surgery. Secondary outcomes were the number of required additional fentanyl doses and was visual analog scale (VAS) pain score during the first 24 hours after surgery.

Results and Discussion: The number of additional fentanyl to the T group was equal to the E group (P=0.075). The number of required additional fentanyl doses was lower in the E group than in the T group (P=0.075). Compared with the T group, the E group was lower VAS scores of the rest at 2, 4, 6, 18 and 24 hours post-surgery and of the move at 2, 4, 6, 12, 18 and 24 hours post-surgery.

**Conclusion(s)**: The number of additional fentanyl to the T group was equal to the E group. The thoracic paravertebral nerve block is as effective as the epidural analgesia in video-assisted thoracoscopic surgery.

#### 03AP03-3

# Does neuraxial anesthesia damage DNA as general anesthesia?

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Background: DNA damage during general anesthesia has been well documented and it yields a significant burden to the patients, as iatrogenic damage. Data on neuraxial anesthesia are missing so far. Our aim was to assess the amount of DNA damage in patients under general anesthesia (GA) and neuraxial anesthesia (NA) Methods: 43 patients undergoing elective traumatology or orthopedic surgery on lower limbs were allocated to the GA or NA group. Blood samples were obtained with informed consent before and after the surgery. Samples were subjected to DNA damage analysis using the DNA Comet method. The nuclear DNA was incubated for 45 minutes with the specific enzymes ENDO III for detection of oxidized pyrimidines and FPG to detect oxidized purines. Slides were then exposed to alkali for 40 minutes for DNA unwinding and cleavage of alkali-labile sites. Then the electrophoresis was applied for 30 minutes at 4°C and DNA migrated to the anode and created comets. After neutralization and staining with ethidium bromide, the gels were analyzed by a specialized semiautomatic software Lucia by fluorescence microscopy. The software measured the ratio of DNA intensity in the tail relative to the head of the comet and provided the ratio of single-stranded DNA damage (SSD), pyrimidine damage (ENDO) and purine damage (FPG). For comparison of results paired the Wilcoxon test was used. Statistical significance was at p = 0.05 Data are presented as a median and interquartile range. Results: Complete data were obtained from 24 patients in GA group and 19

patients in NA group. In GA group there was a significantly higher amount of SSB: 7,58 (5,13 - 10,1); 10,53 (7,41 - 11,67); p<0,0001, ENDO: 8,66 (6,85 - 10,3); 12,57 (9,33 - 13,72); p<0,0001, and FPG: 8,09 (5,9 - 12,6); 11,75 (8,38 - 15,32); p<0,0001 after the surgery. In NA group the elevation of these parameters was not significant: SSB 2,65 (0,93 - 6,55); 2,17 (0,41 - 6,79); p = 0,63, ENDO: 6 (3,69 - 16,6); 5,73 (3,74 - 16,91); p = 0,46, FPG: 6,72 (4,38 - 19,7); 8,33 (4,9 - 19,05); p = 0,81. 
Conclusion: Our results declare that GA significantly damages nuclear DNA, unlike NA. Due to the lower load of genotoxic agents whenever possible patients should be undergoing traumatology and orthopedic surgery in NA. Supported by MH CZ - DRO (UHHK, 00179906).

### 03AP03-4

Postoperative analgesic quality of the BRILMA block vs continous epidural infusion in open liver surgery

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Background and Goal of Study: Epidural analgesia (EA) is the most widely used analgesic technique for open abdominal surgery. However, in patients undergoing extensive liver resections, performing an epidural puncture with the insertion of an epidural catheter has potential morbidity due to the perioperative altered coagulation profiles these patients can experience. New analgesic modalities have emerged recently, such as the modified BRILMA block, scarcely investigated in this context. The aim of this study was to assess the effectiveness of EA with epidural infusion of local anesthetics compared to the modified BRILMA block associated with a PCA of morphine (MPCA) as postoperative analgesia in open liver resections.

Materials and Methods: We compared a retrospective series of patients who underwent open liver resection surgery and received EA with epidural infusion of local anesthetics during 2015-2016, with a cohort of patients who received a modified BRILMA block in addition to a MPCA during 2016. The intensity of pain at rest and movement was registered according to the visual analogue scale (VAS), in the immediate postoperative period, at 6 hrs, 24 hrs and 48 hrs after surgery.

Results and Discussion: A total of 20 patients undergoing open liver resection were included. Fourteen patients in the EA group and six patients in the BRILMA group were compared. There were no differences between the two groups in terms of age (61±9 vs 62±10 years), sex (women/males 6/8 vs 2/5) and surgical risk estimation scale (ASA II/III, 11/3 vs 6/0) but it was in body mass index (BMI 26±3 vs 29±3 kg/m²; p<0.05) in EA and BRILMA group, respectively.

We found better analgesic control immediately after surgery (0 vs 1) and at 6hs (0 vs 2) of postoperative period in EA than in BRILMA group. However, VAS scores were similar at 24 hrs (2 vs 2) and 48hs (2 vs 2) at rest, and at 24h (4 vs 3) and 48hs (3 vs 3) in motion in EA and BRILMA groups, respectively.

Conclusions: The modified BRILMA block associated with a MPCA is not as effective as EA in the immediate and at 6 hrs of postoperative period but it provides a good analgesic control without significant differences in pain scores at 24 hrs and 48 hrs after surgery. A BRILMA block associated with a MPCA is a promising alternative to EA for the control of postoperative pain in patients undergoing open liver surgery. Studies with larger number of patients are needed to confirm these results.

#### 03AP03-5

# The ultrasound scan is not superior to the landmarks technique for performing regular lumbar regional anesthesia

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Background and Goal of Study: The ultrasound scan of the lumbar spine can potentially facilitate the performance of neuraxial anesthesia. The main purpose of the study was to determine if the ultrasound scan (US) is superior to the landmarks (LM) technique for performing every-day spinal, epidural and combined spinal-epidural anesthesia.

Materials and Methods: A prospective randomized controlled trial was designed. 1 tertiary hospital from September 2015 until September 2017 participated. The 18-80 years old ASA 1-3 patients eligible for surgery under spinal, epidural, combined spinal-epidural anesthesia or general anesthesia with epidural catheter for postoperative analgesia were included in the study. Patients with a history of lumbar spine surgery were excluded. The patients were randomly allocated to two groups: the US (the puncture site was determined by lumbar ultrasound scan) and the LM group (the puncture site was determined by the landmarks technique). Data from 146 patients were finally analyzed.

The main outcome was the single-injection success rate. Secondary outcomes were the success of the technique rate, the number of attempts and the time required to complete the technique, the number of times required to change the trajectory of the needle, the rate of change of the level of the puncture and the patient's satisfaction. Results and Discussion: There were no differences between the US and the LM in single-puncture success rate (60% vs 53%), success of the technique rate (95% vs 98%) and rate of change of puncture level (17,5% vs 30%). No differences were also found in the number of punctures per patient (1,65 vs 2,06) and the number of times required to change the trajectory of the needle (0,74 vs 1,14). No differences were found in patient satisfaction (96% vs 98%). The only statistically but not clinically significant difference between the two groups was in the total time required to complete the technique (9 minutes and 10 seconds vs 7 minutes and 31 seconds, p<0,05). The results were the same after subgroup analysis for the type of anesthetic technique and the obese patients (BMI>30).

**Conclusion**: The US of the lumbar spine for performing regular regional anesthesia requires additional time than the LM technique without offering any advantages. Further studies are needed to examine potential advantages in special groups of patients like the obese or the patients with spinal pathology.

### 03AP03-7

The intavenous role of ondansetron in reducing nausea, vomiting and pruritus on patients who underwent spinal anesthesia with bupivacain 10mg and morphine 0.2mg for transurethral Prostate (TURP)

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Background and Goal of Study: Intrathecal injection of morphine is highly effective for the management of postoperative pain. Unfortunately, its use may be limited by side effects, such as pruritus and nausea/vomitus. The purpose of this study is to support the hypothesis that Ondansetron reduces nausea/vomiting and pruritus on patients post spinal anesthesia (Bupivacaine+ Morphine).

Materials and Methods:This study is conducted in urology clinic and the participants were 160 patient older than 50 years old that underwent TURP surgery. This survey studies patient were divided in two groups.In the G 1 (80 Pt), patient were between ages 50-85 years old and the anesthetic that was used for the spinal was bupivacaine (10mg+ morphine 0.2mg). No intravenous medications was given to this group.In the G2 (80Pt), patient were of ages 50-85 years old and the material that was injected intrathecal was bupivacaine 10 mg + Morphine 0.2mg, and patients also received 4mg Ondansetron intravenous.All patient that reported Ondansetron allergy and presented with pruritus before the start of the study, were not use for this study. The degree of pruritus was classified as 0= no pruritus, 1= mild pruritus (no treatment needed), and 2= severe pruritus (treatment was needed). Study took in consideration changes on hemodynamic values before and after the procedure, also the presence of nausea, vomiting and pruritus after the procedure. To compare both groups the chi square test is used. Where the value of P<0.5 is considered statistically significant.

Results and Discussion: Findings among two groups did not find any intraoperative hemodynamic changes. In G. 1 from 80 patients, 18 (22.5%) presented with vomiting and 35(43.75%) presented with pruritus. And G2, patient that presented with vomiting were only 4 (5%), and with pruritus 5 (6.25%) patients. Patients of G2 that presented with pruritus did not need treatment, pruritus was very mild. Pruritus on patients of G1 was >2 and needed treatment. As per vomiting and pruritus patients of G1 and G2, presented there were some differences between of them. P= 0.01. G2, did not present with esktrapiramidale signs or headache.

**Conclusion:** Prophylactic use of Ondansetron reduces not only vomiting but also pruritus post operatively to patients that undergo TURP surgery, and spinal anesthesia with Bupivacaine 10 mg and Morphine 0.2 mg was used used. P= 0.01

## 03AP03-8

# Continuous spinal block as part of balanced anaesthesia for robotic-assisted major pancreatic surgery

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Background: Continuous spinal block provides optimal surgical conditions and maintains cardiorespiratory stability with low doses of local anaesthetics (LA).1 This report aims to demonstrate its efficiency and safety for complex surgical procedures. Case Report: A 58 year-old lady with pancreatic head adenocarcinoma was scheduled for elective robotic-assisted laparoscopic Whipple's procedure. A continuous spinal block was performed before induction of general anaesthesia (GA) using 21G Sprotte needle at L3-4 interspace paramedian. After obtaining free flow of CSF, 25G catheter was threaded 8cm to subarachnoid space with 2 cm within the space. The initial intrathecal (IT) bolus consisted of 0.5% plain bupivacaine 2.5 mg, morphine 200 mcg (2 ml) and fentanyl 15 mcg. A level of T10 was achieved.

After induction of GA, patient remained haemodynamically stable. Further two IT doses of 2.5ml of 0.25% bupivacaine each were given after 120 min and 480 min in 0.5ml aliquots. After 5.5 hours, the surgery was converted from laparoscopic to open approach because surgeons could not visualize the bleeding from the superior mesenteric vein clearly for haemostasis. During the bleeding episode, the patient received 1 unit red cells, 500ml fresh frozen plasma and tranexamic acid 1g. The surgery lasted 9 hours and intraoperative blood loss was about 1 L. No long-acting systemic opioid was required. During surgical skin closure, IT top-up was done with 0.25% bupivacaine 2.5ml, 100 mcg morphine and 20 mcg fentanyl. Spinal catheter was removed at end of surgery. The patient's postoperative pain was well controlled without opioids. There was no evidence of infection, neurological deficit or post-dural puncture headache.

**Discussion**: Continuous spinal block is useful for major abdominal surgeries because it causes less haemodynamic disturbance, allows titration of LA dose according to surgical needs and provides excellent perioperative analgesia. Combining central neuraxial blockade with GA can attenuate stress response to surgery, decrease thromboembolic events and minimize systemic opioids requirement.

# References:

 Jaitly VK, Kumar CM. Continuous spinal anaesthesia for laparotomy. Curr Anaesth & Crit Care 2008:60-4.

**Learning points:** Continuous spinal block offers reliable and safe perioperative analgesia while maintaining cardiorespiratory stability. This technique could be combined with GA for high risk patients undergoing complex abdominal surgeries.

## 03AP03-9

The value of a new parameter The Hypotension Probability indicator to Predict and treat hypotension during spinal anesthesia

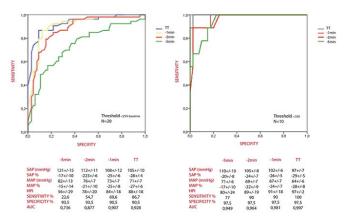
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Background and Goal of Study: Hypotension (HP) is a common side effect of spinal anesthesia (SA) The Hypotension Probability indicator (HPi), is a new parameter that has been recently developed to determine the risk of a patient trending toward a hypotensive event, defined as mean arterial pressure (MAP) < 65mmHg for at least one minute. HPi is based on a mathematical algorithm which uses the waveform from a FloTrac IQTM sensor and displays the calculated value as numeric % over the range 0 to 100%. The aim of the present investigation was to test whether values of HPi above 85% (HPi >85%) may predict HP with two known definitions of this entity

Materials and Methods: After IRB approval and written informed consent, 30 consecutives patients ASA III-IV with known cardiovascular disease, that received SA were prospectively studied. Bupivacaine 0,5% was used to block at L3-4. SAP, MAP, HR, CI, SVRI and HPi were continuously measured through an artery line, connected to a Flo TraclQTM sensor (Edwards LifeSciences, Irvine CA). HP was defined and treated when SAP<25% from its baseline value (Threshold<25%baseline) in 20 patients. While in other 10 patients, HP was defined to a decrease of SAP< 100mmHg (Threshold<100). ROC curve analysis and sensitivity/specificity and the area under the curve (AUC) of the HPi >85% was used to predict the definition of HP and the need of treatment as the final outcome, at treated time (TT), that is at both definitions of HP, and at 1, 2, and 5 minutes before. Results and Discussion: The main results are displayed in figure 1. HPi >85% predicted both definitions of HP at TT, with a sensitivity of 86.7% and AUC of 0.928 for Threshold<25%baseline, and 100% and 0.997 respectively for Threshold<100. Our results demonstrate that HPi >85% predicts HP and more importantly its treatment with almost 2 min in advance when a baseline threshold is used and with 5 min when an absolute value



**Conclusion:** The present study strongly suggest that HPi >85% can be used as a goal of HP treatment during SA in the future. However, more patients and other HP thresholds are needed to be tested to confirm our results

#### 03AP03-10

# Segmental spinal anesthesia for small-incision cholecystectomy in a low-ressource field hospital

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Background and Goal of Study: Providing safe anesthesia in a field hospital is a challenging situation. Segmental spinal anesthesia has been proposed for some abdominal surgeries [1, 2]. We hypothesized that spinal anesthesia would have some advantages in this low-ressource setting. This propective study investigated the feasibility and safety of segmental spinal anesthesia for open cholecystectomy in a deployed hospital.

Materials and Methods: Setting: a field hospital deployed in the Atlas mountains. With research ethics board approval, and informed consent, ASA I–II adults, scheduled for elective small-incision open cholecystectomy were included. Patients received spinal anesthesia performed at a lower thoracic level (T10 injection) using a mixture of 1.5 ml of hyperbaric bupivacaine 5mg/ml (=7.5 mg) and 0.5 ml of fentanyl 50 ug/ml (= 25 ug).

Data recorded: success of surgery under spinal anesthesia, peroperative pain scores [NRS: Numeric rating scale from 0 to 10], requirement of additional

analgesia (fentanyl), surgeon satisfaction [NRS: 0 to 10], peroperative incidents (paresthesia associated with spinal puncture, hypotension, bradycardia) and postoperative events (nausea and vomiting, urinary retention).

Results and Discussion: Sixty two patients (90% female) were included. Average age: 52 years ( $\pm 12$ ). ASA class I / II : 43 (69%) / 19 (30%). All procedures were performed successfully under thoracic spinal anesthesia, except one patient who required general anesthesia due to failure of spinal anesthesia. Three patients complained of paresthesia which responded to needle withdrawal and redirection. Perioperative pain scores were low with a median NRS of 0 (0, 2) [interquartile range]. Seventeen patients (27%) required additional analgesia. The mean dose of fentanyl injected was 57 $\pm$  23  $\mu g$  (SD). The surgeon's satisfaction scores were high: median NRS = 9 (8-9) [interquartile range]. Twelve patients (19%) developed transient intraoperative hypotension which was solved with intravenous ephedrine. Bradycardia was observed in three patients (5%). The incidence of postoperative nausea and vomiting was low (8%). None of our patients showed postoperative urinary retention.

**Conclusion**: In the context of a field hospital, cholecystectomy can be performed successfully and safely under thoracic spinal anesthesia. **References**:

#### References

- 1. Br J Anaesth 2007; 98: 682-6.
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Acknowledgements: medical staff (Royal Moroccan Forces)

#### 03AP03-11

## Comparing effects of combined general/epidural anesthesia and general anesthesia on serum pro and anti-tumorigenic cytokines in major urologic surgery

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Background and Goal of Study: Surgical stress combined with general anesthesia (GA) suppresses the immune system and leads to cancer cell growth and premature metastasis in major oncologic interventions. Epidural analgesia decreases the need for inhalation agents and opioids during surgery by suppressing sympathetic and neuro endocrine responses in the post-surgical period. The aim of the present study is to compare the effects of combined general/epidural anesthesia (GEA) + patient-controlled epidural analgesia (PCEA) and GA + IV patient-controlled analgesia (PCA) on serum IL-6, IL-10, TGF-β levels in patients undergoing radical cystectomy. Materials and Methods: Sixty-five patients were enrolled in this prospective study. Patients were randomly enrolled to group GEA which is combined GEA + PCEA (0.1% bupivacaine+1 μg mL-¹ fentanyl) and group GA which is combined GA + IV PCA (0.03 mg mL-¹ morphine). To evaluate the cytokine response, blood samples were collected at preoperative, postoperative 1st and 24th hours.

#### Results and Discussion:

Twenty-nine patients from both of the groups completed the study. There was no statistically significant difference in serum IL-6, IL-10, TGF- $\beta$  levels between groups GA and GEA at preoperative and postoperative 1st and 24th hours. Total remifentanil consumption was significantly lower in group GEA than group GA (287±403, 596±349) (p<0.05). There was no statistically significant difference between the groups in terms of VAS values at postoperative 15th minute and 1st , 2nd , 6th and 24th hours (p>0.05). Duration of hospital stay was significantly shorter in group GEA than group GA (9.13±2.15, 12.21±3.07) (p<0.001).

In our study, in the pain assessment of patients in postoperative period, VAS values were below 4 in both groups undergoing intravenous morphine and epidural analgesia at all times. This suggests both techniques provide efficient analgesia. Similar serum cytokine levels in two groups can be explained with this efficient analgesia. Thus, it can be said that both analgesia techniques have similar effects on the immune system in patients with undergoing radical cystectomy.

**Conclusion(s)**: There is no difference between two anesthesia methods in terms of serum cytokine levels, however combined GEA + PCEA technique is seemed to be superior to GA + IV PCA due to lower intraoperative narcotic analgesic consumption and shorter hospital stay.

#### 03AP04-1

# Ultrasound verus ultrasound associated to neurostimulation:

Bupivacaine minimum dose in the supraclavicular block

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**Background and Goal of Study**: Compare ultrasound to the association ultrasound neurostimulation in terms of minimum effective dose of bupivacaïne in the supra clavicular block (SCB)

Materials and Methods:68 patients included in a prospective study and proposed humerus fracture are randomized in 2groups:GU (SCB under ultrasound using the technique in the plane with injection at posterior beam brachial plexus) and GUN (SCB the Echoplex needle connected to the neurostimulator is inserted under

ultrasound guidance). Bupivacaine Injection is when you have a contraction of the deltoid to an intensity of 0.5 mA. In the 2 groups, the injection of the initial volume of 35 ml of 0.25% bupivacaine. If success SCB decreases the dose of 3 mL. if not, it is increased by 3 ml. was determined by using up-and-down method of Dixon and Massey, the DM50 and DM90%% minimum doses for 50% and 90% success of SCB in the 2 groups.

Results and Discussion:

	GU	GUN	p
Age (years)	47,8±16,9	51,2±11,2	0,21
BMI(kg/m²)	23,6±1,9	22,8±2,4	0,17
Sex-ratio	2,33	1,22	0,11
SCB procedure duration (mir	n) 4,1±1,8	6,3±2,4	0,044
SCB success rate	31/34	28/34	0,31
DM50%(ml)	18,9±3,8	23,7±2,8	0,04
DM90%(ml)	22,7±4,1	27,6±3,9	0,027

**Conclusion**: The combination of the neurostimulator ultrasound does not reduce the doses of local anesthetics on the contrary it requires higher doses

References: Dingemans, Emmanuel MD et al. Neurostimulation in Ultrasound-Guided Infraclavicular Block: A Prospective Randomized Trial. Anesthesia & Analgesia 2007; Volume 104:1275-1280.

#### 03AP04-2

## Anesthesia techniques for Carpal Tunnel Syndrome Surgery in the Netherlands

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Background and Goal of Study: Carpal tunnel surgery in the Netherlands can be performed with or without an anesthesiologist attending. For procedures with a long tourniquet time, where comorbidities of the patient require more accurate monitoring, or when the patient is refusing to have the operation without some sort of sedation, the attendance of an anesthesiologist is necessary. An interest in the various approaches to provide anesthesia for this procedure, the role of the brachial plexus block (BPB), and the current standard of anesthetic practice in carpal tunnel surgery in the Netherlands triggered this study.

Materials and Methods: The study was approved by the Institutional Review Board. An electronic survey questionnaire containing 9 questions was distributed through the electronic newsletters of the Dutch Society of Anesthesiology and the Dutch Association for Regional Anesthesia. Information was requested regarding the current anesthetic practice for carpal tunnel surgery with particular attention to frequency and type of anesthesia, together with technical aspects. Data were collected using Google forms software. Participation was anonymous and voluntary and dependent on clicking on the link displayed in the newsletter.

**Results and Discussion**: Responses were received from anesthesiologists working in 38 different clinics, representative of approximately 43% of official Dutch hospital organizations.

Carpal tunnel surgery is done in the main operating complex in 60.3% of clinics. An anesthesiologist is involved in 84% of cases for providing some form of anesthesia, which is found to be a BPB in 52% of cases. The preferred approach to the BPB is the axillary approach. We found that 76% of our respondents used 25ml or less of local anesthetics. Ultrasound guidance is used alone or in combination with neurostimulator guidance in 77.6%.

**Conclusions**: In more than half of the clinics studied, carpal tunnel surgery is done in the main operating room, with the BPB being the most performed anesthesia technique. This study gives insight in the current anesthetic practice for carpal tunnel surgery nationwide and can be useful in the development of future guidelines.

## 03AP04-3

Continuous interscalene block versus single shot interscalene block with periarticular injection for shoulder arthroplasty

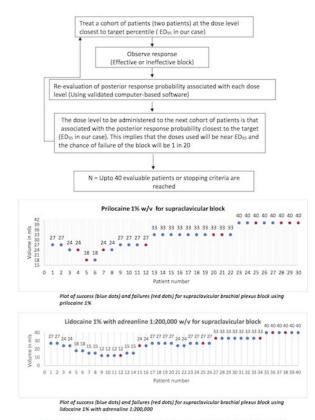
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Background and Goal of Study: Continuous Interscalene Blocks (ISB) using an indwelling catheter are safe and effective for analgesia after shoulder arthroplasty. A continuous delivery system with local anesthetic reservoir can be connected to the catheter to enable continued analgesia after the surgery. Another mode of analgesia is Periarticular Injection (PI) of an "analgesic cocktail" consisting of a combination of local anesthetic, opioid, and NSAID by the surgeon. This retrospective study examined the effectiveness of continuous ISB compared to single shot ISB with PI. Materials and Methods: We performed a retrospective review of all patients who underwent shoulder arthroplasty by a single surgeon in a single institution between January 2014 and October 2016. We divided shoulder arthroplasty patients into two groups based on postoperative analgesic modality; patients who received a continuous ISB using an indwelling catheter (N=63) and patients who received a single shot ISB followed by PI (N=53). We then conducted a retrospective chart review on each patient and identified pain scores (average and maximum) on Postoperative Day (POD) 0 and POD1, intraoperative opioids given, and opioid consumption in Oral Morphine Equivalents (OME) on POD0 and POD1. Pain scores were collected using 0-10 Numerical Rating Scale (NRS). The results of the two groups were compared using one-way analysis of variance.

Results and Discussion: Continuous ISB was associated with statistically significant decrease in opioid requirements in OME on POD0 (3.89 mg vs. 7.89 mg, P<0.01) and POD1 (7.02 mg vs. 12.84 mg, P<0.01) compared to single shot ISB and PI. There was no statistically significant difference in intraoperative fentanyl given (128 mcg vs. 146 mcg, P=0.24) or in any of the pain score measurements. When compared to single shot ISB and PI, the use of continuous ISB was associated with a significant increase in patients who were opioid-free on POD0 (56% vs. 2%) and POD1 (65% vs. 0%).

**Conclusion(s)**: Continuous ISB for shoulder arthroplasty is a superior method for postoperative analgesia compared to single shot ISB with PI as it decreases, and has the potential to eliminate, opioid requirements in the immediate postoperative period.



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Figure 1 showing schematic representation of the study design (upper panel flow chart) and the dose allocations for both groups

# 03AP04-4

The use of Continual Reassessment Method (CRM) for finding ED<sub>95</sub> of prilocaine 1% and lidocaine 1% with adrenaline (1:200,000) for ultrasound guided (USG) supraclavicular block

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Background and Goal of Study: The Continual Reassessment Method (CRM) is an adaptive Bayesian design used for dose finding studies. It can directly estimate the ED $_{\rm gs}$  dose of a drug providing precise results, generating high quality evidence.  $^1$  We aim to find the ED $_{\rm gs}$  of prilocaine 1% and lidocaine 1% with adrenaline for USG supraclavicular block using this method filling a knowledge gap in the literature.

Materials and Methods: After gaining essential approvals, a double blind randomized prospective trial was commenced including ASA I-III patients presenting for awake upper limb surgery. Patients were randomized between 'prilocaine' or 'lidocaine with adrenaline' groups using sealed envelope method. All blocks were performed using ultrasound by two experts operators (> 1000 blocks). The starting dose for both groups was 27 mls. Figure 1 shows the dose allocations and schematic representation of the study design. The success of a block was assessed using the cold and the pin prick sensations in the distribution of radial, median, ulnar and musculocutaneous nerves by an independent assessor at 10 min, 20 min & 30 min. If the ED<sub>95</sub> dose was not in the doses studied or if 40 patients were recruited the study was stopped as per statistical advice.

Results and Discussion: A total of 30 patients were recruited in the prilocaine group and 40 patients in the lidocaine with adrenaline group. For an USG supraclavicular block using our method, the ED<sub>95</sub> of prilocaine 1% is likely to be beyond the recommended maximum safe dose of 400 mgs, while for lidocaine 1% with adrenaline, the dose estimated to be closest to the ED<sub>95</sub> is 400 mgs with the attached success probability of 0.922 (95%CI:0.824-0.976). A detailed data analysis is waited for both groups at the time of submission of this abstract.

Conclusions: The ED<sub>20</sub> of prilocaine 1% and lidocaine 1% with adrenaline lay

beyond 400 mgs which was our testing dose range for these agents. However, 40 mls of lidocaine 1% with adrenaline could be successful in more than 92% of cases. **References** 

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## 03AP04-5

Topical lidocaine 2% gel for analgesia and patient comfort during interscalene brachial plexus and axillary blocks: A noninferiority randomized controlled trial

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Background and Goal of Study: The interscalene (ISBP) and axillary (AX) brachial plexus blocks are common anesthetic methods for upper limb surgery. Needle insertion and manipulation during the blocks may cause substantial discomfort that can increase anxiety, fear and dissatisfaction with anesthesia care. Topically applied local anesthetic gel could provide analgesia while eliminating the need for additional injections. The primary objective of this study was a noninferiority comparison between the analgesia achieved with topical gel to that of skin infiltration for pain upon needle insertion and injection during administration of the ISBP and AX brachial plexus blocks.

Materials and Methods: After EC approval (B371201628396), 30 patients undergoing an ISBP or AX block for surgery of the upper limb were randomized into one of three groups: no anesthesia prior to nerve block, skin infiltration with 3mL lidocaine 2% 5 min prior to nerve block, or 10g (10mL) topical lidocaine 2% gel applied to the skin surface over the interscalene space 5 min prior to nerve block. Primary outcome variables were Visual Analogue Scale (VAS) pain scores during needle insertion and injection. To help clarify the role of patient discomfort on pain ratings, fearfulness on a 5-point Likert scale (from 1 no fear to 5 very fearful) and global discomfort assessed as Verbal Rating Scale (VRS) scores (from 0 more comfortable / less painful than expected to 10 less comfortable / more painful than expected) were also evaluated.

**Results and Discussion**: Topical lidocaine 2% gel was found to be noninferior to lidocaine infiltration in improving pain during needle insertion and injection of the ISBP and AX blocks. Fearfulness increased needle insertion VAS  $(5.6 \pm 2.0, 95\% \text{ Cl} 1.5 - 9.7, \text{ adjusted p} = 0.01).$ 

Conclusion(s): Analgesia conferred by application of lidocaine gel was noninferior to that of infiltration with lidocaine 2% for pain during needle insertion and injection of the ISBP and AX blocks. Lidocaine gel does not require the extra needle insertion and injection that can add to patient discomfort and can increase the risk for intraneural or intravascular injection. Moreover, when applied topically, gel containing local anesthetic may be time-saving as the gel can also serve as an ultrasound acoustic coupling medium.

## 03AP04-6

# Brachial plexus block for urgent surgery in Hereditary Angioedema

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Background: Hereditary angioedema (HAE) is a rare genetic disease caused by a deficiency of C1 esterase inhibitor (C1-INH). Mutations in SERPING1 gene can cause low C1-INH levels (type 1) or a non-functioning C1-INH protein (type 2), ultimately leading to bradykinin accumulation and consequent vasodilatation and vascular oedema. HAE is characterized by recurrent episodes of angioedema of the skin, gastrointestinal tract, and respiratory tract. Flares can be triggered by trauma, infection, cold and emotional stress, among others. Laryngeal oedema with upper airway obstruction and shock are anaesthesiologist's main concerns.

Case Report: 54-year-old male, ASA III (type 2 HAE, rheumatoid arthritis, myocardial infarction 19 years ago) proposed for urgent reconstructive left hand surgery after a knife accident.

He was regularly medicated with danazol, etanercept, methotrexate and folic acid. No predictors of difficult airway found. 1000U of plasma-derived C1-INH concentrate were administered prophylactically two hours before surgery. Two additional doses were kept ready in the OR.

We successfully performed an ultrasound-guided axillary brachial plexus block with ropivacaine 0,75% and lidocaine 2% (total volume of 30 mL). Active warming and sedation with midazolam and fentanyl were achieved. A difficult airway trolley was kept available throughout the procedure. Surgery lasted one hour and was uneventful. The patient was then transferred to the PACU. No flares occurred, and he was discharged home one day later.

**Discussion**: HAE perioperative management challenges even the most experienced anaesthesiologist.

Preoperatively, even in urgent cases, short-term flare prophylaxis should be performed with C1-INH concentrate. Potential triggers should be avoided during the perioperative period. When HAE patients present with trauma, perioperative flare risk is theoretically higher than in patients proposed for elective surgery.

Intraoperatively, general anaesthesia and endotracheal intubation should be avoided, although difficult airway equipment should be available. Regional anaesthesia should be preferred when suitable. Sedation helps on emotional stress management. Anaesthetic drugs are safe. Adrenaline, corticosteroids and antihistamines are ineffective in angioedema episodes.

**Learning points**: Anaesthetic management in HAE patients includes identifying triggers for angioedema episodes, minimizing airway manipulation and administering prophylactic therapy with C1-INH.

# 03AP04-7

Impact and complementarity of the stellate ganglion block to the brachial plexus interscalene block for shoulder and upper limb surgery in adult patients without nerve pathologies (part 1): a clinical study

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Background and Goal of Study: In terms of algology, the increasing knowledge about how the peripheral nervous system works, in the context of a complex pain such as a postoperative pain, seems to imply more and more the two nervous peripheral components, somatic and autonomic. Evaluating the potential impact of cervical sympathetic autonomic nerve block of the stellate ganglion (SGB) on somatic regional anesthesia (by an interscalene brachial plexus blockade (ISB), which is the gold standard for pain management after shoulder and upper limb (UL) surgeries) can provide a first set of response elements and lead to patients healthcare improvement.

Materials and Methods: This is a prospective single-center randomized controlled double-blind pilot trial conducted on 40 patients without nerve pathologies, scheduled for an UL surgery. They were randomized into 2 groups: "ISB+SGB+" (SGB with lidocaine) and "ISB+SGB-" (SGB with NaCl 0.9%). Clinical datas and ultrasound (US) and fluoroscopic images were recorded. The primary outcome was the potential effect of the SBG combined to the ISB on the acute postoperative pain and the secondary outcome, the effect on prevention of chronic postoperative pain syndrome. The results were considered statistically significant if p<0.05.

Results and Discussion: No significant difference between the 2 groups was found for the VAS scores and the painkillers consumption per- and postoperatively

(p>0,05); ISB remains the gold standard for the perioperative pain management. There was also no significant difference between the 2 groups for the impact of SGB on chronic pain (evaulated by the VAS score, Saint-Antoine pain questionnaire and catastrophizing questionnaire, 3 months after surgery, p>0,05). On the other hand, the incidence of chronic postoperative pain syndrome is 6.25% in the "ISB+SGB+" group compared with 25% in "ISB+SGB-", even if this difference is not significant (p=0.315).

Conclusion: US-guided SGB, in addition to ISB, performed preoperatively on scheduled UL surgery patients, free from intercurrent nerve pathology, does not further reduce acute postoperative pain or pain in the early postoperative period, but SGB could find its advantage in terms of chronic postoperative pain prevention or of pain management for more specific patients.

#### 03AP04-8

Impact and complementarity of the stellate ganglion block to the brachial plexus interscalene block for shoulder and upper limb surgery in adult patients without nerve pathologies (part 2): a sono-anatomo-morphologic study

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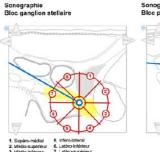
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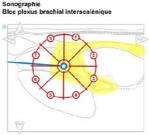
Background and Goal of Study: In terms of algology, the increasing knowledge about how the peripheral nervous system works, in the context of a complex pain such as a postoperative pain, seems to imply the two nervous peripheral components, somatic and autonomic. In this context, the upper limb (UL) and its distinct somatic and autonomic innervation represents a good physiological study's model. Studying the sono-anotomo-morphology of the neck when performing the cervical sympathetic autonomic nerve block of the stellate ganglion (SGB) combined to a somatic regional anesthesia (by an interscalene brachial plexus blockade (ISB), which is the gold standard for pain control for those surgeries) can provide a first set of response elements.

Materials and Methods: This is a prospective single-center randomized controlled double-blind pilot trial conducted on 40 patients without nerve pathologies, scheduled for an UL surgery. Patients were randomized into 2 groups: "ISB+SGB+" (SGB with lidocaine) and "ISB+SGB-" (SGB with NaCl 0.9%). An simple and original matrical system with 8 dials (Fig1) was applied on those pictures. The primary outcome was to objectify the effect of the SBG when combined to the ISB and the secondary outcome, the sono-morphology description of the neck. The results were considered statistically significant if p<0.05.

Results and Discussion: No significant difference between the 2 groups was found for hemodynamic parameters and pupillometry (p>0,05) but well for peripheral temperature (p=0,03). The fluoroscopy allowed to check US-tracking puncture level adequacy and reproducibility for the SGB (>90%). The matricial system confirmed the technics for needle or catheter insertion and the local anesthetic solution distribution and extension, and validated the injection efficacy for SGB and ISB, in a reproducible way. Analyzing the 2D US images allowed to find and confirm the presence of all anatomical structures, which will be useful to describe US transversal views of reference.

**Conclusion**: US-tracking and US-guiding for the different blockade technics is valid and reproducible and allows to control the injection efficacy.





## 03AP04-9

Programmed intermittent bolus infusion for interscalene block reduces the incidence of phrenic paralysis assessed by chest x-ray without affectig pulmonary function on the first postoperative day in patients having shoulder surgery

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Background and Goal of Study: Interscalene block (ISB) effectively provides postoperative analgesia in patients having shoulder surgery. However, phrenic paralysis associated with ISB is sometimes problematic especially in patients with reduced respiratory function. We recently found that programmed intermittent bolus (PIB) infusion decreased the incidence of phrenic paralysis on the first postoperative day(1POD) while providing good analgesia in patients having continuous ISB after shoulder surgery. The goal of this study was to determine if PIB could affect the pulmonary function caused by ISB.

Materials and Methods: After institutional approval and written informed consent were obtained, 22 patients scheduled for shoulder arthroplasty participated in this study. They were randomly assigned to have ISB using PIB (Group P) or ISB with continuous infusion (Group C) as postoperative analgesia. Before the induction of general anesthesia, ISB catheter was placed under ultrasound guidance. General anesthesia was induced with propofol, remifentanil, rocuronium and maintained with sevoflurane and remifentanil. After the emergence from general anesthesia, 15ml of 0.15% levobupivacaine was infused every 6 hours in Group P. In Group C, 0.15% levobupivacaine was continuously infused at 6ml/h. The incidence of phrenic paralysis was evaluated using ultrasound examination and chest X-ray on 1POD. Postoperative visual analog scale (VAS) score was also evaluated. Forced expiratory volume (FEV1.0) and vital capacity (VC) were also measured before surgery and 1POD and the effect of PIB on pulmonary function was evaluated.

Results and Discussion: The incidence of phrenic paralysis assessed by chest x-ray on 1POD was 71% and 14% in Group P and C, respectively (p< 0.05). VAS at 8h after surgery was 1.7±1.4 and 0.7±1.6 (mean±S.D.) in Group P and Group C, respectively (N.S.). The dose of levobupivacaine needed to produce postoperative analgesia was significantly smaller in Group P. However, PIB did not affect FEV1.0 and VC.

**Conclusion**: PIB reduces the incidence of phrenic paralysis assessed by chest x-ray on 1POD in patients having ISB for postoperative analgesia. However, the effect of PIB on pulmonary function was not significant.

#### 03AP04-10

## Respiratory effects of Interscalene Brachial Plexus Blocks

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**Background:** Interscalene brachial plexus blocks (ISB) are commonly performed for arthroscopic shoulder surgeries as it provides excellent analgesia. However, a significant number of patients, especially those with risk factors, developed dyspnea post-block. This is due to hemidiaphragmatic paresis, secondary to phrenic nerve blockade. The aim of this study is to investigate the respiratory effects of ISB.

Materials and Methods: Adult patients scheduled for elective arthroscopic shoulder surgery were recruited. We excluded patients with obesity, pre-existing respiratory impairment and contraindications to regional anaesthesia.

A baseline measurement of lung function (Forced vital capacity (FVC), Forced expiratory volume in 1 second (FEV1) and peak expiratory flow rate (PERF)) was performed with a portable spirometer. Ultrasound was used to measure diaphragmatic excursion of both hemidiaphragms in the mid-clavicular line.

ISB was performed under ultrasound guidance, depositing 15mls of 0.5% ropivacaine within the interscalene grove, targeting the C5 nerve root. After 30 minutes, lung function test and ultrasound scan of the diaphragm were repeated. **Results and Discussion:** Results presented as mean (SD). FVC decreased by

Results and Discussion: Results presented as mean (SD). FVC decreased by 23% (9.9), FEV1 decreased by 22% (11.4) and PEF decreased by 30% (26.4). Preoperatively, diaphragmatic excursion was 5cm (1.6) bilaterally. The diaphragmatic excursion on the ipsilateral side of the ISB decreased to 0.6 cm (.5) post ISB. Interestingly, the diaphragmatic excursion increased on the contralateral side, likely as a compensatory mechanism, to 5.5 cm (1.1). None of these patients experienced dyspnea.

Previous studies conducted when ISBs were performed under landmark technique, using large volumes of local anaesthetic showed a reduction of lung function by about 25-30%. The use of ultrasound and smaller volumes of local anaesthetic does not eliminate the problem of phrenic nerve blockade.

Healthy patient are able to compensate to a certain degree such that the paresis of hemidiaphragm only results in decrease of lung function by about 22-30%.

Conclusion(s): Patients who have no risk factors for developing dyspnea post-ISB are able to tolerate the decrease in lung function of 22-30% without becoming symptomatic, likely due to compensatory mechanisms. However, ISB should be performed with caution in patients with risk factors as they may not be able to compensate for the decline in lung function.

### 03AP05-1

Efficacy of bilateral dual transversus abdominis plane (TAP) block for postoperative analgesia after open abdominal aortic aneurysm (AAA) surgery: a prospective monocentric randomized double-blind controlled trial

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Background and Goal of Study: Patients scheduled for abdominal aortic aneurysm (AAA) surgery carry a high risk of cardiac, renal or respiratory comorbidities. The post-operative pain control is essential in this population. Transversus abdominis plane (TAP) block has been described as an effective technique to reduce postoperative pain and morphine consumption after gynecologic and lower abdominal surgery but not in open AAA surgery. The aim of this study was to demonstrate the postoperative analgesic efficacy of bilateral dual TAP block by reducing the amount of morphine consumption during the first 24 hours postoperative.

Materials and Methods: This randomized, double-blind, controlled, prospective trial approved by the local ethics committee enrolled 60 adult patients with AAA or Leriche syndrome scheduled for an aortic surgery through midline laparotomy. Patients were randomized to receive bilateral dual TAP block using 4 x 10 mL of 0.375% ropivacaine (= 150 mg) (TAP group = 30 patients) or not (CONTROL group = 30 patients). Anaesthetic technique (Remifentanil, Sevoflurane) and postoperative analgesia were standardized. All patients received IV morphine via a morphine patient-controlled analgesia device and IV paracetamol every 6 hours for postoperative analgesia. Postoperative assessments were conducted every hour for the first 48 hours after surgery. Postoperatively pain scores at rest and with movement, total morphine consumption and opioid related side effects were recorded. The primary outcome of the study was total morphine (mg) consumption at 24 hours postoperatively.

Results and Discussion: Both groups were comparable as to gender, age, body mass index (BMI), creatinine clearance and ASA physical status. Nine patients (64,3%) in the TAP group had a BMI > 30 kg/m2 and 5 (35,7%) in the CONTROL group. Total morphine consumption at 24 hours was 35,5 mg (+/- 24,2) in the TAP group and 33,3 mg (+/- 19,5) in the CONTROL group (P=0,71). Total morphine consumption at 48 hours was also similar in both groups (58,4 +/- 39 mg vs 60 +/- 35 mg, P=0,85). This non-significant result could be explained by the fact that the dose of ropivacaine wasn't sufficient.

Conclusion(s): In our study, bilateral dual TAP block performed in open AAA surgery doesn't show a reduction of morphine consumption during the first 24 hours postoperative. A study with different doses of ropivacaine in this type of surgery could be interesting and refine this work.

# 03AP05-2

# PECS II block as primary anaesthesia for breast conservative surgery

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**Background**: Pectoral blocks have been popularly used for peri-operative analgesia in breast surgery. We used PECS II block with sedation as a sole anaesthetic for an elderly, high risk anaesthesia patient with retrosternal goitre.

Case Report: A 79 year-old-lady was diagnosed with ductal carcinoma-in-situ of her left breast with ultrasound and mammography guided core biopsy and was planned for wide local excision of tumor. Patient history revealed a retrosternal goitre for which she had received radioiodine therapy and had shrunk to a palpable thyroid 4cm \* 6cm. Chest X-ray revealed clear deviation of trachea to the left and possible narrowing. A previous CT scan had revealed significant deviation of trachea indenting on the carina. Following risk assessment and detailed discussions with a multidisciplinary team, it was agreed that the operation would be performed under a regional block with sedation. The patient was informed about the decision and consented to procedures.

The patient was premedicated, then standard anaesthetic monitoring followed with iv access. Under asepsis, PECS II block was administered with 1% lignocaine to skin and then used 0.25% levo-bupivacaine, first 10ml between pectoralis major and minor followed by 20ml between pectoralis minor and serratus anterior.

Intra-operatively, patient received additional titrated doses of midazolam and fentanyl. The lesion was excised and histologically confirmed the diagnosis. Patient's cardiorespiratory parameters remained stable and was comfortable. During the post-operative period, the patient's condition remained unchanged without an increased demand for analogsia. Patient feedback was very good.

**Discussion**: PECS II block can provide good peri-operative analgesia as a part of multimodal strategy¹. Besides breast surgery, PECS II block has proved to be very helpful low risk intervention in many different procedures like clavicle operations, minimally invasive cardiac surgeries and cardiac synchronization therapy device implantation.

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(Reg Anesth Pain Med 2015:40: 68-74)

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**Learning points:** We demonstrated that PECS II block can be used as primary anaesthesia in a patient in whom general anaesthesia is of high risk with minimal risk of complications<sup>2</sup>.

### 03AP05-4

# ESP: new regional technique, new uses

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Background and Goal of Study: The erector spinae plane (ESP) block is an emergent regional anesthetic technique. This novel approach was initially proposed for thoracic surgeries, however, changing the puncture site, it can be used in abdominal surgeries too. We present our experience with this block, a total of 8 cases in thoracic surgeries and 2 in abdominal surgery with good results.

Materials and Methods: ESP block was performed in 8 thoracic surgeries (video assisted thoracotomy and pectus excavatum repair) and 2 abdominal surgeries (laparotomic cholecystectomy). It is performed using a single puncture technique, echoguided and, in all cases, a mixture of 1% mepivacaine with ropivacaine 0.5%, a total of 30 ml per side is administered.

Results and Discussion: In 9 of these 10 cases, the result was satisfactory, with a score on the Visual Analgesic Scale (VAS) <3. In 1 case, the patient presented a VAS score of 5, being the only case in which it was necessary to administer morphine to control pain. The ESP block is a novel technique focused, initially, on interventions located in the thoracic region. The aim is to locate the lateral process of T4 and deposit the anesthetic in the depth of the spinal erector muscle. This muscle extends to the lumbar region, so it is increasingly common to find in the literature cases in which this block is performed with a thoracic puncture site, which is effective in abdominal wall surgeries.

**Conclusion**: ESP block is an interesting option in cases in which epidural anesthesia is contraindicated. It is even possible to insert a catheter and connect it to an anesthetic infusion pump controlled by the patient

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#### 03AP05-5

# Quadratus Lumborum block type II as analgesic strategy in hip surgery

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**Background**: The Quadratus Lumborum (QL) block was initially described by Blanco. Currently, this block is performed as a perioperative pain management procedure in abdominal surgery but the publications involving QL block are few and the most part are case reports or small trials involving abdominal surgery. Recently, Parras and Blanco reported its use as an alternative to femoral nerve block for postoperative analgesia after hip surgery. We performed the QL block type II as an analgesic strategy for a femoral intramedullary nail placement.

Case Report: We describe a case of a 90 year-old woman, 62kg, ASA 2, with hypertension, scheduled for femoral intramedullary nail placement due to a transtrocanteric fracture. We performed a QL block type II with 30 ml 0.2% Ropivacaine as part of multimodal analgesic strategy, prior to spinal anesthesia with 0,5% ropivacaine 9mg plus sufentanyl 2 µg. Intra-operative analgesia consisted of acetaminophen 1g and dexamethasone 4mg was administered. The procedure took 45 minutes to complete and was uneventful. After resolution of the spinal block, the patient reported moderate incisional pain over the distal part of surgical incision and no pain and sensitive block was reported on dermatomes T6 to L3.

**Discussion**: For the following 24 hours after the block, the patient had no pain at rest or with movement with acetaminophen 1g and ketorolac 15mg every 8 hours. There was no need for rescue analgesia. The patient was satisfied with the pain management strategy.

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Learning points: We report a case of excellent analgesia after a single-shot type II
QL block in a patient undergoing femoral intramedullary nail placement. This

case shows that the QLB II could be an appropriate alternative to femoral block as analgesic strategy for fracture surgery of the femur neck. Although this nerve block seems to be effective and easy to perform, future prospective studies are needed to clarify the role of QL block in surgical procedures involving the hip.

### 03AP05-6

# Continuous Thoracolumbar Fascia Block, a new promising block for analgesia in major spinal surgery

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Background and Goal of Study: Spinal surgical procedures, including posterior lumbar interbody fusion and oncological spinal surgery, are associated with severe postoperative pain in the first few days. To enhance early functional outcome and ambulation, adequate pain management is paramount. Nowadays, multimodal pharmacological low opioid approach for postoperative analgesia is common practice. However, the use of loco regional anaesthesia techniques still seems controversial as hard evidence is lacking. In our hospital wound infiltration with local anaesthetics and multimodal analgesic low opioid approach for these procedures are routine. Our hypothesis was that continuous administration of local anaesthetics simply administered under the posterior thoracolumbar fascia (TLF block) might result in improved analgesia, reduction of opioid use and earlier mobilization.

Materials and Methods: After ethics approval we retrospectively analysed three patients who underwent major spinal surgery in whom post procedure wound infiltration catheters parallel to the wound, just below the thoracolumbar fascia were placed using a blind, loss of resistance technique. Primary outcome measures were ASA classification, VAS scores, PONV-scores, opioid use and time to full mobilisation.

Results and Discussion: Three patients could be identified (M/F=2/1, ASA II/ III=2/1, age 72.3 y (range 69-74). The VAS scores are shown in table 1. Opioid consumption is shown in table 2. No patients showed PONV. Full mobilization was achieved at day 1 in two patients and at day 3 in one patient. There were no 30-days readmissions or re-operations reported.

Conclusion(s): The use of a continuous thoracolumbar fascia (TLF) block led to low pain scores, reduced time to mobilization and low opioid use in the first four days after the procedure. Continuous TLF block may be a promising new technique for enhanced recovery after major spinal surgery.

### 03AP05-7

# Anaesthesia for breast surgery, clinical practice in our hospital

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Background and Goal of Study: Breast surgery has undergone changes in recent years, encouraging new initiatives for the anaesthetic management. Emerge of the ultrasound as a common tool in regional anaesthesia (RA) has allowed the description and the improvement of the techniques used in there surgeries.

The aim of the study is to consider including RA in breast surgery in our clinical practice.

Materials and Methods: In this observational retrospective study we collected data from patients under breast surgery suspicious of malignancy from March to October 2017 in our hospital. Benignant pathology was excluded.

Each anaesthesiologist decided which technique was performing in every case.

We analysed sex. age.type of surgery.type of anaesthesia.regional

We analysed sex, age,type of surgery,type of anaesthesia,regional technique used (epidural, Pectoral blockade (PEC) 1 and 2, interfascial blockade(BRILMA)),administered drugs, PONV prophylaxis, immediate postoperative PONV, immediate postoperative pain, pain in two month and length of hospital stay.

Results and Discussion: Study included 77 patients, 3 of them were excluded because of missing data (Figure 1).

From 53 patients submitted to General anaesthesia (GA), 30 had immediate postoperative pain (56%), however 4 patients from 21 submitted to combined anaesthesia (GA+RA) had immediate pain (19%).

Analysing pain in two months, patients in the RA group was 4'7%. On the other hand, GA group was the 20%.

There were no differences in PONV. In all cases we followed Apfel scale to apply

PONV prophylaxis.

The length of hospital stay was independent from the type of anaesthesia applied.

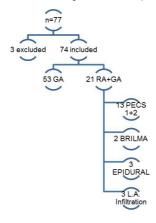
We had no case of systemic toxicity of local anesthetic (LA), neither pneumothorax. In all cases the regional blockade was performed with ultrasound. One inconvenient of our study is that there was no standardized anaesthesia for

this kind of surgeries.

Conclusion: Although more cases are needed to have strong recommendations,

our information suggests that chest wall blocks are a great option in these patients,

safe, effective and not difficult to realize in our clinical practice. We are on the way to protocolize anaesthesia for these surgeries in our hospital based in our study.



# 03AP05-8

# Quadratus lumborum block for perioperative analgesia in patients treated with abdominoplasty. A randomised controlled trial

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Background and Goal of Study: Postbariatric abdominoplasty involves removing large amounts of excess skin and subcutaneous tissue. The quadratus lumborum (QL)-block provides regional analgesia of the abdominal wall. The goal of study was to investigate the effect of a QL-block as part of a multimodal analgesia regimen in postbariatric patients treated with standard full abdominoplasty.

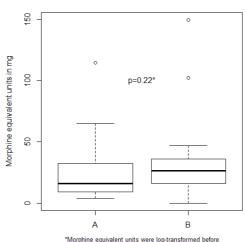
Materials and Methods: Randomised, placebo-controlled, triple blind study (n=50). All patients received perioperative paracetamol and peroperative local infiltration anesthesia. QL-block was administered bilaterally before induction of general anesthesia with 40 ml of either ropivacaine 0.375% (n=25) or saline 0.9% (n=25). Patients received patient controlled iv analgesia (1 mg morphine intravenously with a 5 minute lockout-time). Opioid use the first 24 postoperative hours were converted to morphine equivalent units (MEQ) using a standard table. Pain was reported on the numerical rating scale (NRS) at the postoperative ward, and at 12, 24 and 48 hours postoperatively and converted to area under the curve (AUC) using the linear trapezoid rule. Sample size was estimated to 23 patients in each group.

Results and Discussion: 4 patients were excluded due to reoperation (n=2), and deviation from study protocol (n=2). Patient characteristics were similar between groups. For the primary endpoint, MEQ were similar between groups during the first 24 hours with mean 26 (25) vs 33 (33) mg (Fig 1)(p=.22, administered treatment in group A and B sensored due to triple blinding). NRS AUC was also similar between groups (p=.68 and .55 during rest and coughing, respectively). Technical challenges in administering the block was reported in 13 of 46 patients and the lack of an opioid-sparing effect suggest the block should be reserved for individual cases in this population.

Conclusion: The QL-block did not reduce opioid use or pain after standard full abdominoplasty in postbariatric patients.

**Acknowledgements** Dr Frøyen, Dr Lysebråten, Elisabet Anderson, all colleagues at our dept, nurses at the postoperative and gynecological wards, and the nurse Pain-team for invaluable contributions.

### Accumulated dose first 24 postoperative hours



one-sided Student's T-test performed

#### 03AP05-9

Comparison of ultrasound guided transversus abdominis plane block and quadratus lumborum block for postoperative pain in cesarean section: A prospective, randomized-controlled study

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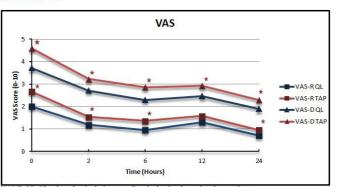
Background and Goal of Study: Effective analgesia after cesarean section is important for faster recovery and preventing complications. The aim of this study is to compare the postoperative analgesic efficacy of Transversus Abdominis Plane (TAP) block and Quadratus Lumborum (QL) block administered by Ultrasound (US) guidance under the general anesthesia for cesarean section.

Materials and Methods: After ethics committee approval, 99 pregnant women aged 18–49 years who refused or contraindicated to regional anesthesia were included in study. In this prospective, randomized, and double blinded study, patients that scheduled for elective cesarean, were randomly allocated in two groups (Group TAP n=49, Group QL n=50). Standard monitorization and general anesthesia was performed. After surgery was completed, TAP or lateral QL block (QL1 block) was applied bilaterally with US guidance. 0.3 ml/kg 0.25% bupivacaine was injected for each side. Patient-controlled analgesia (PCA) pump was used for all patients (25 mg tramadol bolus, 20 minutes of lock out time). Visual Analogue Scale (VAS) scores at rest, and movement, the total amount of tramadol consumption at the end of 24 hours, and rescue analgesic doses were recorded.

Results and Discussion: Demographics, intraoperative hemodynamic changes, duration of surgery and intraoperative fentanyl consumption were similar in both groups. Duration of anesthesia and the first analgesic administration interval were statistically longer in the Group QL (p<0.05). VAS scores at rest and movement were found in Figure 1. Total tramadol consumption was 227±97 mg in Group TAP and 166±101 mg in Group QL (p<0.05). However, no significant difference was found statistically regarding to demand of rescue analgesics (p>0.05).

Conclusion: In our study, we observed that QL1 block as part of multimodal analgesia, provides better analgesia than TAP block. Also QL1 block reduces the amount of opioid used and the first analgesic administration interval after cesarean section. We believe that QL block is a good alternative for pain relief after cesarean section

Figure 1: <u>Visual analog scale</u> (VAS) at rest <u>and with movement</u> (<u>Dinamic</u>) in <u>each group</u> in the first 24 postoperative hours.



VAS-R QL: Visual Analog Scale Scores at Rest in the Quadratus Lumborum Group
VAS-R TAP: Visual Analog Scale Scores at Rest in the Transversus Abdominis Plane Group
VAS-D QL: Visual Analog Scale Scores with Movement in the Quadratus Lumborum Group
VAS-D TAP: Visual Analog Scale Scores with Movement in the Transversus Abdominis Plane Group
\*p<0.05|

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#### 03AP05-10

The transversalis fascia plane block and the ilioinquinal/ iliohypogastric nerve block whereby ropivacaine is placed at the transverse abdominis muscle in addition to the correct plane are superior to the classical ilioinguinal/ iliohypogastric nerve block

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Background and Goal of Study: Ultrasound-guided ilioinguinal/iliohypogastric nerve block (IIB) is widely used in pediatric inguinal herniorraphy. An advocated technique is cross-plane, which has some difficulty. In clinical practice, local anesthetic (LA) is often injected into incorrect plane (not injected between the internal oblique muscle (IO) and transverse abdominis muscle (TA) but into the two muscles themselves). Therefore, we investigated the influence of where LA was placed. Our hypothesis was the injection at IO is effective because the nerves pass through it near the block injection site. Recently, a successful effect of the transversalis fascia plane block (TFPB) for inguinal hernia repair is reported and we have introduced it, hence, we report the comparison with IIB.

Materials and Methods: We studied 86 children who underwent the Pott's procedure from October 2016 to December 2017. We extracted heart rate (HR) and respiratory rate (RR) before skin incision (SI) and the maximum value (MX) during operation from the electronic anesthesia records. Anesthetic method was standardized; General anesthesia was maintained with 70% of nitrous oxide and 2% sevoflurane in oxygen. Airway was secured by the proseal LMA and spontaneous ventilation with pressure support 10cm H<sub>2</sub>O was applied. Ultrasound -guided IIB and TFPB were performed using a linear probe. The goal of IIB was 0.1 ml/kg of 0.2% ropivacaine injection between IO and TA. We made three groups by the placement of LA. IO group: more than 0.05 ml/kg of LA was injected in IO. TA group: more than 0.05 ml/kg of LA was injected in TA. Correct group: most of LA was injected between IO and TA. TFPB group received 0.4 ml/kg of LA.

Results and Discussion: The HR before SI and the MX in each group were the following: the correct group; 104±15 and 134±15, the IO group; 107±14 and 140±14, the TA group; 103±16 and 120±19, TFPB group; 99±14 and 120±16. The MXs in the TA and TFPB group were significantly lower. The RR before SI and the MX in each group were the following: the correct group; 31±7 and 49±11, the IO group; 30±3 and 46±10, the TA group; 30±6 and 41±10, the TFPB group; 33±7 and 44±10. The MX in the TA group was significantly lower compared to the correct and the IO groups.

Conclusion(s): The IIB whereby LA was placed at TA in addition to the correct plane attenuated intraoperative HR and RR increases. The TFPB may be an alternative to the IIB, but we need more data and experience.

## 03AP05-11

## Ultrasound guided erector spinae plane (ESP) block in thoracic trauma

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Background: In elective cases continuous neuraxial blocks are a cornerstone of multimodal analgesia. In an emergency setting, the issues of consent coagulopathies and sepsis often preclude the use of such procedures. Uncontrolled pain will increase sedation requirements on ICU, the likelihood of respiratory complications and long term morbidity as well as chronic pain. These issues become especially apparent in thoracic trauma and emergency thoracotomy which carry an increased of respiratory failure and persistent pain. The novel ESP offers a

Case Report: We report the case of a 40-year-old male who fell 16ft from a ladder doing yard work. He presented with a haematopneumothorax and serial dislocated rib fracture (5-9) on the left side With concurrent atelectasis an emergency VATS was scheduled. His past medical history consists of asthma and heavy smoking Out of concern for postoperative respiratory compromise, the patient agreed to the implementation of an ESP block + catheter for postoperative analgesia. After induction of anaesthesia and maintenance with propofol and remifentanil, the patient underwent uncomplicated surgery. Postoperatively, respiratory mechanics and pain scores allowed further treatment on the normal ward. Mobilisation could be achieved early and only non-opiod analgesics were needed in addition to intermittent 15ml boluses of ropivacain 0,2% via the ESP catheter which was removed on day 3.

Discussion: The erector spinae block was first described by Forero et al in 2016 (1)A modification of the technique is described as the mid-point transverse process to pleura (MTP) block by Costache et al(2). Both techniques aim to access the paravertebral space through a more superficial injection site compared with traditional paravertebral appraoches. The goal is to minimize complications like vascular puncture and perforation of the pleura. Due to the continuous nature of the ESP, block performance is possible on different levels as suggested by case reports.

#### References

1. Forero M. The Erector Spinae Plane Block: A Novel Analgesic Technique in

Thoracic Neuropathic Pain, Reg Anesth Pain Med, 2016

2.Costache I,de Neumann L, Ramnanan CJ et al. The mid-point transverse process to pleura (MTP) block: a new end-point for thoracic paravertebral block. Anaesthesia, 2017

Learning points: The ESP block is safe and simple to perform in emergency settings. It helps avoid complications central techniques. Systematic studies to compare are needed

#### 03AP06-1

# Tramadol as an adjuvant to local anesthetics for brachial plexus block: A meta-analysis of randomized trials

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Background and Goal of Study: Tramadol has a unique action in that it has a central opioidergic, noradrenergic, serotonergic analgesic, and peripheral local anesthetic (LA) effect. Many studies have reported contradictory findings regarding the peripheral analogsic effect of tramadol as an adjuvant to LA in brachial plexus block (BPB). This meta-analysis was to evaluate the effects of tramadol as an adjunct to LA in BPB on the sensory block, motor block, analgesia, and adverse ffects during shoulder or upper extremity surgery.

Materials and Methods: We searched the PubMed, EMBASE, Cochrane, KoreaMed databases, and Google Scholar for eligible randomized controlled trials (RCTs) that compared BPB with LA alone and BPB with LA and tramadol. Primary outcomes were the effects of tramadol as an adjuvant on duration of sensory block. motor block, and analgesia. Secondary outcomes were the effects of tramadol as an adjuvant on time to onset of sensory block and motor block and on adverse effects. We performed the meta-analysis using Review Manager 5.3 software.

Results and Discussion: We identified 16 RCTs with 751 patients. BPB with tramadol prolonged the duration of sensory block (mean difference [MD], -61.5 min; 95% CI. -95.5 to -27.6; P = 0.0004), motor block (MD. -65.6 min: 95% CI. -101.5 to -29.7; P = 0.0003), and analoesia (MD, -125.5 min; 95% Cl, -175.8 to -75.3; P < 0.0001) compared with BPB without tramadol. Tramadol also shortened the time to onset of sensory block (MD, 2.1 min; 95% CI, 1.1 to 3.1; P < 0.0001) and motor block (MD, 1.2 min; 95% CI, 0.2 to 2.1; P = 0.010). In subgroup analysis, the duration of sensory block (MD, -35.8 min; P = 0.48 / MD, -65.6 min; P = 0.0006), motor block (MD, -72.0 min; P = 0.27 / MD, -61.0 min; P = 0.0002), and analgesia (MD, -91.0 min; P = 0.41 / MD, -120.7 min; P < 0.000001) was prolonged for BPB with tramadol 100 mg, but not for BPB with tramadol 50 mg. The quality of evidence was high for duration of analgesia according to the GRADE system. Adverse effects such as nausea, vomiting, pruritus, and sedation were comparable between the

Conclusion(s): In upper extremity surgery performed under BPB, use of tramadol 100 mg as an adjuvant to LA appears to prolong the duration of sensory block, motor block, and analgesia, and shorten the time to onset of sensory and motor blocks without altering adverse effects.

#### 03AP06-2

# Dexmedetomidine as an additive to local anaesthesia to decrease intraocular pressure in glaucoma surgery

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Background and Goal of Study: Dexmedetomidine, as an alpha 2 agonist, has a well-established role in decreasing intraocular pressure (IOP). This effect has been shown at a histological level and clinical level. This study states the hypothesis that Dexmedetomidine locally as an additive to local anaesthesia in different doses not only will increase the duration of the block or achieve some level of sedation, but also can reduce the IOP in this diseased eye to a level that will help the surgical conditions and improve the surgical outcome

Materials and Methods: This is a prospective triple blinded randomized control trial with three parallel groups.one control group C and two study groups D25 and D50 received paribulbar block with Dexmedetomidine 25 microgram and Dexmedetomidine 50 microgram respectively

All patients in all groups were monitored for the following:1-IOP before and after the block.2- Onset of the block.3-sedation level .4-duration of the block.5- Patients

Results and Discussion: Dexmedetomidine showed no differences regarding intra-ocular pressure after injection locally (29.71±1.69 for D50,30.25±2.36for D25 and 29.4±3.756for control group with p-value0.65) or even at the end of the surgery (D50:10.86±1.478, D25:10.75±1.63, and 10.6±1.589 the control group with p-value 0.5). On the other hand, Dexmedetomidine with dose 50 micrograms and 25 micrograms showed a statistically significant rapid onset of the block (3.57±0.917 and 4.201±1.23 minutes respectively) with p-value 0.00 in comparison with the control group (6±2.034 minutes). moreover, both test groups showed a prolonged block duration (252.36±36.82 minutes in D50, 223.36±25.63minutes in D25 and 160±20.36 minutes in the control group with a p-value less than 0.05)

Conclusion: Dexmedetomidine has no statistical effect on the intra-ocular pressure in the glaucomatous eye but shorten the onset and prolong the duration of the

#### 03AP06-3

### The effectiveness of Dexamethasone in local anaesthetic mixture for Pain Relief following shoulder arthroplasty

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Background and Goal of Study: Upper limb surgeries especially shoulder surgeries are generally very painful. Brachial plexus block is performed both for anaesthesia and analgesia. Several adjuvants with local anaesthetics have been used to increase the duration of analgesia for postoperative pain including clonidine, fentanyl, morphine, epinephrine and dexamethasone (1). Use of Dexamethasone perineurally started 12 years ago and various studies have shown to increase duration of analgesia (2,3) It has been used in varied doses and in different local anaesthetic concentration mixtures.

Materials and Methods: At the Royal Derby Hospital we conducted an audit of using Dexamethasone in local anaesthetic mixture for shoulder arthroplasty. From Feburary to September 2017. 56 patients for shoulder replacements received interscalene approach for brachial plexus block using 20 mls of 0.5% bupivacaine along with 6.6 or 3.3 mg of Dexamethasone. Patients were followed up after 24 hrs postoperatively and primary and secondary outcomes were recorded. The primary outcome was postoperative analgesia duration, secondary outcome was opioid consumption in 24 hours, and the record of sensory and motor function. Patient satisfaction and any complication were also recorded. Standard of post operative analgesia duration was 9-12 hrs without dexamethasone which was recorded in our previous auditn 2011. The first part of questionnaire was filled by the anaesthetist doing the block and the second part was filled by the inurse or doctor in ward.

Results and Discussion: Out of 56 patients, 51 patients were included. In majority of patients (70.7%), the duration of analgesia was 18- 24 hours with average duration 22.9 .24 hours opioid consumption was lesser in 6.6mg group as compare to 3.3.33.3% patients in 3.3mg and 65.5% in 6.6mg had numbness in whole arm at 24 hours.17.6% patients in 3.3 mg and 41.1% Patients in 6.6 mg and were unable to move shoulder until they first experience first pain. Patient Satisfaction rate was

Conclusion: Dexamethasone in nerve blocks along with Bupivacaine and offers another modality to help prolong the pain relief which may help avoid the necessity of plexus catheters.

#### 03AP06-6

# Pharmacokinetics of bupivacaïne in combination with clonidine versus dexmedetomidine in spinal anesthesia.

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Background and Goal of Study: Comparison of the plasma pharmacokinetics of bupiyacaine in combination with clonidine versus dexmedetomidine in a spinal

Materials and Methods: Randomized, double-blind prospective study including 40 patients ASA I or II, admitted for surgery for fracture of the femoral neck under spinal anesthesia. divided into 2 groups: GC (injection of 10 mg of bupivacaine hyperbare0,5% + 15 µg clonidine) and GD (10 mg hyperbaric bupivacaine + 3µg dexmedetomidine) neither the patient nor the pharmacologist know the nature of the adjuvant. Another anesthesiologist who assured only transport of samples, evaluates the time and duration of sensory block (prick-touch test at T12) and motor (modified Bromage score> 2) Venous blood samples of 3 ml were obtained before bupivacaine injection and immediately after spinal injection and at 5, 10, 30, 45, 60, 120 and 240 min after the final injection. The plasma separated by centrifugation of blood samples and stored at -20°C until use. Bupivacaine quantification in samples was carried out using HPLC method with ultraviolet absorbance detection (λ =207 nm). Statistic study with SPSS22.

### Results and Discussion

delay sensitif block (min)	7,8±2,6	5,7±1,9	0.044
delay motor block (min)	10,8±3,4	10,2±3,1	0,21
duration of act (min)	54,6±16,2	50,8±19,1	0,54
duration of motor bloc(min	92,2±31,6	101,1±29,4	0,07
duration of sensitif bloc (min	151,4±39,2	176,6±44,6	0,031

Systemic clairance Cl(ml/min	930±282	818±131	0,024
Volume of distribution VD (I)	102±24,8	118±41,8	0,067
Plasmatic half-life T½(min)	88,7±34,9	104,6±49,6	0,029
Maximal plasma bupivacaïne concentration Cmax (µg/ml)	0,668±0,234	0,412±0,186	0,034
Time to reach the peak plasma concentration Tmax(min)	38,66±16,44	51,29±18,87	0,041

Conclusion: Dexmedetomidine decreases the systemic absorption of bupiyacaine compared to clonidine during spinal anesthesia, which could explain the extension of sensory block.

#### 03AP06-7

# Comparison of the efficacity and safety of dexmedetomidine versus clonidine in combation with bupivacaïne during spinal anesthesia for hip surgery

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Background and Goal of Study: comparing dexmedetomidine versus clonidine associted to bupivacaine in spinal anesthesia

Materials and Methods: Double-blind prospective study including 60 patients ASA I or II, admitted for surgery of the femoral neck under spinal anesthesia. the anesthesiologist practice a slow injection, randomly, 10 mg hyperbaric bupivacaine associated with 15 mcg of clonidine (GC) or 3µg of dexmedetomidine (GD). neither the anesthesiologist nor the patient know the nature of the adjuvant. the same anesthetist notes the onset time of sensory block (prick-touch tst is negative in fracture site), the motor block (modified Bromage > 2), the occurrence of hypotension or bradycardia and use of analgesics during the 24 first hours (1g paracetamol if VAS> 3)

#### Results and Discussion

	GC	GD	p
age(years)	69,2±18,6	71,8±15,9	0,34
BMI(kg/m2	21,6±2,3	22,1±1,8	0.42
sex-ratio	1,5	2,33	0,14
delay sensitif block(min)	7,6±2,4	5,2±1,3	0,041
delmay motor bloc (min)	11,4±3,8	10,2±2,9	0,09
duration of motor block(min)	124,6±28,9	138±31,8	0,087
duration of sensitif block(min)	148,7±34,8	182,8±41,	0,027
hypotension	16%	10%	0,54
bradycardia	6%	3%	0,66
ephedrine(mg)	2,1±0,8	1,7±0,6	0,44
atropine(µg)	0	0	1
paracetamol(g)	1,2±0,4	0,7±0,4	0,039

Conclusion: Dexmedetomidine in combination with bupivacaine is more effective than clonidine on the sensitive part of the spinal anesthesia

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#### 03AP06-10

# Bupivacaine induces apoptosis via blocking T-type Ca2+ channels and resulting activation of mitochondrial apoptotic pathway in SH-SY5Y cells

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Background and Goal of Study: Local anesthetics have been shown to be neurotoxic even at normal clinical dose. Recently, we reported that bupivacaine induced neuronal apoptosis via blocking T-type Ca2+ channels, but the detailed mechanisms are still not clear. Since mitochondria play key roles in activating apoptosis in mammalian cells, we investigated the role of mitochondria in apoptosis induced by bupivacaine via blocking T-type Ca2+ channels.

Materials and Methods: Human neuroblastoma SH-SY5Y cells were treated with bupivacaine, NNC55-0396 (T-type Ca2+ channel inhibitor), EGTA (a divalent cation chelater) and CaCl2, then activation of caspase-3 was determined. In order to further illustrate whether mitochondria contribute to apoptosis, alteration of mitochondrial membrane potential (MMP) and production of intracellular reactive oxygen species (ROS) in bupivacaine-treated cells were also analyzed by flow cytometry.

Results and Discussion: Bupivacaine activated caspase-3 in a time-dependent manner. EGTA further enhanced bupivacaine-induced caspase-3 activation at 16 h after treatment. CaCl2, however, significantly decreased bupivacaine-induced caspase-3 activation. NNC55-0396 not only activated caspase-3 in a timedependent manner but also significantly enhanced bupivacaine-induced activation of caspase-3. At 24 h after treatment, bupivacaine significantly reduced MMP. Bupivacaine-induced reduction in MMP was greatly increased by NNC55-0396 and EGTA, but significantly inhibited by CaCl2. Both bupivacaine and NNC55-0396 significantly increased level of intracellular ROS. Furthermore, a combination of bupivacaine and NNC55-0396 greatly increased ROS production. Compared to EGTA, which enhanced the bupivacaine-induced ROS production at 16 h after treatment, CaCl2 significantly inhibited such change. In SH-SY5Y cells, bupivacaine reduced MMP and increased intracellular ROS production, resulting in activation of caspase-3. Both NNC55-0396 and EGTA greatly enhanced bupivacaine-induced MMP depolarization, intracellular ROS accumulation and caspase-3 activation. However, CaCl2 significantly suppressed these changes induced by bupivacaine. Conclusion: Mitochondrial dysfunction is critically involved in bupivacaine-induced apoptosis. Bupivacaine may induce cell death via blocking the T-type Ca2+ channel and resulting activation of mitochondrial apoptotic pathway.

# 03AP07-3

# Ultrasound imaging of axillary brachial plexus block confirms existence of fascial septa producing separate nerves compartments

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Background and goal of the study: Diffusion of local anesthetic (LA) into the axillary brachial plexus sheat may be affected by fascial septa producing compartment around each nerve and preventing free LA spread1. Existence of axillary septa and compartments has not been confirmed in a cadavers study2 Ultrasound Imaging (USI) is specially useful to visualise the anatomy of tissues interfaces and fascial layers. We tested the ability of ultrasound imaging to visualise and confirm the existence axillary septa and compartments during axillary brachial plexus blockade (ABPB)

Material and methods: We retrospectively reviewed the USI (GE linear probe Logiq e US machine) of 60 US guided axillary blocks performed in patients aged 23-76, between february and november 2017. All the blocks were performed with menivacaine 1.5% 30 ml.

Results and discussion: In 54/60 case we were able to clearly visualize hyperechoic septal structures dividing the axillary sheath in compartments, each one containing nerve and local anesthetic, in some period of the block or at the end of the injection. Axillary septa and nerve compartment USI is demonstrated in Figure 1. The compartments are most of the times potential spaces becoming actual (and visibles) only after needle tip has pierced a septum and local anesthetic injection has filled and distended the comparment. in 50/54 the LA anestetic filling a single nerve compartement remains localized in that compartment, unable to reach

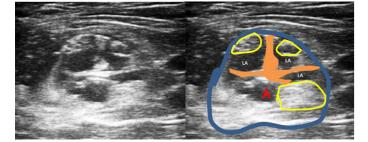


Fig 1. Observe a distended round axillary sheat sepimented and divided by multiple septa in compartments, each one containing nerve and local anesthetic. Red A=axillary artery: vellow circles=nerves: brown draw=septa: white LA=local

Conclusion: USI provides good evidence of existence of septa and nerve compartments in axillary brachial plexus sheath. Most of the times the LA injection in one nerve compartment do not spread to others nerve compartments. USI of compartments and septa increases functional anatomy awareness.

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#### 03AP07-4

### Ultrasound-guided Selective Versus Conventional block of the Medial Brachial Cutaneous and the Intercostobrachial Nerves

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Background and Goal of Study: For superficial surgery of antero- and

posteromedial surfaces of the upper arm, the Medial Brachial Cutaneous Nerve (MBCN) and the Intercostobrachial Nerve (ICBN) must be selectively blocked. in addition to an axillary brachial plexus block (ABPB). We compared efficacy of ultrasound guided (USG) versus conventional block of the MBCN and the ICBN. Materials and Methods: Eighty-four patients, undergoing upper limb surgery, were randomized to receive either USG (n=42) or conventional (n=42) block of the MBCN and the ICBN with 1% mepivacaine. Sensory block was evaluated using light touch on the upper and lower half of the antero- and posteromedial surfaces of the upper arm 5 10 15 20 min after nerve blocks. The primary outcome was the percentage of patients who had no sensation in all these 4 regions innervated by the MBCN and the ICBN at 20 min. Secondary outcomes were onset time of complete anesthesia, volume of local anesthetic, tourniquet tolerance, quality of ultrasound images.

Results and Discussion: Surgical procedures were carried out under regional anesthesia alone in all patients. In the USG Group, 37 patients (88%) had no sensation at 20 min in any of the four areas tested versus 8 patients (19%) in the Conventional Group (p<0.001). When complete anesthesia was obtained, it occurred within 10 min in more than 90% of patients, in both groups. Mean total volumes of local anesthetic used for blocking the MBCN and the ICBN were similar in the two groups. Ultrasound images were of good quality only in 20 of 42 patients (47.6%). Forty-one patients (97.6%) who received USG block were comfortable with the tourniquet versus 16 patients (38.1%) in the Conventional Group (p<0.001). Conclusion: Ultrasound guidance improved the efficacy of the MBCN and ICBN blocks

### 03AP07-5

# The sonoanatomical relation of trunk level of brachial plexus at supraclavicular fossa

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Background and Goal of Study: Supraclavicular brachial plexus block is usually done trunk level of brachial plexus. Understanding of the relation of trunks is important for patient to receive good postoperative pain control. However, there is no article investigated the anatomical relation of trunks. The aim of this study was to investigate the relation of trunks at supraclavicular fossa by ultrasonography.

Materials and Methods: One hundred patients scheduled for elective orthopedic surgery were participated in this study. Patients were placed in the supine position, with the head facing away from the side to be observed. The brachial plexus was observed from the level of C5 vertebra to the supraclavicular fossa by ultrasonography

Distributions of trunks were defined as follow.

Superior trunk derives from the C5 and C6 roots.

Middle trunk derives from the C7 root. Inferior trunk derives from the C8 and T1 roots

Location of trunks at supraclavicular fossa were defined as follow.

Group A: Superior, middle and inferior trunks are located from anterior to posterior (Fig. 1)

Group B: Superior and middle trunks are located side by side at anterior area and inferior trunk is located at inferior area (Fig. 2)

Results and Discussion: The relation of trunks is summarized in table 1. The frequencies of Group A and Group B are 76.5% and 23.5%.

If the catheter tip of supraclavicular brachial plexus block was inserted below sternocleidomastoid muscle and above brachial plexus for shoulder surgery, it is

effective for superior trunk and maintained good postoperative pain of Group A. However, if the catheter tip is inserted more inside near the subclavicular artery, local anesthetics are only effective to middle trunk and it does not control pain management of Group B.

Inferior trunk is located at inferior area both Group A and B. The catheter tip is inserted below the subclavicular artery, it is possible to control pain management for ulnar side of arm

Conclusion: Understanding of the relation of trunks at supraclavicular fossa is important for patient to maintain good postoperative pain control.

#### 03AP07-6

# Use of ultrasound for epidural neuraxial blockade in hip and knee replacement surgeries: A randomised controlled

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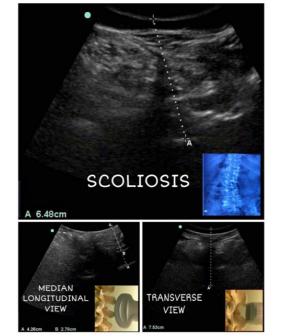
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Introduction: Obesity, osteophytic spine with deformities, variant epidural anatomy and suboptimal position predispose anaesthesiologist to challenges. We aimed to determine the utility of preprocedural ultrasound scan compared with the conventional blind technique for epidural neuraxial blockade in patients undergoing hip and knee replacement surgeries in terms of technical difficulty, clinical efficacy, safety and patient comfort.

Material and methods:210 patients aged 50-88 years with BMI 30-45kg/m<sup>2</sup> and osteophytic spines including abnormalities were randomized in two groups. Both groups received combined spinal epidural anaesthesia (CSEA). Epidural depth was confirmed by LOR technique. In group 'B' preprocedural ultrasound was done to identify level of intervertebral space in median longitudinal view and needle insertion site. Epidural depth was measured from skin to midpoint of posterior complex in median longitudinal and transverse view. Two tailed tests, Pearson correlation coefficient and Bland-Altman analysis with 95% confidence interval were calculated

Results: Both groups were similar in physical characteristics. Ultrasound improved success of CSEA at 1st attempt from 74.28% in group 'A' to 85.71% in group 'B'(p-0.038). Fewer needle insertion attempts(p-0.013),passes(p-0.022) and anaesthesiologist(p-0.044) were required in group 'B' thereby, ultrasound reduced the technical difficulty. Ultrasound determined the most neutral space and its orientation in scoliosis. Ultrasound precisely determined the depth of epidural space with insignificant difference of 0.030cm(p-0.66) and Pearson correlation coefficient of 0.977 using both views. Bland Altman analysis revealed mean difference of 0.007cm [-0.044,0.030]. Ultrasound improved efficacy and safety with higher patient satisfaction score(p-0.019) and decreased procedural complications(p-0.003) like inadvertent dural puncture (p-0.013).

Conclusion: Preprocedural ultrasound scan improves success rate for epidural neuraxial blockade and can be used as an adjunct to lumbar epidural blocks in obese patients with osteophytic abnormal spines. Therefore, lumbar ultrasound scan is a valuable skill to learn to ensure higher standards of healthcare



#### 03AP07-7

### Comparison between palpation and ultrasound assessment of spinal level in pregnant women undergone spinal anesthesia

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Background: Neuroaxial anesthesia is a widely used technique in obstetrics, with several advantages over general anesthesia. latrogenic neurological damage after spinal anesthesia is a rare event in daily practice. One of the reasons related to this type of injury is the misleading punctured level. There is evidence in the literature that the lower end of the spinal cord is related to L2 in 43% of women and 27% of men. Literature shows up to 63% of error in the punctured level. This project aimed to evaluate the puncture level accuracy rate in pregnant patients.

Methods: An observational study was carried out in a university hospital. Patients over 18 years of age who underwent spinal anesthesia for cesarean delivery were included. The site of successful puncture was marked at the end of the spinal injection. After the end of the surgery, the patient was put in the same position of initial puncture (sitting down position) and the was examined with ultrasound.

Results: A total of 44 patients were analyzed from April to December of 2017. The mean age was 29.25 ± 6.44 years and mean BMI of 30.74 ± 8.11. The incompatibility rate between the two methods was 45.45% (table 1). By palpation, the most frequent believed space punctured was L3-L4 (68.2%), but it was not correct in 46.66% of these cases. Table 2 shows the incompatibility rate by experience of the professional

Conclusion: A non-negligible error rate was observed however with results compatible with the literature, and the level is usually punctured at the immediately superior level of the believed space.

Table 1

LEVEL OF PUNCTURE	J- PALPATION N (%)	ULTRASOUND N (%)
L1-L2		1 (2.3%)
L2-L3	4 (9.1%)	14 (31.8%)
L3-L4	30 (62.2%)	21 (47.7%)
L4-L5	10 (22.7%)	8 (18.2%)

EXPERIENCE OF PROFESSIONAL	INCOMPATIBILITY BETWEEN PALPATION AND ULTRASOUNI
FIRST YEAR MEDICAL RESIDENT	62.5%
SECOND MEDICAL RESIDENT	55.5%
THIRD YEAR MEDICAL RESIDENT	0%
ASSISTANT ANESTHETIST	0%

### 03AP07-8

### The Most Frequently Cited 100 Articles on Ultrasonography in the Anaesthesia Literature

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Background and Goal of Study: We investigated most highly cited 100 articles related to ultrasonography in the anaesthesiology literature.

Materials and Methods: Using the advanced mode of the Web of Science(WOS) the words;SU=anesthesiology AND TS=ultrasound OR SU=anesthesiology AND TS=ultrasonography OR SU=anesthesiology AND TS=sonography OR SU=anesthesiology AND TI=ultrasound OR SU=anesthesiology AND TI=ultrasound OR SU=anesthesiology AND TI=ultrasonography OR SU=anesthesiology AND TI=sonography OR SU=anesthesiology AND TI=USG were used to scan articles on December 2017.

Results and Discussion: From 1975 to date, it appears a total of 4955 articles related to ultrasonography were published in anaesthesiology literature in the WOS The most cited article had 676 citations, the least cited articles had 78 citations. The mean citation number for the articles was 134.36±82.31. The mean annual citation number for the articles varied from 158 to 3.15 and the mean was 12.15±15.59. The most cited article was by Critchley LAH et al, A meta- analysis of studies using bias and precision statistics to compare cardiac output measurer techniques: published in the Journal of clinical Monitoring and Computing.

Focused articles related to ultrasonography in the anaesthesiology literature in

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regional anesthesia, cardiovascular system, cranial evaluation, chest evaluation and others were conducted in 63.7%, 18.6%, 8.8%, 4.9% and 3.9% studies, respectively. The three journals that appeared most frequently in the top 102 were Anaesthesia and Analgesia(23.5%), British Jornal of Anaesthesia(21.6%), and Anesthesiology (21.6%).Of the articles, 79.4% were listed in the SCI, 20.6% were listed in the SCI-F The top three countries of authors were USA(33.3%). Canada(12.7%) and England(11.8%) Of the authors 35.3% on the continent of Europe and 64.7% outside the continent of Europe. There was no significant difference found between the continent of authors and index of journals and the total number of citations and mean annual number of citations. There was significant correlation found between the number of patients in the studies and mean annual number of citations(r=0.234:p=0.033).

Conclusion(s): This is the first study to investigate most cited articles related ultrasound and anesthesiology. The most frequently cited studies use of ultrasonography included regional anesthesia topics. There was significant correlation found between the number of patients in the studies and mean annual number of citations.

# 03AP07-9

# Ultrasound-guided fascial block of the intercostal nerves, new multimodal approach in laparotomy of the upper abdomen a descriptive study

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Pain management is a fundamental part of the multimodal rehabilitation strategy for abdominal surgery. Currently, the laparoscopic approach to abdominal pathologies has modified the analgesic approach, favoring the use of abdominal wall blocks versus epidural analgesia. But, when the technique must be reconverted (technical problems, bleeding) we face an analgesic challenge. Since 2015 we have been conducting ultrasound-guided fascial blockade of the intercostal nerves at the level of the 8th rib for open cholecystectomy (modified BRILMA) in our hospital, having been incorporated bilaterally in the case of laparotomies performed in the upper abdomen since 2016. With the administration of the local anesthetic at this level blockage of the lateral and anterior cutaneous branches of the intercostal nerves 7-11, responsible for the innervation of the upper abdominal wall, is achieved. Encompassed in a multicenter study started in 2016 on the effectiveness of this blockade, we conducted a review of the postoperative analgesic techniques applied in the superior laparotomies of our medical center A total of 37 patients who met the inclusion criteria from January 2016 to May 2017 were registered: 15 in the analgesia group with modified BRILMA block, 17 with parenteral analgesia with morphine and 4 with epidural analgesia. We have seen that the modified BRILMA, uni or bilateral, has a higher quality of recovery (early walking, oral tolerance) and better pain control (EVN <2 in motion) in patients with abdominal wall surgery (eventration and open cholecystectomy). This technique has not been shown superior to parenteral opioids in the control of pain, except in the absence of excessive sedation. We can conclude that, although the sample size is small and more studies are needed, the modified BRILMA provides good control of postoperative pain in upper abdominal laparotomy, with fewer adverse events and better recovery, so it could be considered an option Analgesic in the multimodal approach in upper abdominal laparotomy References

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# 03AP07-10

"Evaluation of the effectiveness of a Pecs Blocks I associated with a supraclavicular nerve block to ensure analgesia when placing a pacemaker"

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Background and Goal of Study: Pacemakers are currently placed at the Erasmus Hospital under local anesthesia performed by the surgeon, and the amount of local anesthetic agents sometimes reach the maximum permitted doses. Moreover these patients often present an associated conduction block. This represents a contraindication to lidocaine 2% (local anesthestic frequently used). We hypothesized that using a Pecs Block I associated with a supraclavicular nerve block should require a smaller quantity of local anesthetic

Materials and Methods: This is a prospective randomized study conducted over a period of 9 months. The patients scheduled for a pacemaker implantation were prospectively randomized in two groups: The group ALR ( Pecs block I associated with a supraclavicular nerve block associated with ) or group ALC (Local Anesthesia by a surgeon). In case of patient discomfort or failure of the techniques used, we allowed a second local infiltration of the tissues. A 50 mm needle Stimuplex 360 Braun was used in the ALR group. If despite the second infiltration, the patient was still in pain, we increased the depth of sedation. The endpoint is the total amount of local anesthetics used. The secondary objectives are: evaluate the postoperative analgesia, the pain scores evaluated via the analog verbal scale (EVA) and the paracetamol consumption in postoperative. Comparisons were analyzed with the Chi-Square and the Mann Whitney test statistics.

Results and Discussion:31 total patients were enrolled: 16 for the group ALC group and 15 for the ALR group. There is a significant difference between the two groups: the ALR received more local anesthetics volume. (ALR with a mean volume of 27,5 ml vs ALC with a mean volume of 19,9) P= 0,0003. Regarding the pain scores, there is no significant difference between the two groups. P= 0,12.

Conclusion: There is a significant increase consumption of local anesthetics in the ALR group and there is no significant difference regarding the pain scores. A supraclavicular nerve block associated with a PECS BLOCK I is not adequate to provide anesthesia for the implantation of a pacemaker

# Ultrasound-guided infraclavicular block: inplane versus out of plane

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Background and Goal of Study: the identification of the axillary nerve plexus at the infraclavicular level is easily identifiable in ultrasound. The aim is to compare the feasibility and effectiveness of infraclavicular block (ICB) by ultrasound-quided technique(US) in the plan versus off plan.

Materials and Methods: after informed consent of the patients proposed for elbow surgery, a young resident who has received theoretical training in US regional anesthesia, instead a superficial US probe with a flat head perpendicular to the coracoid apophysis. After identification of the artery and the axillary vein and the 3 bundles of nerve plexus and pleura; an echogenic needle is introduced at the level of the cephalic ultrasound probe according to the technique in the plan in the IM group or the medial border of the probe according to the technique out plan. the visualization of the needle tip is indisponsable. We practice a single injection of 30 mL bupivacaine 0.25% isobaric around the lateral and posterior nerve bundle. sensory block or insufficient engine musculocutaneous nerves, radial or ulnar is considered a failure. statistical analysis is made by SPSS22

Results and Discussion: 25 patients in each group were introduced. Anthropometric parameters are superimposed

	GI	GO	p
Procedure duration (min)	5,3±12	4,1±1,7	0,038
Viewing the needle tip	76%	92%	0,027
the volume of hydrolocalisation (ml)	5,6±2,2	4,4±2,1	0,19
Number attempts	28/25	27/25	0,41
Induced pain (VAS: 0à100)	44,3±15,8	39,6±7,9	0,18
Delay sensory block (min)	17,7±4,5	18,2±5,7	0,34
Delay motor bloc (min)	24,8±6,1	25,4±7,9	0,21
Block Successes	92%	96%	0,64
Block Facility (VAS)	58,7±26,8	39,4±11,2	0,042
Vascular puncture	8%	0%	0.37

No cases of pneumothorax or other major complications were detected.

Conclusion: ICB performed under ultrasound using the technique off plan is a better feasibility

#### 03AP08-1

# Regional anaesthesia and the diagnosis of compartment syndrome: a systematic review

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Background and Goal of Study: Acute compartment syndrome (ACS) typically occurs secondary traumatic or iatrogenic tissue injury. It is associated with significant morbidity and mortality, especially if diagnosis is delayed. Refractory n, often out of proportion to injury is deemed an important diagnostic sign of ACS. 1] As a result, there is significant trepidation in the use of regional anaesthesia (RA) in patients deemed at risk of ACS. [2] We conducted a systematic review of the evidence to assess whether this viewpoint is supported by published evidence. Materials and Methods: The healthcare database advanced search tool provided

by the National Institute for Health and Care Excellence was used to collect literature. The search terms used were ("compartment syndrome" AND ("regional anaesthesia" OR "regional anesthesia"). There were no historic or language restrictions. Cases involving paediatric patients or intravenous RA were excluded Each article was assessed using GRADE criteria.

Results and Discussion: Our search generated 133 publications. Each was assessed against inclusion criteria, resulting in 28 papers. There have been no other systematic reviews conducted on this subject. We found no greater than low quality evidence in support of the hypothesis that RA contributes to the delayed diagnosis of ACS. Of particular relevance in our review are recent publications from military trauma specialists which are strongly in favour of the use of RA despite their patients being at high risk of ACS. [3] We acknowledge that publication bias is likely to be a significant factor on this subject. There are no prospective studies and the retrospective work is of relatively poor quality. There is clearly need for further research in this area

Conclusion: Given the benefits of regional anaesthesia, withholding it in patients deemed at risk of acute compartment syndrome is not supported by the published

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### 03AP08-3

# Effect of intralipid on electrophysiologic effects of ropivacaine. Study in an experimental porcine model of ropivacaine intoxication

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Goal of Study: Ropivacaine (R) is considered less cardiotoxic in comparison to other long duration amide local anesthetics (LA). However, several case reports in which significant cardiac side effects have occurred after R administration. Recently, experimental studies suggest that lipid emulsions are effective in reversing LA toxicity. The so-called "lipid sink" effect, is suggested to be the basic mechanism of this treatment and its efficacy varies depending on the physico-chemical properties of the LA. In our knowledge no studies have evaluated the efficacy of intralipid in reversion the electrophysiologic effects of R.

Material and methods: Eleven Large-White anesthetized pigs were studies. A R bolus of 5 mg.kg-1 was administered. The animals were randomly assigned to two groups: control group (C-group, n=5) and intralipid group (IL-Group, n=6). Ventricular conduction (evaluated by QRS) was measured in sinusal rhythm and after ventricular pacing at cycle length of 400 ms on the baseline, 3 min after R administration and 1, 5,10 and 30 minutes after Intralipid infusion (1.5 mL/kg over 1 minute followed by an infusion of 0.25 mL/kg/min). In C-group a saline infusion was administered instead of Intralipid. Statistical analysis: Mann-Whitney test and Wilcoxon test as appropriate.

Results: R induced an intense slowing of ventricular conduction manifested in sinusal and in stimulated QRS. QRS duration in sinus rhythm increased from 67±9 ms to 101±18ms (p=0.003) and stimulated QRS increased from 95±7 ms to 359±65 ms after R administration (p=0.003). Lipid infusion increased the recovery of the enlargement of the QRS in sinus rhythm in the first minute: 16% in IL-Group vs. 5% in C-group (p=0.05); Figure 1. We did not detect significant differences in the sinusal QRS interval or in the stimulated QRS interval at 5, 10 and 30 minutes of IL administration between the two groups.

Conclusion: R infusion was associated with an intense slowing of ventricular conduction and a market use-dependence block. There was a transient rapid recovery in sinusal QRS interval seen in the intralipid group at 1 min of its administration. However, this difference was no sustained on the rest of timepoint of the experiment. More research is warranted to define the role of intralipid

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Can the histological changes and inflammatory response in meninges caused by spinal block through tattooed skin progress to adhesive arachnoiditis? An experimental model in Rabbits

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Background and Goal of Study: The intrathecal injection of saline through a needle inserted through tattooed skin was capable of producing histological changes over the meninges of rabbits 6 months after lumbar puncture (1). The purpose of this study is assess if the inflammatory response in meninges caused by spinal block through tattooed skin of rabbits appearing early, if is progressive and if develop to adhesive arachnoiditis

Materials and Methods: Fourty two young male adult rabbits, each weighting between 3300 and 5400g and having a spine length between 38 and 41cm were divided by lot into 3 groups as follows: GI, spinal puncture through tattooed skin and saline injection - capitivity for 30 days:GII spinal puncture through tattooed skin and saline injection - capitivity for 360 days; GIII spinal puncture through non tattooed skin and saline injection - capitivity for 30 days. After intravenous anesthesia with ketamine and xylazine, the subarachnoid space was punctured at S1-S2 under ultrasound guidance with a 22-gauge 21/2 Quincke needle. All animals received 5µl/cm of spinal length (0.2ml) of saline intrathecally. During all period of capitivity the animals were maintained under medical observation and were killed by decapitation. The lumbosacral spinal cord portion was removed for histological analysis using hematoxylin-eosin stain.

Results and Discussion: None of the animals for the control group (GIII) shows signs of injuries to meninges. After 30 days of spinal block through tattooed skin, 78,5% of the animals for GI shows signs of perivascular lymphoplasmacyte infiltration in the pia matter and arachhoid (leptomeninges). And after 360 days .92.8% of the animals from GII showed inflammatory infiltration and areas of adherence in the leptomeninges, changes compatible with arachnoiditis.

Conclusion: On the basis of the present results, intrathecal injection of saline through a needle inserted through tattooed skin is capable of producing histological changes over the meninges of rabbits. These changes are early and evolve in focal areas to adhesive arachnoiditis. Our recommendation is that the spinal block preferably be placed through areas non tattooed because of the possibility of future clinical complications

# References:

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## 03AP08-5

# Cerebral blood flow alterations associated with high volume caudal block in infants

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Background and Goal of Study: Major reductions of cerebral blood flow velocity (CBFV) with concomitant reduction of cerebral oxygenation have been observed after administration of high volume (1,5 ml/kg) caudal block in infants. This is caused by a rostral movement of cerebrospinal fluid (CSF)caused by the caudal injection that in turn will cause a substantial increase in intra cranial pressure (ICP) The primary aim of this study was to determine at what injected volume will significant reductions in cerebral blood flow appear. We hypothesize that this volume-blood flow relationship will appear similar to the well-known ICP volume pressure curve, thus, showing a curvilinear relationship.

Materials and Methods:15 patients were studied (Age: 0-6 months, weight:2,7-6,4 kg). Ultrasound Doppler measurements of CBFV of the right middle cerebral artery (Vmax, Vmin, VTI, PI, RI) together with hemodynamic parametres where recorded at predetermined randomized points of injection during the caudal injection.

Results and Discussion: Final analysis of the Ultrasound Doppler measurement parameters are pending (complete data analysis will be presented at the Congress). Preliminary analysis show an inflection point at approximately 50-60% of the injected volume, corresponding to a volume of 0,75-0,9 ml/kg

Conclusion: Our preliminary data analysis show that cerebral blood flow parameters start to be more substantially affected when > 1 ml/kg is injected

#### 03AP08-7

Scalp Nerve Block Using Bupivacaine or Levobupivacaine Provides Effective and Safe Acute Pain Control to Pediatric Patients underwent Surgery for Moyamoya Disease

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Background and Goal of Study: There are many studies demonstrating that regional scalp nerve block provides better hemodynamics, acute and chronic pain control for neurosurgery. Most of previous studies included adults only. Aim of this study is to exam if scalp nerve block provides similar benefit to pediatric patients as well.

Materials and Methods: We reviewed all consecutive patients suffering from moyamoya disease underwent elective surgery during 2015/11 and 2016/10. All patients received endotracheal general anesthesia induction with fentanyl, propofol/ thiamylal and cisatracurium/ rocuronium followed by sevoflurane/ desfurane/ propofol maintenance. If a patient was selected to receive regional scalp nerve block by his/ her anesthesiologist, 0.5% levobupivacaine or bupivacaine was injected each side for supratrochlear, supraorbital, zygomaticotemporal, greater and lesser occipital nerve after general anesthesia induction. We do not perform auriculotemporal nerve block to avoid possible damage to temporal artery which is critically important in moyamoya disease patients. Pain scores and analgesic medications during the first 24 hours after surgery were reviewed to assess the efficacy of nerve block.

Results and Discussion: During these 12 months, there were 16 patients underwent elective surgery for moyamoya disease, 11 of them were children under age 18. Surgeries included EDAS, EPS, or combination of them. Five patients received regional scalp nerve block and six didn't. All patients were exbutated in OR and sent to ICU for intensive care at least one night. In the patients without scalp nerve block, the analgesics used were Acetaminophen 3.67, Naproxen 0.5, Ketorolac 0.167, Nalbuphine 0.5, Ultracet 0.5 (all showed as "average given times/ 24hrs"). In the patients with scalp nerve block, the analgesics used were Acetaminophen 3, Naproxen 0.8, Ibuprofen 0.8 (all showed as "average given times/ 24hrs"). There was no adverse event caused by regional scalp nerve block. Conclusion: In patients with regional scalp nerve block underwent surgery for moyamoya disease, the analgesic medication in the first 24 hours after surgery were reduced. It is an effective and safe technique for such pediatric patients.

## 03AP08-8

Peribulbar block vs. general anaesthesia for corneal transplantation: analgesic requirements and pain control

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Background and Goal of Study: Effective anaesthesia for corneal transplantation (CT) can be achieved with general (GA) or regional anaesthesia. Evidence regarding the comparative merits of each technique is scarce. CT has usually been performed under GA, due to fear of the 'open-sky' situation. Peribulbar block (PBB) is an increasingly used technique for CT. We believe that PBB can achieve effective surgical anaesthesia and postoperative analgesia with lower analgesic requirements and similar surgical conditions, compared to GA. The aim of this study was to compare the analgesic efficacy of PBB and GA for CT.

Materials and Methods: We conducted a prospective observational study to compare CT surgery in adults under BPB and GA. After local ethics committee approval, CT performed between August and November 2017 were studied. Exclusion criteria included refusal to participate. Data collected on each patient included age, gender, American Society of Anesthesiologists physical status (ASA), procedure and anaesthesia lengths, analgesic drug administration, pain on arrival in the operating theatre and 30 minutes after surgery, postoperative analgesic needs and the opinion of the ophthalmologist regarding surgical conditions. Data was analysed using Statistical Package for the Social Sciences version 22. The statistical tests used were Chi-squared and Mann-Whitney U. Statistical significance was assumed for p < 0.05.

**Results and Discussion**: The study included a total of 39 patients. PBB was used for 20 CTs, 16 of which were lamellar keratoplasty. GA was used for 19 CTs, 15 of which were penetrating keratoplasty. Age, gender and ASA status in the two populations were similar, although there was a trend (p = 0.057) towards GA use in younger patients. Total fentanyl dose (p < 0.001), paracetamol use (p < 0.05) use, tramadol use (p < 0.05) and non-steroidal anti-inflammatory use (p < 0.05) were significantly lower in the PBB group. There were no differences in pain score on arrival in the operating theatre; there was a trend towards lower pain scores 30 minutes after surgery in the PBB group (p = 0.077). No difference was observed regarding the surgeon's opinion of surgical conditions.

Conclusion: In this study, CT under PBB provided comparable pain control and surgical conditions to GA, with much lower systemic analgesic requirements.

#### 03AP08-9

Prediction of the need for additional analgesia in the postoperative period

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Materials and Methods: Based on the NCCB a prospective randomized study was conducted between 2013 and 2016, analyzing the adequacy of postoperative analgesia after radical cystectomy in 107 patients with bladder cancer aged 61.0 years (95% CI: 56.0; 67.0). All patients in the postoperative period received longm epidural or paravertebral analgesia. Patients were divided into two groups (Gr), depending on the level of the subjective verbal analogue scale (VAS). 1st Gr with VAS≤3 points. 2nd Gr with VAS≥4 points. 1st Gr consisted of 91 patients who did not need additional analgesia in the postoperative period, and 2nd Gr consisted of 16 patients requiring additional analgesia. To assign patients to one of the groups, decision rules were built using decision trees. classifier in the study used decision trees built using the C & RT algorithm. The method of decision trees makes it possible to develop a model and to predict the belonging of observations to a particular class of categorical function, even at the preoperative stage, depending on the corresponding values of one or several prediction characteristics. As a criterion of agreement, the Gini criterion was used. The algorithm was terminated by the percentage of unclassified observations at terminal vertices. To assess the suitability of decision trees for the classification of the examination sample, a V-cross-check was conducted. As information signs for the construction of the 'decision trees" classifier, all the initial (preoperative) indices were taken and those were chosen whose p-values were less than 0.05 (mean arterial pressure (MAP), heart rate (HR), pH, intraoperative hypotension (IH)).

Results and Discussion: Based on the constructed classifier tree, we present an algorithm for assigning patients to 1st or 2nd Gr. Step1. If the symptom of HR is at the most traumatic moment<65.5, then the patient refers to 1st Gr. Step2. If the symptom of HR is at the most traumatic moment>65.5, and the sign of MAP<96.5, then the patient belongs to the 1st Gr. Step3. If the symptom of HR is at the most traumatic moment>65.5 and the sign of MAP>96.5, and the sign of IH=1, then the patient refers to the 2nd Gr. Step3. If the symptom of HR is at the most traumatic moment>65.5 and the sign of MAP> 96.5, and the sign of HI=2, then the patient belongs to the 1Gr.

**Conclusion:** The developed algorithm allows to accurately predict the need for additional analgesia in the postoperative period in 92.52% of cases.

### 03AP09-1

Local Anaesthetic Toxicity Due To The Migration Of An Epidural Catheter: A Rare Complication Due To a Rare Situation

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**Background**: Local anaesthetics can cross cell membranes and interact with charged targets and signaling systems. For that reason, they produce a variety of toxic effects in several tissue types: heart, brain and skeletal muscle. Systemic toxicity occurs in 1:10,000 for epidurals, but this data is not clear due to the low incidence. Infusion of 20% lipid emulsion to treat severe systemic drug toxicity is the election treatment in this situation.

Case report: 24 year old parturient woman, with no diseases and no allergies. She asked for epidural analgesia. Technique was performed in one attempt, with no incidences. Epidural space was at 5 cm from the skin, so catheter was placed at 10 cm and bupivacaine infusion was started. During the first 4 hours, no incidences appeared, and correct analgesia was achieved. After that, the anaesthesiologist was called due to patient's pain. Before administering using the placed catheter, syringe aspiration obtained blood. After reviewing the catheter position, it was noticed that it was placed at 13 cm, 3 more inside than before. While these manoeuvres were being performed, the patient presented metallic taste, dizziness, visual and auditory disturbances, with disorientation and drowsiness. At that moment bupivacaine infusion was stopped, and monitoring and lipid 20% infusion were started. At the same time, the anaesthesiologist asked for help, and prepared the drugs needed in case of cardiac arrest. After 5 minutes, the patient recovered ad integrum. Toxic doses of local anaesthetic were not reached.

**Discussion**: Even though the catheter was initially correctly placed, it seems that vascular migration is the cause of the toxicity, even though we have not found any described case in the literature. Lipid Rescue seems to be an effective treatment, according to our experience and the several case reports found after our review. More data is needed: the current knowledge is only about reports of cases, due to the low incidence of this entity.

#### Learning points:

- Local Anaesthetic toxicity is a rare condition that can be devastating.
- Due to the low incidence, reporting the cases is essential to learn about how to treat it
- Intravascular infusion of local anaesthetic, especially bupivacaine, is a potentially dangerous cause of toxicity.
- Once the diagnosis is suspected, lipid rescue must be started: the consequences (including cardiac arrest) can be fatal. This includes asking for help.

#### 03AP09-2

# Anaesthesia for 2-fraction prostatic brachytherapy – a case report

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**Background**: Prostatic brachytherapy presents the Anaesthesiologist with unique problems<sup>1</sup>. The aim of this report is to describe our anaesthetic approach to a patient with a recidivated prostatic cancer that needed to be awake and immobilized for more than 12 hours, to be submitted to 2 sessions in the same day.

Case Report: 79-year-old patient, with past medical history of ischemic cardiac disease, hypertension and radiotherapy for prostatic cancer in 2009, with recent recurrence, was proposed for brachytherapy in 2 sessions spaced 12 hours apart. Preoperative exams were normal. Clopidogrel and aspirin were suspended and thromboembolism prophylaxis was secured. Patient was monitored by ASA standards and a combined spinal-epidural at L3 level was performed with bupivacaine (10mg) and sufentanyl (2,5ug) uneventfully. Anxiety was managed with midazolam iv. The first session of brachytherapy lasted 3 hours and involved insertion of needles in the prostatic tissue, confirmation of correct placement in CT room and radiation treatment. Needles remained in place and the patient was sent to the recovery room with an epidural perfusion for analgesia and immobilization. Epidural block and pain were assessed hourly and nurse-care provided with lumbar-sacral massages. 12 hours later, the second session was executed. At the end, perineal needles were withdrawn and epidural catheter was removed. The day after, patient was discharged home.

**Discussion:** Regional techniques are the leading anaesthetic approach to pelvic brachytherapy<sup>1,2,3</sup> but there aren't any specific publications about the ideal anaesthesia for 2-fraction prostatic brachytherapy. Analgesia, immobilization and even monitoring and transport between radiotherapy, CT and recovery rooms are main concerns. Based on our experience, we suggest the portrayed technique as an appropriate option for this procedure.

#### References:

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- 3.Optimal perioperative anesthesia management for gynecologic interstitial brachytherapy; Nielsen et al; JContemp Brachytherapy 2017; 9(3):216-223

**Learning points**: 2-fraction prostatic brachytherapy presents the Anaesthesiologist with additional concerns, namely analgesia, immobilization, monitoring and transport. Combined spinal-epidural anaesthesia with an epidural infusion seems an appropriate option.

### 03AP09-3

# The anaesthesiologist's own experience in PDPH

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**Background**: Post-dural puncture headache (PDPH) develops during 5 days after dural puncture and attributed to low cerebrospinal fluid (CSF) pressure. It worsens within 15 min after sitting or standing and improves after lying, with at least one of the following: neck stiffness, tinnitus, hypacusia, photophobia and nausea [1]. All known clinical signs of PDPH are related to brain and CSF pressure, but not to local CSF leakage region.

Case Report: I am an anaesthesiologist with 28-years experience. In 2009 I had severe headache and for exclusion of subarachnoid hemorrhage the diagnostic lumbar puncture in L3-L4 level was provided in side position with the Quincke-point needle G22. There was only one attempt without blood-leakage via the needle. CSF was clear and leaked under high pressure and laboratory analysis was normal. On the third day after dural puncture I felt signs of PDPH: quite intensive headache in sitting and especially in standing position with nausea. I was treated conservatively: stayed in bed, oral rehydration, coffee drinking and metamizol orally. PDPH lasted about 3 weeks. On the 7th day after dural puncture I felt hyperesthesia on the lateral surface of both thighs in the region innervated by both lateral femoral skin nerves. Hyperesthesia lasted for one month and sometimes it was painful to touch as burned surface. After this period the hypesthesia developed in the affected region, which lasts about 45 days.

Discussion: The development of PDPH in my situation was suspected due to risk factors: female with severe headaches in anamnesis, increased CSF-pressure, large needle diameter (G22). The unexpected was the manifestation of neuropathia of both lateral femoral skin nerves. The dural puncture was performed in L3-L4, the lateral femoral skin nerves run from L2-L3. During the puncture I did not feel any paresthesia, so the needle did not touch the nerve branches. There was no blood from the needle, so it is not suspected the blood irritated the nerves. The only possible explanation may be the CSF collected in epidural space could affect the lateral femoral skin nerves. It is not suspected that CSF has direct toxic effect on peripheral nerves, but the pressure provided by CSF collection in vertebral canal can press on nerve branches.

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**Learning points**: PDPH can lead to peripheral neuropathy.

### 03AP09-4

Myoclonus following spinal anaesthesia: a case report of a rare complication

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**Background**: Myoclonus is a clinical sign defined as sudden, brief, shock-like, involuntary movements. Spinal myoclonus is a rare form of non-generalized movement disorder often restricted to one somatic region, usually attributed to spinal cord pathology. 3 We report a case of myoclonus following spinal anaesthesia.

Case Report: A 57 year-old female with no significant medical history presented for an urgent surgical drainage of perianal abscess. Standard ASA monitoring was applied and a spinal block was performed at L3-L4 spinal space, paramedian approach with a 27-G Quincke needle. After backflow of clear cerebrospinal fluid 10mg of 0.5% bupivacaine plus 2,5µg of sufentanil were injected in the subarachnoid space uneventfully. Adequate sensory and motor block was achieved and the surgery was performed. About 2h after the spinal block procedure, the patient developed involuntary myoclonic movement of both lower limbs with no other neurologic manifestations. The patient was conscious, alert and had already recovered motor function of both legs. Diazepam 5mg and magnesium 2g were administered intravenously and myoclonic movement diminished slightly and disappeared 30 min after its onset.

**Discussion:** Spinal myoclonus following neuroaxial anaesthesia is extremely rare. Some theories about its pathophysiology have been suggested and include: abnormal hyperactivity of local dorsal horn neurons with loss of inhibition from suprasegmental descending pathways, increased irritability of α-motor neurons caused by the inhibitory effects of local anesthetics or high-dose local anesthetic or opioid direct neurotoxicity.<sup>2,3</sup> In our case report this complication occurred when the spinal block was regressing which suggests that loss of inhibitory function in the spinal cord may account for the myoclonus. There is no established treatment for spinal myoclonus but the use of anticonvulsants and benzodiazepines has been described as effective.<sup>3</sup> The use of magnesium has never been described but it exerts depressant effects in the CNS acting as an antagonist at the NMDA receptor witch may contribute to the attenuation of the involuntary movements.

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**Learning points**: Anaesthesiologists should be aware of the potencial of this rare complication to occur following neuroaxial anesthesia and know how to manage this distressing situation.

### 03AP09-5

Case report: spinal epidural haematoma as a complication of removing a thoracic epidural catheter

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**Background**: Regional anesthetic techniques on the neuroaxis are common procedures in Anesthesia. They are not exempt from complications. Spinal epidural haematoma (SEH) is the most uncommon and severe. To reduce its incidence we must consider different factors such as coagulation lab tests, anticoagulation and antiplatelet drugs or the moment for removing the epidural catheter.

Case Report: We present a case of a 41 years old women, ASA II, with a diagnose of a metastatic neuroendocrine intestinal tumor who is programmed for surgery. Presurgery blood tests are normal. Before surgery, an epidural catheter is atraumatically placed between D10-D11 space without any incidence. Surgery is uneventful. Removal of the catheter is done respecting the safe intervals of the thromboprophylaxis therapy. 24 hours after catheter removal, the patient presents paresthesias and hipoesthesia from D10 level. A magnetic resonance imaging (MRI) is performed and an haematoma compressing the spinal cord expanded from D8 to D10 is observed. An urgent drainage and laminoplasty is carried out within the first 12h since the beginning of the symptoms. She gradually recovered from neurological symptoms.

**Discussion**: We report this case to analyze which factors take action in the onset of SEH, its diagnose and therapeutic management. Despite performing the epidural puncture and removal of the catheter according to the clinical guidelines a SEH appeared. We analyze two aspects which might be a cause of SEH: the diagnose of a carcinoid syndrome related to the tumor and the suspicion of an intradural migration of the epidural catheter

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1. M. Lagerkranser. Neuraxial blocks and spinal haematoma: Reiew of 166 case reports published 1994-2005. Scandinavian Journal of Pain 2017; 15: 118-129 2. Pumberger et al. An Analysis of the Safety of Epidural and Spinal Neuraxial

Anesthesia in More Than 100,000 Consecutive Major Lower Extremity Joint Replacements. Reg Anesth Pain Med. 2013;38: 515-519

3. Volk et al. Incidence of spinal haematoma after epidural puncture: analysis from the German network for safety in regional. Eur J Anaesthesiol 2012; 29: 170 - 176 Learning points: the exact incidence of SEH after epidural analgesia is difficult to estimate due to its rarity (circa 1:150.000). In our case, despite we followed the guidelines, a SEH was formed. An early detection performing a MRI and consulting neurosurgery specialist led us to an effective treatment.

#### 03AP09-6

# A Continuous Erector Spinae Plane Block in a Pediatric Patient: A Case Report

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**Background**: The guided ultrasound Erector Spinae Plane (ESP) block is a new simple and safe technique of regional anesthesia <sup>1</sup>

Case Report:A four-year-old girl (18kg) diagnosed with empyema was admitted for a right thotacotomy. The patient had a previous INR of 1.7 therefore neuraxial techniques were avoided. General anesthesia was induced with IV lidocaine, fentanyl, propofol and rocuronium. After endotracheal intubation, the patient was placed in a left lateral position and the ESP block was performed using a high-frequency (13-6MHZ) linear ultrasound transducer (Mturbo,Sonosite) in a longitudinal orientation, 1 cm lateral to the T4 spinous process. A 50-mm needle (Visioplex R -Bevel 30°) was inserted in-plane and in a cranial-to-caudal direction. The block was administered by injection of 0,4% 15ml in total, followed by the insertion of a catheter and a continuous infusion of 0,1% ropivacaine solution combined with clonidine 1mcg/ml at a rate of 6 ml/h using an elastomeric pump. Additional analgesia was supplemented with dipyrone and ketoprofen

**Discussion:**The Esp block is a regional anesthesia technique recently described as a simple and safe procedure.¹ The ultrasound-guided Esp block involves local anesthetic injection into a paraspinal tissue plane distant from the pleura and neuraxis.² Consequently, the Esp block can anesthetize the ventral and dosal rami of the spinal nerve roots and the rami communicants that transmit autonomic fibers, leading to somatic and visceral analgesia.This method was initially described for thoracic analgesia when performed at the T5 process. Additionally, recent data indicates that at a lower vertebral level such as T7, it can provide effective and extensive abdominal analgesia. Finally, the relatively superficial location of the Esp block minimizes concerns with clotting disorders.³

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- 3. Chin J.K., et al:The Erector Spinae Block Provides Visceral Abdominal Analgesia in Bariatric Surgery, *Reg Anesth Pain Med*.2017;42

**Learning points**: To our knowledge this is the first reported case of a continuous Esp block in a pediatric patient. Future investigations could bring evidence to its clinical application for postoperative analgesia in pediatric anesthesia

# 03AP09-7

# **Quadratus Lumborum Block for Robotic Abdominal Surgery: A Case Report**

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**Background**: Since Enhanced Recovery Surgery (Eras) protocol has been implemented, there has been a growing interest in multimodal anesthesia. Regional anesthesia could be a key for this purpose. After the introduction of ultrasound guided blocks, some alternatives seem promising as the Quadratus Lumborum (OL) block. <sup>1,2</sup>

Case Report: The case was a 61-year-old woman who underwent a Robotic Hartmann Surgery. General anesthesia was achieved with lidocaine, dexmedetomidine, magnesium sulfate, rocuronium, propofol, sevoflurane and ketamine. An incision in the abdominal wall middle line was necessary, so a rescue in analgesia was made. Our choice was a bilateral posterior QL block was performed, in the end of surgery, as follows: the patien was in the supine position, a high-frequency transducer was placed in a tranversal manner and the border between the quadratus Lumborum Muscle and the Latissimus Dorsi Muscle was visualizedand then, using a 100-mm needle (Stimuplex R, Ultra 22G, Germany), 40 ml .of 0,3% ropivacaine were injected. Additional analgesia: dipyrone and tenoxicam. There was no need for opioid, during her postoperative period

**Discussion**: The promise of more extensive abdominal analgesia compared with the Transverse Abdominal Plane (TAP) block accounts for the growing interest in QL block. This muscle along with the thoracolumbar fascia could be an anatomical bridge between the anterolateral musculature of the abdominal wall and the lumbar paravertebral region.<sup>2</sup> the lack of consensus on the mechanism of spread for QL block may be partially attributed to the variable descriptions of the approaches: QL1 would be named lateral QL block; the QL2 block would be called posterior QL block, and the transmuscular QL block would be an anterior QL block.<sup>3</sup> The choice of analgesia in the operating room and postoperatively will have an impact on elements on ERAS protocol, so minimizing opiates by using regional blocks could be one of the keys.<sup>1</sup>

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- 2. Chin J. K. et al., Essentials of Our Current Understanding: Abdominal Wall Blocks. Reg Anesth Pain Med;42:133-183
- 3. Elshakawy H., Quadratus Lumborum Blocks. Advances in Anesthesia. 2017:35:145-157

**Learning points**: There is a lack of data about QL block in an opioid free multimodal anesthesia for Robotic Surgery and we presented a successful case of this combination.

#### 03AP09-8

# Analgesia management with epidural catether in mitral valve repair via minithoracotomy – A case report

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**Background:** Minimally invasive cardiac surgery (MICS), via minithoracotomy, is thought to be a fast track to extubation and recovery. Adequate analgesia is essential. Chronic pain, due to intercostal nerve injury, develops in up to 50% of patients. Anaesthesiologists play a key role in facilitating optimal outcomes after surgery. We report a case of postoperative pain management with an infiltration catheter technique for MICS.

Case Report: 63 years, woman, 80kg, ASA 3 [arterial hypertension, atrial fibrillation (AF), rheumatic mitral stenosis, class II NYHA heart failure] presented for an elective minimally invasive mitral valve repair through a right minithoracotomy (4th intercostal space) and cryoablation of AF Calculated FuroScore II 1.55%. After premedication with intravenous (IV) midazolam 1.5mg, radial arterial and jugular central venous catether were placed. General anaesthesia was induced with IV remifentanil 1mcg/ kg/h, propofol 50mg, rocuronium 1mg/kg. A transesophageal echocardiography probe was inserted atraumatically. ASA standard, invasive blood pressure, central venous pressure, neuromuscular block, depth of anaesthesia and cerebral oximetry monitoring were used. After cardiopulmonary bypass (CPB) by femoral cannulation, cryoablation of left atrium was performed followed by placement of the mechanical prosthesis. Total bypass time was 186min (139min aortic cross-clamping time). No need for inotropic support. Analgesia with paracetamol 1g, tramadol 100mg and morphine 10mg was performed after protamine reversion. Immediately before closure, epidural catheter was placed at the 4th intercostal space and ropivacaine 0,75% 75mg was administered. Anaesthesia and surgery were uneventful. Patient was shifted to ICU and extubated 3 hours after. Multimodal analgesia was performed and there was no need for additional bolus of ropiyacaine. Discharged 4 days after surgery, without complications, 3 weeks after, patient referred no complications, adequate pain control and good satisfaction with analgesia management.

**Discussion:** Thoracotomy incisions are associated with severe pain, leading to a decrease in pulmonary function, increase in metabolic and hormonal activity and increased cardiac morbidity. Regional analgesia techniques have an opioid-sparing effect, reducing stress response and pain chronification. Local anaesthetic infiltration through catheter allows excellent analgesia for 8-12 hours after surgery, providing a route of additional analgesia.

#### 03AP09-9

# Epidural anaesthesia in a patient with advanced multiple sclerosis

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Introduction: Multiple sclerosis is the most common demyelinating disease of the central nervous system. It's more frequent in women, but the prognosis is worst in men. Perioperative physiological stress and anaesthesia may exacerbate the disease. We present a case report of an epidural anaesthesia in a patient with advanced multiple sclerosis.

**Case report:** A 46 year-old male patient with advanced multiple sclerosis, was scheduled to elective sacral ulcer flap reconstruction. He had a history of restrictive pulmonary disease, severe dysphagia and tetraparesis.

The day before and in the morning of the surgery, he received 10 mg of metoclopramide and 50 mg of ranitidine. In the operating room, standard monitorization and supplementary oxygenation (FiO2 of 0,4) was started. Patient was preloaded with 500 ml of crystalloid fluid. Epidural anaesthesia was performed with 37,5 mg of ropivacaine (0.75%) and 0,02 mg of sufentanil. Prone position with protection of pressure areas and active warming were accomplished. The surgery lasted one hour and was uneventful. The patient was discharged home and neurologic exacerbations were not reported.

**Discussion:** Multiple sclerosis has many anaesthetic implications, so it is crucial to ponder the advantages and disadvantages of each option, taking into account the patient state and the type of surgery. In this case, we decide to perform neuroaxial anaesthesia in order to avoid pulmonary aspiration and respiratory complications. Epidural block is a safe option with less risk of neurotoxicity comparing with subarachnoid block. Hemodynamic stability, normothermia, absence of technical difficulties, low doses of local anaesthetics and suitable pain control, were important contributing factors for the good outcome.

**Learning point:** Epidural block is a safe technique in patients with multiple sclerosis disease.

Maintenance of hemodynamic stability, normothermia, respiratory function and suitable pain control are crucial in these patients.

#### 03AP09-10

# Case report: Scalp Block with dexmedetomidine as an additive to local anesthetics for Basal Cell Carcinoma (BCC) surgery to a high risk patient

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**Background**: Regional scalp anesthesia is an appropriate choice for regional excision of BCC. When the LA is combined with dexmedetomidine, it can provide sedation, analgesia and hemodynamic stability. We report a case of surgical excision of a giant BCC under scalp block anesthesia to a high risk patient with dexmedetomidine as an additive to local anesthetics.

Case Report: A 95-year old patient underwent BCC scalp excision surgery. He had a history of COPD, CAD, paroxysmal AF, HTN, monocular, BPH, METS<3. Standard monitoring, IBP, Et CO2 were applied. Goals of anesthesia were to provide sedation, anxiolysis and optimal analgesia without disturbing hemodynamic status and respiratory function. The supraorbital, supratrochlear, zygomaticotemporal, auriculotemporal, greater occipital, and lesser occipital nerves were blocked with a total volume of 20 ml lidocaine 1% and 20ml ropivacaine 0.75% plus 1mcg/kg dexmedetomidine (70mcg) equally injected in the aforementioned points. Sensory block was established successfully at 10 minutes. Without administration of other drugs, the 180 min surgery was carried out under mild to moderate sedation (Ramsay score -2 to -3 points) with the patient hemodynamic stable and no complaint of pain or dissatisfaction. He was discharged from PACU with an Aldrete Score of 9. Analgesia endured 20 hours and no signs of delirium occurred.

**Discussion**: BCC is a skin cancer, which often appears on scalp and rarely may grow to dimensions larger than 5 cm. Managing an elderly high risk patient with PNB is of high importance since benefits outweigh risks. Scalp block can be used as an adjunct to general anesthesia or serve as the main anesthetic method. Dexmedetomidine is a selective a2-adrenoreceptor agonist that offers sedation and analgesia and when mixed with a LA it can prolong duration of block. Peripheral infiltration of 1mcg/kg can provide optimal balance between block features and systemic effects while avoiding adverse events of bradycardia and hypotension. Furthermore, following this anesthetic plan a potential admission in the ICU can be avoided and a high risk patient can be managed as a day case.

**Learning points:** This case shows that scalp block is a safe and cost effective choice of anesthesia for extensive skin lesions in high risk patients. The additive of 1mcg/kg dexmedetomidine to LA can augment analgesia, prolong action of LA and achieve sedation with hemodynamic stability without apnea and delirium events.

## 03AP09-11

# Local Anesthetic Systemic Toxicity in an elderly patient for urgent surgery

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**Background**: Peripheral Nerve Blocks are used widely and have improved patient safety and satisfaction while diminishing complications related to general anesthesia. However, Local Anesthetic Systemic Toxicity remains an adverse effect with probable detrimental consequences. We report the management of a case of LAST after Combined Psoas Compartment and Sciatic Nerve Block for a femoral neck fracture that allowed stabilization of the patient and conduct of operation.

Case Report: A 96 year old female presented to the orthopedic department after suffering a right femoral neck fracture. She was classified ASA III physical status as her medical history included chronic atrial fibrillation, hypertension and dementia. She reported a stroke with neurological deficit one month ago. Standard monitoring plus an arterial line were placed. Using a nerve stimulator a total of 25ml Lidocaine 1% and 25ml Ropivacaine 0,5% were injected with negative aspiration test for psoas compartment and sciatic block after proper muscle response. 5 minutes after completion, upper body convulsions, altered mental status and hemodynamic instability developed. Prompt recognition of LAST guided IV infusion of 1,5ml/kg 20% lipid emulsion over 1 minute followed by continuous infusion of 0.25ml/kg/min and midazolam 5mg were administered while intubation was commenced. Titrated vasopressor support allowed normalization of hemodynamic parameters and the surgery was performed successfully. The patient was transferred intubated in the ICU and discharged the following day to orthopedic department.

**Discussion**: Elderly patients with major comorbidities pose a challenge for anesthetists. Peripheral nerve blocks can offer hemodynamic stability when other anesthetic options may be considered high risk. However, LAST can be a devastating event and patient characteristics can amplify the risk of occurence. Its diverse clinical presentation and the probability of late onset toxicity demands thorough monitoring. Emergency equipment and drugs including lipid emulsion must be readily available.

Learning points: LAST although rare is a major and potentially fatal event. Thus, proper organization of departments which commence PNBs must permit prompt management of this complication. Immediate recognition and management can lead to reversal of adverse symptoms and stabilization to proceed with the operation.

### 03AP10-1

# Effects of local anesthesia of the skin on pain during lumbar puncture and patient satisfaction

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Background and Goal of Study: Despite a lower risk profile and a more favorable outcome, a majority of patients prefers general anesthesia over spinal anesthesia for a variety of reasons, one of them being fear of pain during needle insertion. Local anesthesia of the skin before lumbar puncture is neither a standard procedure nor is it clear which method of local application is considered superior. We evaluated the effect on pain reduction of different local anesthetic treatments before lumbar puncture, and assessed patient satisfaction and future acceptance of spinal anesthesia.

Materials and Methods: In this prospective randomized controlled trial 83 patients scheduled for elective surgery under spinal anesthesia were randomly allocated to three subgroups: group I (control) without local anesthesia, group II (EMLA) received EMLA patch and group III (Prilocaine) had local skin infiltration using 2ml of Prilocaine prior to lumbar puncture. Statistical analysis was performed using univariate ANOVA.

Results and Discussion: Insertion pain was significantly reduced in both the EMLA- and in the Prilocaine-group as compared to the control group. Slightly lower pain scores indicated a better pain control in EMLA-group than in Prilocaine-group, though this did not reach statistical significance. Total duration of procedure was significantly longer in Prilocaine-group as compared to EMLA-group. Although pain was significantly higher in the control group, there was no significant difference between patients in all the groups regarding future decision for or against spinal anesthesia.

**Conclusion**: Local anesthetic pretreatment both applied to skin of infiltratred was found to significantly reduce spinal needle insertion pain. Similar to previous findings in different settings our data supports the use of local anesthesia prior to spinal puncture in daily routine for patient comfort.

#### 03AP10-2

# A clinical retrospective study comparing thoracic epidural catheterization between awake and anesthetized patients

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**Background and Goal of Study**: Conducting the regional anesthetic blocks including epidural catheter placement has been well established in anesthetized pediatrics. However, the clinical differences and safety of thoracic epidural catheterization in anesthetized adult patients have not been well evaluated.

**Materials and Methods**: Medical records of 549 successive patients who had received thoracic epidural catheterization before (n = 303) or after (n = 246) anesthesia induction for major abdominal surgery were reviewed retrospectively. We compared the procedure related clinical differences and incidence of complications. **Results and Discussion**: The incidence of radicular pain during the procedure was 1.7 % (n = 5) of patients in awake. The median time for epidural catheterization (66.5 vs. 40.0 s, P < 0.001) and the number of attempts for epidural catheterization (median [Q1-Q3], 1[1-3] vs.1 [1-2], P = 0.003) were increased in awake than anesthetized patients. The incidence of dural puncture and vascular injury was similar between two groups. The median wound pain score using numerical rating scale (0 = no pain, 10 = worst pain imaginable) was lower in awake than anesthetized group (3 vs. 4 on postoperative day 1, P < 0.001, and 2 vs. 3 on postoperative day 3, P = 0.002). Serious complications including meningitis, epidural abscess, epidural hematoma, spinal cord injury, spinal cord ischemia and paraplegia were not observed in both groups.

Conclusion: Overall clinical outcomes and complications of thoracic epidural cathetrization were comparable regardless awake or anesthetized patients. However, long-term follow-up studies of more patients are needed to ensure safety of thoracic epidural procedure in anesthetized adult patients.

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#### 03AP10-3

# Hemodynamic variations between continuous paravertebral and epidural thoracic block in laparoscopic esophagectomy: a prospective study

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**Background and Goal of Study**: Recently the paravertebral thoracic catheter (PVCT) was developed with ultrasounds techniques in thoracic surgery and it seems that it induces less hypotension than epidural (ET) with similar quality of analgesia. The purpose of this study is to compare, for the first time, the proportion of the hypotension episode in both groups in the esophagus surgery, Lewis-Santy, with thoracotomy and laparoscopy.

Materials and Methods: Prospective, randomized, interventional, monocentric study. After ethical committee approval, 26 patients in ET group vs. 28 in PVCT group were included. They had both the following protocol: A bolus of 5ml of Ropivacaïne 0,2% and 10 µg of Sufentanil was injected at the end of the abdominal part of the surgery, then an infusion of Ropivacaïne 0,2% 4ml/h was realized at the thoracic time. Postoperative analgesia consisted on a Ropivacaïne 0,2% infusion at 6ml/h in the ET groupe and 8ml/h in the PVCT group and a bolus of 4ml every 15min as required. The primary endpoint was a mean arterial pressure (MAP) less than 70 mmHn or a decrease in MAP of about 20% when compared to preopérative one Hypotension was correlated to PVCT or ET when all other surgical or anesthesic causes of hypotensions was verified by a standard algorithm in both groups. We compared the MAP till 15 min after the bolus, during the thoracic time, and in the postoperative period until 48 hours. We also assessed the fluid administration, the use of vasopressor drugs, the analgesic efficacy (NRS), and the use of morphine during the post-operative time till 48 hours in both groups. Chronic pain at 3 and 6 months was also compared

**Results and Discussion**: There were significant differences between the two groups regarding the episodes of hypotension (23/26) in ET group vs. (11/28) in PVCT group (p<0,001). The proportion of hypotension was significantly higher after the bolus (p=0,002) and on post operative period (p<0,001). We noticed more use of ephedrine in perioperative (p=0,019) and of noradrenaline in postoperative (p<0,001). There were no significant differences between the two groups regarding the frequency of NRS score > 4. morphine consumption, and chronic pain.

**Conclusion**: PVCT provides better hemodynamic stability than ET, but it is equal efficacy on analgesia to ET in esophagus surgery.

### 03AP10-4

# Regional and neuraxial anesthesia for visceral organ transplant – status quo at german transplant centers

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Background and Goal of Study: The use of perioperative epidural anesthesia leads to a reduction of morbidity and may even influence mortality. However, the risk-benefit ratio of regional and particularly neurraxial anesthesia for visceral transplant surgery is controversial due to potentially beneficial effects on pain and organ function on the one hand and risk of bleeding and infection and their respective sequelae on the other hand. So far, only results from case series and small-scale clinical trials suggest feasibility and effectiveness of epidural anesthesia (EDA) for both renal and liver transplant. The aim of this study was to determine the status quo of the use of regional anesthesia for visceral organ transplant in Germany.

Materials and Methods: An online survey was performed amongst the departments of anesthesiology of all German transplant centers registered for transplantation of visceral organs in the year 2015.

Results and Discussion: The total reply rate was 83%. For liver graft recipients, none of 20 centers used EDA as standard procedure and only one center used an individual patient decision making process. In renal graft recipients, three of 32 centers used EDA as standard procedure and two centers based on individual decision making. In pancreas graft recipients, one of 17 centers used EDA as standard and four centers followed an individual decision making process. The most frequently mentioned reasons against EDA differed between organs: Those were mainly a high bleeding risk during liver transplantation, a significant but clinically not relevant pain reduction for renal transplant patients, and a high infection risk in pancreas transplantation. Regional anesthesia techniques other than EDA were applied even less frequently and solely for renal transplantation. In organ donors, EDA use was also restricted because of an increased risk of bleeding, particularly during partial liver donation.

**Conclusion**: The lack of evidence-based information on the risk-benefit ratio of regional anesthesia during visceral organ transplantation is reflected by the cautious use of these techniques in German transplant centers.

# 03AP10-5

EpiFaith™ Syringe: The Novel LOR Device to Assist the Identification of Epidural Space in Ex- Vivo And In- Vivo Porcine Model

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Background: EpiFaith™ syringe, as an improved loss of resistance (LOR) device was invented to help identification of epidural space (ES) with clear visual signal. The relative position of the plunger and spring-loaded indicator indicates the real-time pressure within the syringe. (Fig. 1A) The adjustable sensing pressure can be selected by different user's experiences. The pressure is conducted and maintained in a specific range (6-16kPa) unless the LOR occurs. (Fig. 1B)

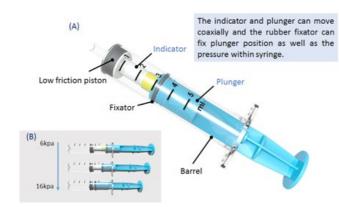


Fig. 1(A) EpiFaith syringe; (B) The relative position of indicator and plunger represents the pressure in syringe. Therefore, a clear visual signal will be identified as pressure drops.

**Materials and Methods**: Ex- vivo test: Twenty attempts with air or saline were performed on a fresh porcine spine. (Fig. 2 A1, A2) Protruding length of needle tip is measured.

In- vivo test: Four attempts on a porcine model were performed and ES was identified by a saline-filled EpiFaith syringe. (Fig. 2 B1) The contrast dye was injected with two images taken before and after the injection. (Fig. 2 B2)

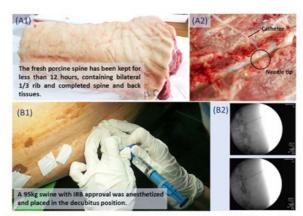


Fig. 2 (A1) The porcine specimen; (A2) The protruding length of the needle tip can be directly measured because the vertebral body has been removed; (B1) Four consecutive attempts were performed sequentially from lumbar to lower thoracic spine. Paramedian approaches (PA) were used; (B2) 18G Touhy needles and 20G catheters were used to complete the procedures. The comparison of images from C-arm can clearly verify the fluid movements.

Results and Discussion: The ex-vivo tests shows clear visual signals when needle tip reaches ES and the protruding length of needle tip is shorter than 1.0 mm; false positive occurred three times. The one resulted with saline was due to repeat redirections without pulling plunger to decrease the pressure. The others resulted with air were due to "loose" tissue from repeatedly testing specimen. Generally, although using saline leads to lower false positive rates, gas does provide faster and clearer visual signals.

The subtractions between x-ray images of in-vivo test demonstrated the correct spreading of contrast dye in all four attempts, suggesting the needle was located successfully.

**Conclusion(s)**: The EpiFaith™ syringe helps physicians to realize occurring of pressure drop, leading to a successful identification of ES. We believe this device with objective signal is beneficial to both junior and senior physicians.

### 03AP10-6

### Intrathecal Morphine for caesarean delivery

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Background and Goal of Study: Caesarean delivery is often associated with strong postoperative pain and still leads in up to 18% to chronic postoperative pain. Intrathecal opioids are commonly used for analgesia and the reduction of needed local anesthetics. We examined, whether the addition of morphine to the standard sufentanil has an impact on postoperative analgesia after caesarean delivery.

Materials and Methods: Using a before-and-after design we examined 153 patients undergoing caesarean delivery. The extent of pain was the primary outcome measure. Secondary measures included adverse events and the use of analgetics during the first 24 hours after surgery. For statistical analysis of the not normally distributed data, the Mann-Whitney-U-Test was used.

Results and Discussion: Evidence from this systematic investigation of the both protocols suggests only a small beneficial effect of additional morphine at a price of more adversive side effects. Women who received morphine and sufentanil reported significant less restrictions in activity in bed (7 vs 7,5) and in sleeping (3 vs 5) [0= no restrictions, 10= maximum restrictions]. They were more satisfied with the pain management (8,0 vs 7,0) [0= very unhappy, 10= very pleased] and were given significant less paracetamol and tramadol than patients who only obtained sufentanil intrathecal.

**Conclusion**: Spinal anesthesia with intrathecal morphine has small beneficial effect concerning activity in bed and in sleeping and lesser extend of pain management at the expense of an increased incidence of nausea, dizziness and pruritus.

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#### 03AP10-7

# Epidural Analgesia in the cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy – a risky practice?

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Background: The Hyperthermic Intraperitoneal Chemotherapy (HIPEC) allows prognostic improvement in patients with peritoneal carcinomatosis. Intraoperative hemodynamic stability and satisfactory postoperative analgesia turn HIPEC in an anesthetic challenge. Epidural technique is recommended, however hematologic and coagulation alterations due to this surgery, can limit the technique. This study aims to evaluate safety and effectiveness of epidural analgesia in HIPEC surgery. Methods: Retrospective descriptive study during 06/2016-06/2017 (data from Acute Pain Group records). Patients were submitted to general anaesthesia and epidural analgesia (patient controlled analgesia). Anesthetic induction: fentanyl, propofol and rocuronium. Maintenance: desflurane, rocuronium and Ropiyacaine 2% (epidural). according to patient needs. Chemotherapy perfusion duration: 60 minutes. After surgery patients were daily evaluated by an Acute Pain Group anaesthetist. Variables evaluated: demographic data; epidural catheter level; surgery duration; epidural catheter and internment duration; blood loss; intraoperative vasopressor needs: fentanyl and ropiyacaine dosage: type of vigilance after post anesthetic care unit discharge; post operative complications incidence; quality of analgesia in movement and at rest. Pain evaluation: quantitative scale. Analgesia considered satisfactory: no pain/soft pain; moderate: moderate pain; poor: intense/maximal

Results:47 patients, mean age 57 years old, 72% female, 83% ASA II and 17% ASA III. Mean surgery duration of 411 minutes. Average fentanyl dosage ev 0,20mg and ropivacaine (2%) epi 52mg. Intraoperative vasopressors needs: 44,6% surgeries. Mean blood loss: 300ml; erythrocyte units transfunded in 3 patients. Nausea and vomiting (NV) prophylaxis: 93,6%. Mean epidural catheter duration: 6 days. Post operative vigilance: 77% Intermediate care unit 77%; Intensive care unit 23%. Internment mean duration: 14 days. Complications incidence: 55,3% (NV: 19,1%; hypotension 12,8%; pruritus 8,5%; paresthesia 6,4%; accidental catheter withdrawal 6,4%; thrombocytopenia or coagulation alterations: 2,1%). Analgesia quality (rest/movement): satisfactory 97,8%/80,8%, moderate in 2,2%/19,2% respectively.

Conclusion: In major complications absence, our experience suggests epidural analgesia as a safe, well-tolerated and effective technique. Tight vigilance is recommended to achieve a satisfactory analgesia and to reduce the complications incidence

#### 03AP10-8

## Spinal Anesthesia with Hypobaric Local Anesthesia for Geriatric Orthopedic Patients

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Background and Goal of Study: Regional anesthesia is the most commonly used method in the hip and lower extremity surgeries, and the majority of patients are in the geriatric age group. In elderly patients, cardiac, endocrine, renal, cerebral, respiratory diseases, perioperative-postoperative morbidity and mortality risk increases. Hypobaric and low-dose local anesthetics can provide adequate analgesia and anesthesia.

Materials and Methods: Twenty-four patients who underwent spinal anesthesia with hypobaric solution were retrospectively investigated. Patients with a mean age of 79±9 had surgery due to hip prosthesis. After routine monitoring of the patients, the fracture side was placed laterally on the lateral side and the spinal anesthesia area was cleaned with povidone iodine. The most suitable interval was observed and a mixture of 10mg isobaric marcaine+37.5mcg fentanyl+2cc distilled water was given in the subarachnoid space with 25G spinal needle.

Results and Discussion: There was no significant decrease in the initial blood pressures measured before and after spinal anesthesia. Initial MAP median was 100±4 mmHg, post-anesthesia MAP was 98±21 mmHg, and no significant decrease was observed. The first input pulse was 80±19/min, the post anesthesia pulse pulse rate was 79±15/min and no significant decrease was observed. Significant elevation was observed in oxygen saturations before and after the block, which was thought to be due to the oxygen mask attached. The mean duration was 81±37 min. Two patients with severe cardiac and pulmonary insufficiency were observed in the PACU for 24 hours, and the other patients were directly removed from the collection room. No complications were detected preoperatively, intraoperatively or postoperatively.

Conclusion: Patients undergoing hip prosthesis surgery are generally elderly patients with high risk co-morbidities and postopertive intensive care follow-up. Regional anesthesia is the first choice in these patients. Central regional blocks made with hypobaric local anesthesia are at a reduced risk of sudden hypotension. In addition, when the fracture is at upper side, it protects the patient from secondary pain and trauma and provides a more comfortable block to both the anesthetist and the patient. We believe that more studies on spinal anesthesia with hypobaric local anesthesia are needed.

### 03AP11-1

# Opioid free anesthesia in Steiner muscular dystrophy

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Background: Steinert muscular dystrophy is the most frequent form of muscular dystrophy in adults with a prevalence of 3-5:100,000 and an autosomal dominant inheritance. Its anesthetic management represents a challenge for the anesthesiologist. The variety of complications that may arise in the perioperative period due to skeletal muscle involvement, multisystemic attainment and increased sensitivity to certain drugs such as opioids, muscle relaxants and the inhalational anesthetics generally involved in general anesthesia. Regional anesthesia is an alternative to general anesthesia avoiding the use of the mentioned drugs and, when free of opioids, it is possible to avoid its adverse effects and,in this particular case, respiratory and cardiac depression and muscular stiffness1

Case Report: We present a case of a 47-year-old patient with Steinert's muscular dystrophy and chronic anemia proposed to total abdominal hysterectomy due uterine leiomyoma. After standard ASA monitoring and active patient warm-up, we chose sequential anesthesia with spinal block in the intervertebral space L3-L4, with injection of 12mg of levobupivacaine (0.5%) reaching a blockage level up to T9 dermatome and consequent placement of an epidural catheter. During the surgical procedure, the level of the blockade was tested and epidural block was performed with 75mg of ropivacaine (0.5%). The patient was still lightly sedated with a propofol infusion and, as part of multimodal analgesia,1g of IV paracetamol was given. The surgery lasted 2.5h and the peri and postoperative period were uneventful. As a postoperative analgesic strategy we chose a PCEA with ropivacaine (0.1%) along with IV paracetamol (1g) every 6h and IV ketorolac (30 mg) twice a day. The analgesic strategy was effective, the epidural catheter was removed on the 3rd postoperative day and the patient was discharged.

**Discussion:** Combined neuraxial anesthesia proved to be an excellent anesthetic technique, it allowed a rapid onset of action and adequate relaxation for the procedure through spinal block and allowed titration of local anesthetic doses according to the desired level of blockade through epidural block.

#### References:

1.Russel SH, Hirsh NP. Anaesthesia and myotonia. Br J Anaesth 1994; 72: 210-6 **Learning points**: Regional techniques are a safe alternative in patients with Steinert muscular dystrophy avoiding exposure to drugs that precipitate seizures and allowing effective postoperative analgesia without the use of opioids.

#### 03AP11-2

# Pneumocephalus following combined spinal-epidural anesthesia – A Case Report

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**Background:** Regional anesthesia techniques, including neuraxial anesthesia, are common anesthetic modalities used in orthopedic surgery. Despite their advantages, there can be complications.

**Objectives:** This article describes a case of pneumocephalus following a combined spinal-epidural (CSE) anesthesia with the "loss of resistance to air" (LORA) technique to the identification of the epidural space.

Case Report: A 78-year-old women ASA III was proposed for a partial hip replacement. We used a CSE anesthesia which proved difficult but was finally achieved after multiple attempts. Immediately after the procedure, the patient was unconscious, without any voluntary movements or response to call, maintaining spontaneous respiration and hemodynamically stable. This situation reversed in about 30 minutes. Cranial CT scan reveled multiple intracranial air collections. The patient recovered with no other symptoms related to pneumocephalus.

**Conclusions:** There are little advantages in using the LORA technique and there are rare but potentially severe complications of its use. Therefore its use must be weighted/ we discourage its practice.

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#### 03AP11-3

# Continuous spinal block in a geriatric patient with multiple comorbidities

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**Background**: Continuous spinal block (CSB) is a well-established technique of regional anesthesia as it may prove advantageous in geriatric patients and/or patients with severe cardiorespiratory pathology. CSB combines the fast onset of spinal block with the possibility of repeated administration of titrated doses until the intended blockade is achieved, as well as the possibility to prolong anesthesia in long surgeries. In addition,it allows a reduction of the dose of the drugs used and, consequently, a reduction of toxicity and less interference with the respiratory and cardiovascular systems1

Case Report: We report a case of an 80-year-old woman with a history of uncontrolled hypertension, severe COPD, class III heart failure (NYHA), obesity, moderate pulmonary arterial hypertension moderate mitral and tricuspid insufficiency, severe aortic stenosis and ischemic heart disease proposed for total knee arthroplasty. After standard ASA monitoring and invasive blood pressure monitoring, the patient was pre-medicated with 1mg midazolam and 50 µg fentanyl and a catheter was placed in the subarachnoid space at L2-L3 level and an initial dose of 5mg of levobupivacaine (0.1%) with 2  $\mu g$  of sufentanil was administered Surgery started after verification of a block level up to the L1 dermatome. During the surgical procedure another administration of 2.5mg of levolupiyacaine was performed. The patient remained hemodynamically stable throughout the surgery with MAP values above 62 mmHg. 100mg of tramadol and 1g of paracetamol were also provided. The surgery lasted approximately 2 hours and the spinal catheter was removed at the end of the surgery. In the scope of postoperative analgesia, a continuous femoral block with ropivacaine PCRA (0.15%) was performed. Regional analgesia was further supplemented with 30 mg 12/12h IV ketorolac and 1g IV paracetamol 6/6h. The postoperative course was uneventful and postoperative analgesia was effective. The patient was discharged on the 7th postoperative day. Discussion: In this clinical case, general anesthesia and single-shot spinal block could have been relatively contraindicated, and CSB proved to be safe and an effective alternative allowing a high intraoperative hemodynamic stability in a patient with severe cardiorespiratory pathology.

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**Learning points**: CSB is a safe and an effective alternative in complicated cases and provide high hemodynamic stability.

#### 03AP11-4

Surgical drainage of a hepatic abscess under thoracic epidural anesthesia using intravenous (I.V.) dexmedetomidine

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**Background**: Hepatic abscesses are extremely morbid. Surgical drainage under general anesthesia, is indicated for abscesses over 5cm in diameter. We report a case of surgical drainage of hepatic abscess under thoracic epidural anesthesia using IV dexmedetomidine in a patient with severe chronic obstructive pulmonary disease (COPD).

Case report: A 70year-old man was admitted to our General Surgery Department with fever and abdominal pain. A hepatic abscess 7,5 cm in diameter was found, thus surgical drainage was mandated. Once the options were discussed with both the patient and the surgeon, performing the surgery under thoracic epidural anesthesia was decided. A 20G catheter was set in the epidural space through the T7-T8 intervertebral space where 10 ml of ropivacaine 0,75% and 1ml fentanyl 0,05mg/ml were injected. Meanwhile, intravenous infusion of dexmedetomidine was initiated (1mcg/kg/h). The sensory block was sufficient, with no signs of respiratory distress or remarkable changes in blood pressure or heart rate. The operation was carried out smoothly.

**Discussion**: Epidural anesthesia has been shown to reduce postoperative pulmonary complications¹ (PPCs) and it has been proven safe to use in a hepatectomy under conscious sedation². Dexmedetomidine³ reduces stress during surgical procedures under regional anesthesia. In our case, the patient's COPD, an independent risk factor for the development of PPCs, was the main reason to perform this anesthetic technique.

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**Learning points** This is the first upper abdominal surgery under epidural anesthesia and dexmedetomidine.

It should be clear that this technique, even if performed by anesthetists experienced in regional anesthesia, it cannot be considered as a first choice for this kind of surgery.

However, it may be suitable in patients with impaired respiratory function who are in elevated risk for PPCs.

#### 03AP11-5

# Accidental subdural catheterization after epidural technique for analgesia during labor. About a case

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**Background**: Among the complications of the epidural technique there is the subdural blockade (SB) and cannulation of subdural space<sup>1</sup>, with a prevalence of 0.02% and low diagnostic rate. We present the case of a woman with SB who gave birth and had definitive radiological diagnosis after clinical suspicion.

Case Report: 32 years-old woman in labor requesting epidural analgesia. We performed a single atraumatic puncture with Tuohy 18G needle, administering test dose with 3 ml of 0.25% bupivacaine (7.5 mg) with vasoconstrictor; no hemodynamic or blockade response. Then a total dose of 10 ml, 9ml 0.125% Levobupivacaine (LVB 11.25 mg) + 1 ml fentanyl (50 mcg), is administered fractionally. After five minutes, physical examination shows paralysis of both legs (Bromage scale 3), without motor deficit in upper limbs, pain and temperature abolished to T3-T4 level, also hypotension; no respiratory distress. We delay continuous infusion of LVB and observe the regression of the clinical symptoms to avoid other complications (mainly neurological or cardiac). Painless childbirth after 110 minutes without more analgesic requirements. The patient recovers mobility in lower limbs 15 minutes after labor and no headache appears on successive days. NMR confirms the diagnosis with "railroad track" image.

**Discussion**:The handling of the case was correct; the patient was diagnosed soon and the appropriate safety measures were prepared to cope with possible complications in the delivery room (general anesthesia with intubation devices,

lipid emulsion, etc.). Characteristics of sensitive blocking are: short duration, large, asymmetrical, patched, with cephalic progression. Motor blockade is variable, limited, with short duration. SB could produce sympathetic blockade with Horner syndrome or alterations of II and IV cranial nerves. The Hoftman and Ferrante criteria are used for diagnosis.

#### References:

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**Learning points**: 1-SB is clinically heterogeneous. 2-Clinical suspicion with radiological definitive diagnosis<sup>2</sup>. 3-If suspected, we should dose volume, concentration and time lapses of the anesthetics administered. 4-Do not confuse SB with total spinal blockade. 5-Clinical follow-up is important after complications, always guided by the pain specialist.

## 03AP11-6

# Continuous spinal anaesthesia in the high-risk orthopedic elderly patient: a case report

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**Background**: Severe aortic stenosis is a serious condition which requires tight haemodynamic control during surgery. We present an example of its management using an uncommon anaesthestic technique: continuous spinal anaesthesia.

Case Report: An 83-year-old man presented at the Emergency Department due to an accidental fall. Radiographic evaluation showed a total hip arthroplasty periprosthetic fracture. Past medical history included severe aortic stenosis, Parkinson disease with dementia, and COPD. Due to patient comorbities we decided to perform the procedure under peripheral nerve blocks and continuous spinal anaesthesia. Ultrasound-guided femoral and lateral cutaneous femoral blocks were done with 20ml of ropivacaine 0.5%. Dural puncture at L3-L4 level followed, using a 18G Tuohy needle, and the catheter introduced intrathecally. Imag of sufentanyl and 3mg of isobaric bupivacaine were given through the catheter, and pushed forward with 1.2ml bupivacaine. Surgical sensitive blockade was accomplished 15 minutes later. The procedure lasted 2 hours without any further anaesthetic administration. No adverse haemodynamic effects or cardiac events were noted and postoperative recovery was uneventful. The patient did not complain of postdural puncture headache or lower limb pain after surgery, and was safely discharged from anesthesia care.

**Discussion**: Continuous spinal anesthesia is a rarely-used technique for providing effective anesthesia. The anaesthetic management of patients with severe aortic stenosis requires careful planning to minimize the already known high morbidity and mortality secondary to preload and afterload sudden decreases. These patients depend on adequate preload to overcome the mechanical outflow obstruction, but also on afterload which ensures coronary perfusion (of particular importance considering the oxygen requirements of a typically hypertrophied heart). Finally, reflex tachycardia from a single-shot spinal can cause sudden hemodynamic collapse.

## References:

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**Learning points**: Continuous spinal anaesthesia, although uncommon, remains a useful anaesthetic skill. An aging population and its increasing effects on health issues, namely severe cardiovascular disease, challenges anesthesiologists to provide effective and safe intra-operative care.

### 03AP11-7

# Multimodal anesthesia combining Erector Spinae plane block (ESP block) and general anesthesia in a series of 4 patients who were to undergo laparoscopy nephrectomy

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Multimodal anesthesia combining epidural catheter and general anesthesia is a common technique in surgeries with intense postoperative pain. However, placement of the epidural catheter is not always possible, either due to technical difficulties or conditions of the patient that contraindicate its insertion.

Erector Spinae plane block or ESP block [1], recently described, provides extensive and potent but unilateral analgesia. This block is made by injecting the anesthetic in the plane between the Erector Spinae muscle and the transverse process. Its effect is due in part to the diffusion of the local anesthetic to the paravertebral space through the spaces between adjacent vertebrae, acting both on the dorsal and ventral branches of the thoracic spinal nerves [1–3].

Its safety profile is different from the epidural catheter. Placement is performed under ultrasound guidance, the target is the transverse process, which is easily

identifiable and is relatively distant from neural or major vascular structures and the pleura, and, finally, provides an extensive analgesic effect with a single puncture. We present a series of 4 patients who were to undergo laparoscopy nephrectomy, with ESP block as part of a multimodal analgesia.

We perform the block before anesthetic induction at T8 level. The highest EVA score was 2/10 in one patient and 1/10 in the remaining 3 during postoperative follow-up (36-48 hours). Patients only reported diffuse abdominal discomfort of low intensity, which we attribute to peritoneal irritation related to laparoscopy.

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#### 03AP11-8

# Spinal stenosis: little air, big trouble

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**Introduction:** Spinal stenosis is a narrowing of the spinal canal and neural foramina. Symptoms, like back and/or leg radicular pain, are thought to result from neurologic compression and diminished local nerve perfusion. Case series and reports suggest that undiagnosed spinal stenosis could be a significant contributor to neurologic complications after neuraxial block.

Case report: 90-year-old woman presented for closed reduction of right proximal femoral fracture. Medical history of hypertension, congestive heart failure and chronic renal failure. A continuous spinal technique was performed using 2ml of an anesthetic mixture with 5mg of levobupivacaine, 2,5ug of sufentanil and 50mg of magnesium sulfate (MgSO4-). 40 minutes later she was admitted in the Postanaesthetic Care Unit, with complete reversal of motor and sensitive blockade. For control of pain (7/10) 1ml of levobupivacaine was administered through the subarachnoid catheter with immediate pain relief. After a few minutes, a motor block, disproportionate to the sensitive block, was noted. Four hours later as the motor block remained an urgent MRI was requested, revealing critical L2-L5 spinal stenosis and a small air bubble at L2 level. After evaluation by neurosurgery a conservative approach was decided. Complete recovery of quadriceps femoris function occurred 48 hours later, with no other neurological disfunction.

**Discussion:** Patients with spinal canal pathology, including spinal stenosis, are usually not candidates for neuraxial blockade because of the risk of exacerbating preexisting neurologic deficits or developing new ones.

Although other causes such as ischemia or neurotoxicity cannot be ruled out, the most probable explanation for prolonged motor block in this case was the small pneumocephalus aggravating the previous neural compression.

Conclusion: The safety of neuraxial anesthesia in patients with spinal stenosis remains controversial. Additional research is required to quantify the risk and characterize the mechanism of severe neurologic complications after spinal blockade. A double-crush mechanism should always be kept in mind when considering a spinal technique in patients with preexisting spinal stenosis.

# 03AP11-9

# Aracnoiditis and obstructive hidrocephalia after spinal anesthesia with prilocaine (PART I)

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**Background**: Neuraxial anesthesia is a widely used procedure to perform a multitude of surgical interventions. Knowledge of the technique and skill is needed to reduce possible complications. Although with little frequency, after performing the anesthesia technique, patients can present neurological deficits

Case Report: A 44-year-old man with no previous medical history, who underwent a cystoscopy to study hematuria.

A spinal anesthesia is performed: Puncture L3-L4, unique, atraumatic. Needle n 27 Whitacre. Clear CSF (cerebrospinal fluid). 40 mg of Prilocaine are administered. Aseptic technique and without incidents. At the end of the technique, the patient reports that he has felt paresthesias in lower left member.He is sedated with propofol during the procedure.

After finishing, the patient goes to the Post-Anesthesia Recovery Unit to continue with their care and is discharged to the hospitalization room at 2 h, after recovery from motor block, clinical stability and without presenting any incidence.

In the room, the patient reported numbness and paresthesias in both legs and anal

At 48 h, he presents progressive improvement of strength in lower limbs, so he is discharged four days after the procedure.

After 11 days of the procedure, he goes to the Emergency due to the impossibility to defecate. The examination highlights: S2S4 sensory alteration, paresis of the proximal musculature of both lower limbs, subjective hypoesthesia perianal area.

Lumbosacral MRI is also performed urgently, evidencing the roots of the cauda floating on a liquid discretely denser than CSF, from L2 to L5, as well as edematous appearance of the covers that enhance after the administration of contrast (Figure 1)

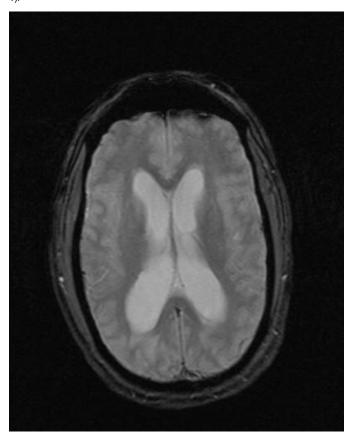


Figure 1.
The patient is diagnosed with arachnoiditis secondary to spinal anesthesia.
Treatment with Methylprednisolone 1 g was decided for 5 days.

He presented progressive improvement of strength in lower limbs, sensory improvement, maintained defecation and spontaneous micturition, so he was discharged 13 days after admission.

## 03AP11-10

Transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache after caesarean section Keywords: Sphenopalatine ganglion block, Postdural puncture headache

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Backgraund: The sphenopalatine ganglion (SPG) is a parasympathetic ganglion, located in the pterygopalatine fossa. The SPG block is used for a long time in the treatment of headache of various reasons. Post dural puncture headache treatment (PDF) for anesthesiologists has always been problematic. When an SPG block cannot relieve pain due to PDPH, an epidural block patch (EBP) is applied (1).

**Method**: The Cotton-tipped applicators, one for each nostril, were inserted parallel to the nose floor and advanced until resistance was felt. This represents contact with the posterior nasopharynx wall. Each cotton-tipped applicator was left in place for approximately 10 min. Symptoms relief was reported 5 min after the cotton-tipped applicators were removed. Twenty female patients with postspinal headache after cesarean section were included in the study. Patients were ASA I or II. We used Visuel Analog Scale (VAS) to assess the severity of the headache. The cotton-tipped applicators was soaked up with 0.3 ml of 0.5% bupivacaine cotton tips before intranasal placement. We sent 0.2 ml of 0.5% bupivacaine to the back of the cotton-tipped applicators.

The cotton-tipped applicators was held for 5 minutes intranasal. Then 0.2 ml of bupivacaine was sent through the bar and the rod was held for 5 more minutes. Blood pressure and oxygen saturation were followed. The response was taken immediately after 5 min. However, after 6 hours postspinal headache peaked in five patients, and SPG block was reapplied to the patients. Patients were discharged 24 hours after being observed and then prescribed caffeine 520 mg-acetaminophen 4000 mg orally in 24 hours.

**Discussion:** SPG block is not the gold standard for postspinal headache. PDF is the gold standard for postspinal headache. However, the SPG block is a treatment that can be applied at the bedside and results immediately. We can easily implement the SPG block in a multimodal approach (1.2).

**Conclusion**: Sphenopalatine ganglion (SPG) block is an easy and successful procedure for postspinal headache. **References:** 

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#### 03AP11-11

Trends in practice and safety measures of epidural analgesia: report of a national survey

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Background and Objectives: The clinical use of epidural analgesia has profoundly changed over past decades. Minimally invasive surgery and emergence of alternative analgesic techniques have led to a decline in its use. In addition, there is increasing awareness of the patient-specific risks for complications such as spinal hematoma and abscess. Local guidelines for management of complications, i.e. 'epidural alert' systems, have been introduced in some hospitals to coordinate and potentially streamline early diagnosis and treatment. How widely such protocols have been implemented in daily practice is unknown.

**Methods**: We conducted a web-based survey in order to analyze trends in practice, key indications, safety measures, safety reporting and management of complications of epidural analgesia in the Netherlands. Data were gathered using a questionnaire. We used descriptive statistics to analyze the data.

Results: Data from 85 of 94 hospitals were collected and analyzed, a response rate of 90%. Fifty-five percent reported a trend towards decreased use of perioperative epidural analgesia, while 68% reported increasing use of epidural analgesia for labor. Key indications for epidural analgesia are thoracotomy, laparotomy of the upper abdomen and abdominal cancer debulking. An epidural alert system was available in 45% of Dutch hospitals, whereas in the remaining hospitals responsibilities and timelines for management of epidural emergencies are determined on an ad-hoc hasis

**Conclusions**: This national audit concerning use and safety of epidural analgesia demonstrates that the majority of Dutch hospitals do not have procedures and policies in place to manage suspected spinal hematoma or abscess.

**Acknowledgements:** The authors would like to thank all anesthesiologists who filled in the questionnaire.

# **Obstetric Anaesthesiology**

### 04AP01-1

Single bolus propacetamol with patient-controlled epidural analgesia in post-cesarean pain control

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Background and Goal of Study: The addition of non-opioid analgesics to provide opioids dose-sparing and reduce opioids related side effected has been widely used in postoperative pain management. Propacetamol is an intravenous formulation of paracetamol prodrug. The study was aimed to investigate the analgesic effect of propacetamol on post-cesarean pain and epidural analgesics consumption within 48 hours.

Materials and Methods: We performed a prospective, randomized, placebo-controlled trial for single-dose of propacetamol to patient controlled epidural analgesia (PCEA). Sixty parturients undergoing epidural anesthesia for cesarean delivery received either 1 g paracetamol (Group P) or saline (Group C) immediately after the delivery of placenta. All patients were provided with bupivacaine and fentanyl solution via PCEA. Primary outcome was measured by pain intensity. Postoperative pain was assessed by numeric rating scale (NRS) at postoperative care unit, 2, 6, 24 and 48 hours postoperatively. The total consumption of PCEA solution, rescue analgesics, muscle tone, side effects and satisfaction were recorded and analyzed.

**Results and Discussion**: Pain intensity in Group P(n=31) was significantly lower compared to Group C (n=29) only within initial 2 hours at rest (0.8±0.9 vs 1.5±1.6, p=0.04) but not during movement (p=0.18) . Total morphine consumption and patients requested rescue analgesic did not differ significantly between groups(p>0.05). There was no difference between groups with respect to muscle tone, side effects and patient satisfaction (P>0.05).

**Conclusion(s)**: The addition of single-bolus intravenous 1 g paracetamol to PCEA reduced pain intensity only within 2 hours after cesarean delivery but did not provide a PCEA dose-sparing effect during the first 48 hours.

### 04AP01-2

Manual uterine displacement does not always increase the inferior vena cava cross-section area after subarachnoid injection of local anesthetics for Caesarean section

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Background: The inferior vena cava (IVC) in a parturient is compressed by enlarged uterus, which is thought to be one of the causes of hypotension after subarachnoid local anesthetic injection (SI). Therefore, aortocaval decompression maneuvers, such as left lateral tilt of 15 or leftward manual uterine displacement (MUD), are widely adopted during Caesarian section (CS) to reduce assumed IVC compression by the pregnant uterus in the supine position. However, a recent magnetic resonance imaging study shows that a 15 left lateral tilt is not a sufficient relief from the IVC compression in term parturients, and the dogma is in controversy. The MUD is another measure to avoid IVC compression, however, there is no study showing IVC decompression by it under spinal anesthesia for CS. The purpose of this study is to uncover the effect of MUD by measuring IVC cross-section area (IVCCA) using ultrasonography in term parturients who undergo spinal anesthesia for caesarean section.

Materials and methods: 88 full term pregnancies receiving elective CS under spinal anesthesia were included in this study from January to November 2017. We measured end-expiratory IVCCA "before anesthesia (supine position)", "3 minutes after SI", "after applying MUD (3-6 minutes after SI)", and "after operation". To obtain IVCCA, we used planimetry with a sector probe (S-NerveTM FUJIFILM SonoSite Japan) at epigastric fossa. We defined 20% change of IVCCA or more compared to the prior one as significant.

Results and Discussion: We were able to obtain the data of IVCCA in 73 patients "before anesthesia" and "3 minutes after SI". IVCCA of "3 minutes after SI" became significantly small (P = 0.0234). In 65 patients, we were able to compare "3 minutes after SI" and "after applying MUD". MUD was effective in 26 patients (40%), but there was no significant difference between the two measures (1.00(0.65-1.58) v.s. 1.15 (0.57-1.85) cm2, P = 0.63). On the other hand, MUD was effective in 17 of 29 patients (59%) whose IVCCA at "3 minutes after SI" was decreased by more than 20% from the "before anesthesia". In those patients, the IVCCA of "3 minutes after SI" and "after applying MUD" were 0.69 (0.44-1.15) and 1.33(0.49-1.91), respectively.

Conclusions: We measured IVCCA in full term parturients during anesthetic management for elective CS. Although MUD was considered to be effective in parturients whose IVCCA decreased after SI, IVCCA was not increased in general by MUD.

#### 04AP01-3

Large Volume Bupivacaine 0.5% versus Small Volume in Elective Caesarean Section 89

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**Background and Goal of Study**: Spinal anesthesia in cesarean section still presenting a quiz to the anesthetist in the form of severe hypotension and difficult satisfactory surgical conditions. In this study, we tried to solve this quiz by increasing the volume of bupivacaine to achieve proper spinal level accompanied with prolonged sitting up to avoid hypotension.

Materials and Methods: 53 patients were randomly divided into two groups B and C. Group B (25 patients) received 3 ml bupivacaine and left 5 minutes sitting up while group C (28 patients) received 2.5ml and asked to lie immediately supine. Both groups were tested for hypotension, ephedrine dose, and sensory block level. Results and Discussion: There was a statistically significant decrease in ephedrine dose in Group B (7.2±15.684 mg in group B versus 27.86±12.04 mg in group B with a P value <0.05). The proper surgical level was achieved in both groups.

**Conclusion(s)**: Large volume 3ml of bupivacaine with prolonged sitting will lead to fewer incidences of hypotension and proper surgical block. **References:** 

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#### 4AP01-4

Incidence and risk factors for 24-hour postoperative nausea and pruritus after low dose neuraxial morphine in parturients undergoing Cesarean delivery treated prophylactically with ondonsatron and dexamethasone

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Background and Goal of Study: Neuraxial morphine is recommended as first line treatment for postoperative cesarean section pain but is frequently accompanied by nausea, vomiting and pruritus. In this study we examined the incidence of postoperative nausea and vomiting (PONV) and pruritus 1 hour and 24 hours following treatment with low dose intrathecal morphine and prophylactic dexamethasone and ondansetron in parturients undergoing cesarean delivery.

Materials and Methods: In this prospective, observational, cohort study, 201 women undergoing cesarean delivery under spinal anesthesia with intrathecal morphine were included. All participants were approached preoperatively and requested to fill out a questionnaire regarding anesthesia experience and previous history of PONV and pruritus. All parturients received spinal anesthetisa with a standardized solution which included hyperbaric bupivacaine 12 mg, fentanyl 20 mcg, preservative-free morphine sulfate 0.1 mg with prophylactic dexamethasone 4 mg and ondansetron 4 mg. In the post anesthesia care unit and 24 hours postoperatively women were interviewed regarding development and severity grade (0-10) of nausea, vomiting, and pruritus.

Results and Discussion: In the recovery room there was a 14.5% of nausea and a

77.6% of pruritus. 17.9% of women had nausea and 73.3% of women had pruritus 24 hours after surgery. Severe nausea occurred in 7.4% of women, and severe pruritus occurred in 24.9% of women. Women with nausea and pruritus in the PACU (Post anesthesia care unit) had higher incidence of 24 hour nausea and pruritus, as compared with women who did not suffer from nausea and pruritus in the PACU. Conclusion(s): In our study cohort, there was a moderate rate of postoperative nausea and high rate of postoperative pruritus 24 hours after low dose neuraxial morphine administration, in spite of dual prophylaxis treatment with dexamethasone and ondansetron. Our findings suggested that women who experience nausea, vomiting or pruritus in the immediate postoperative period are at increased risk for

persistent PONV and pruritus.

#### 04AP01-5

# Mini-dose of oxytocin at the beginning of spinal anaesthesia for Caesarean section: the influence on uteroplacental blood flow

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**Background and Goal of Study**: Our previous results [1] showed that in spinal anaesthesia (SA) for Caesarean section (CS), Torroni's technique of i.v. administration of 0.5 IU of oxylocin immediately after SA and before delivery significantly attenuated maternal arterial hypotension and lessened phenylephrine use. The goal of our study was to assess the possible influence of this technique on the uteroplacental blood flow.

Materials and Methods: SA for elective CS was performed in 12 women, randomly divided into study (n=6) and control (n=6) groups. In the study group, slow i.v. bolus of oxytocin (0.5 IU) was administered immediately after SA performance. Uterine and umbilical circulation blood flow was measured just before and 5-6 min after performance of SA

Results and Discussion: Right uterine artery systolic/diastolic ratio (SDR) in the study and control groups (M±SD) was, resp., 1.69±0.09 and 2.07±0.68 before, 3.49±1.80 and 3.09±1.26 after SA performance, all differences insignificant; resistance index (RI) was, resp., 0.40±0.03 and 0.51±0.12 before, 0.65±0.10 (p=0.004 vs pre-anaesthetic) and 0.56±0.14 after SA performance. Left uterine SDR was, resp., 1.75±0.21 and 2.07±0.61 before, 3.77±1.83 (p=0.041 vs pre-anaesthetic) and 3.38±0.95 (p=0.035 vs pre-anaesthetic) after SA performance; RI was, resp., 0.42±0.06 and 0.49±0.10 before, 0.68±0.11 (p=0.003 vs pre-anaesthetic) and 0.67±0.09 (p=0.018 vs pre-anaesthetic) after SA performance. Umbilical arterial SDR was, resp., 2.49±0.26 and 2.59±0.31 before, 2.92±0.93 and 2.72±0.87 after SA performance; RI was, resp., 0.59±0.05 and 0.58±0.06 before, 0.62±0.13 and 0.59±0.11 after SA performance. Any intergroup difference was not significant. The moderately increased resistance of uterine arteries during SA in both groups may result from both regional analgesia and uterine contractions. Umbilical arterial RI did not change significantly.

**Conclusion(s)**: Torroni's technique during spinal anaesthesia for Caesarean section has no negative influence on uteroplacental blood flow.

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#### 04AP01-6

# Using simulation to implement a general anaesthesia checklist for caesarean sections

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**Background:** Following an audit of obstetric general anaesthesia (GA) practice, difficult obstetric intubation rates (14.6%) in our institution were found to be higher than reported (0.64% to 5.7%)<sup>1,2</sup>. Improper airway assessment and planning can contribute significantly to adverse airway events<sup>3,4</sup>. The use of a GA checklist may facilitate preparation<sup>5</sup>.

Materials and Methods: A retrospective chart review auditing obstetric GA practice over 6 months was performed<sup>6</sup>. A checklist was developed (figure 1). Anaesthetic trainees participated in a simulation of an obese parturient for Category 1 GA caesarean delivery (CD) without, and subsequently with the checklist. The checklist was modified, introduced into clinical practice and reviewed 1 year later.

Results and Discussion: In 2015, 7.5% of CDs were performed under GA. The GA audit revealed 45% (18/41) of GA CDs occurred after-hours. 46% (19/41) were category 1. The difficult intubation rate was 15% (6/41). Five patients had a Cormack-Lehane grade 3 and one patient had elective awake fibre-optic intubation. Simulation identified the omission of essential steps in airway preparation. Only 55% of trainee (11/20) ensured suction functioned, 50% (10/20) confirmed bougie at-hand and 20% (4/20) checked they had a 2nd generation LMA available. 45% (9/20) put the patient head up and 20% (4/20) pre-oxygenated to ET 02 of >0.9. Repeated simulation with use of a checklist during pre-oxygenation did not delay time to induction.

Despite 95% of trainees stating it improved safety, only 57% of trainees and 54% of nurses had incorporated it into routine practice 1 year later.

Conclusion: There is a high rate of difficult intubation in our unit and a significant proportion of GA CDs happen out-of-hours. Whilst introduction of a checklist improved preparation, poor compliance remains a challenge despite education and training.

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- 2. McKeen DM., et al. CJA 2011;58(6):514-24
- 3. Cook TM, et al. BJA 2011;106(5):632-42
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6. Joy S et al.RCOA 2012. pp. 224–5 **Figure 1.** Checklist



Prophylaxis

Sodium Citrate 30ml

Position
Ramp or Table hand controls
Left Lateral Tilt

Preoxygenation
Tight fitting mask (15L/min)
Nasal prongs (10L/min)
ET 02 > 0.9

Primed
Running iv line

#### 04AP01-7

Pressure

Cricoid

The peripartum hemodynamic profile of singleton versus twin pregnacies in parturients delivering with spinal anesthesia and prophylactive phenylepherine drip measured by noninvasive cardiac output monitoring

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Background and Goal of Study: Spinal anesthesia is considered gold standard anesthetic technique for cesarean deliveries (CD) but is associated with a high rate of hypotension. The recent international consensus recommends continuous prophylactic phenylephrine infusion (PPI) administered throughout CD titrated to blood pressure measurements to prevent hypotension. However little information is available on hemodynamic profiles of women with twin pregnancies as compared to singleton pregnancies perioperatively. Therefore, in this study we aim we compare maternal hemodynamic changes both intraoperatively and postoperatively with the use of the NICAS bio impendence monitor in healthy singleton versus twin parturients undergoing CD deliveries with spinal anesthesia with PPI.

Materials and Methods: After IRB approval and signed informed consent, healthy term women with either twin or singleton undergoing spinal anesthesia for uncomplicated CD were enrolled. The following data were collected - cardiac output (CO), strove volume (SV), mean arterial pressure (MAP), and total peripheral resistance (TPR). Measurements were measured at 5 time points: 1) before arrival in OR, 2) after spinal anesthesia with PPI, 3) after beginning of oxytocin infusion 4) in post anesthesia care room 5)24 hours postoperatively and 6) 48 hours postoperatively. All parturients received standardized spinal solution consisting of 12 mg hyperbaric, 20 mcg fentanyl and 100 mcg preservative-free morphine. PPI was administered was titrated to preserve blood pressure to 20% of baseline blood pressure and stopped at the end of surgery. Oxytocin was administered as a continuous infusion (20 units/ 1000cc Ringer lactate) at a rate of 100cc/hr.

Results and Discussion: One hundred thirty seven women singletons and 27 women twins competed the study. There were no significant differences between groups in age or BMI. Hemodynamic data are found in Table 1. Intraoperatively there was no difference in any hemodynamic parameter. However postoperatively at all three times women with twin pregnancies had higher MAP, lower CO and higher TPR compared with parturients with singleton pregnancies (Figure 1).

Conclusion(s): There were significant hemodynamic changes postoperatively but not intraoperatively in parturients with twin pregnancies compared to women with singleton pregnancies. These changes need to be studied further.

### 04AP01-8

The peripartum hemodynamic profile of healthy women delivering with spinal anesthesia and prophylactive phenylepherine drip measured by noninvasive cardiac output monitoring

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Background and Goal of Study: Spinal anesthesia is considered gold standard anesthetic technique for cesarean deliveries (CD) but is associated with a high rate of hypotension. The recent international consensus recommends continuous prophylactic phenylephrine infusion (PPI) administered throughout CD to prevent hypotension. In recent years, numerous non-invasive devices have become available for to measure cardiac output (CO) and to calculate total peripheral resistance (TPR). The whole-body bio-impedance based device (NICAS) is a noninvasive device previously validated. Therefore, in this study we aim we aimed to identify maternal hemodynamic changes both intraoperatively and postoperatively with the use of this machine in healthy singleton parturients undergoing CD deliveries with spinal anesthesia and PPI.

Materials and Methods: After IRB approval and signed informed consent, healthy term women undergoing spinal anesthesia for singleton CD were enrolled. The following data were collected - CO, mean arterial pressure (MAP), stroke volume (SV) and TPR. Measurements were measured at 5 time points: 1) before arrival in OR, 2) after spinal anesthesia with pi 3) after delivery of baby and beginning of oxytocin infusion 4) in post anesthesia care room 5)24 hours postoperatively and 6) 48 hours postoperatively. All parturients received standardized spinal solution consisting of 12 mg hyperbaric, 20 mcg fentanyl and 100 mcg preservative-free morphine. PPI was titrated to preserve blood pressure to 20% of baseline and stopped at the end of surgery. Oxytocin was administered as a continuous infusion (20 units/ 1000cc Ringer lactate) at a rate of 100cc/hr.

Results and Discussion: One hundred thirty seven women competed the study. Average age was 34.9±5.7 and average BMI was 30.1±5.1. Hemodynamic data are found in Table 1 and Figure 1. One hour after delivery in the PACU, there were significant decreases in stroke volume, heart rate, blood pressure and CO with a concomitant increase in TPR. Within 48 hours the TPR decreased and CO and stroke volume increased and TPR decreased.

**Conclusion**: Significant hemodynamic changes were seen at all time points both intraoperatively and postoperatively with the most significant changes occurring one hour postoperatively. Further studies need to be performed to discover hemodynamic changes of spinal anesthesia and PPI in different parturient populations.

# 04AP01-9

# Caesarean-section: one-year retrospective study

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**Background and Goal of Study**: Labour is a painful experience and several analgesia techniques are available. When C-section has to be performed there is no standard anesthesia technique.

**Materials and Methods**: The objective of this retrospective study was to evaluate the anesthesic techniques more used in cesarean sections in our hospital and in which context it was performed other technique.

Results and Discussion: After obtaining approval from the ethics committee, we collected anesthetic data from all caesarean sections performed between January and December of 2016, in Centro Hospitalar Tondela-Viseu Portugal. During this period, there were a total of 1.961 births, 439 of them by C/S (22,4%). Two hundred and five (46,7%) were performed in emergency and two hundred and thirty four (53,3%) were elective. Regional anesthesia was performed in 371 patients (84,5%) [Epidural anesthesia for 361 patients (82,2%), spinal block for 2 (0,5%), sequential for 5 (1,1%) and combined spinal-epidural anesthesia for 3 patients (0,7%)]. General anesthesia was performed in 68 patients (15,5%), all of them as an emergency.

**Conclusion:** In our hospital 22,4% of births are performed by C-section. If not contraindicated, regional anesthetic techniques are the preferred method for C-section delivery in our hospital, once they are associated with lower morbidity (3-4). The main reason to perform a general anesthesia in our hospital is emergency.

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Gynecol, 2005, vol. 106 (pg. 281-7)

### 04AP01-10

### General anaesthesia for c-section - why do we still do it?

91

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**Background and Goal of Study**: In Portugal caesarean-section (c-section) rate is 32,9% (1). Although regional anesthesia (RA) is the hallmark choice for c-section, general anesthesia (GA) may be indicated due to emergent/urgent delivery, contraindication for regional technique or inadequate regional block. The WHO suggests an ideal rate of 5 to 10% of c-section deliveries for optimal mother and child outcomes (2).

The goal of the study was to characterize women that underwent general anesthesia for c-section in a tertiary obstetric unit from january 2015 to october 2017.

**Materials and Methods**: Review of clinical and anesthetic data of consecutive women submitted to c-section under GA in the considered time frame. Retrospective and descriptive analysis was performed.

**Results and Discussion**: In this period there were 7057 deliveries and the c-section rate was 26,9%. 12.8% (n=242) underwent GA.

In the studied group indication for c-section were: labor/placenta related (44,2%), fetal distress (33,5%), and maternal disease (18,6%).

The median age was 32,5 +/- 5,9 years and most were ASA 2 (75,2%).

Urgent c-section was the main reason for GA (60,3% vs. 24,4% elective and 12,0% emergent). The indication for GA was contraindication to regional block (37,6%), obstetric emergency/urgency (29,3%), regional block failure (16,9%) and maternal refusal for RA (7,4%).

Rapid sequence induction was performed in all cases: thiopental in 177 (73,1%), propofol in 56 (23,1%), suxamethonium in 211 (87,2%) and rocuronium in 29 (12%). In one case endotracheal intubation was impossible and airway was rescued with a supraglotic device. One woman had dental injury. Hypertension (7,9%), hypotension (3,3%) and dysrhythmia (3,3%) were the most frequent intraoperative complications.

**Conclusion(s)**: We observe a high rate of c-section but still lower than the national rate. The rate of GA is also higher than desirable. As a referral centre, we have a higher prevalence of maternal disorders and high-risk pregnancies contributing to these circumstances and the high prevalence of contra-indications to RA is another factor for the GA rate. As a teaching unit for anaesthesia trainees, the prevalence of failed technique is probably inflated.

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### 04AP02-1

# Pelvic pain after spinal anesthesia for cesarean section. A misdiagnosed case of transient osteoporosis of the hip (TOH)

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Background: TOH is a rare but severe disease which affects mostly men; it's more frequent in females in late stage of pregnancy. Symptoms are acute pain or fracture of the hip(s). It can evolve to avascular femur necrosis with similar radiologic features (altered bone marrow density and vascular deficit). Promptly recognized it can be successfully treated relieving pain, allowing physical activity and reducing complications(1,2).Pelvic Girdle Pain(PGP)is pain between posterior iliac crest and gluteal fold, strictly related to musculoskeletal system; it needs specific management and multidisciplinary evaluation. Its prevalence in pregnancy is 70-85%. Etiology is unclear and multifactorial(3).

Case Report: A 40-years old nulliparous woman underwent cesarean section (CS) at 40 weeks of gestation for breech-vertex presentation. She complained of right and anterior thigh and inguinal pain since 6 weeks. She rated pain 6/10 on the Numeric Rating Scale. Past medical history was silent, she never suffered for PGP. Due to pain and impaired physical activity she consulted her gynecologist who imputed symptoms to uterine enlargement and fetal pressure on obturator nerve and prescribed no therapy. The day of CS she received uncomplicated subarachnoid anesthesia(SA) at L3-L4 level; she referred a total benefit concerning to hip pain, but 3 hours later she complained of pain on both hips. Anesthesiologists were sigled out. We excluded potential arms of SA and asked for X-ray. Image showed at both femur heads two area of subcortical damage with irregular margins. Then MRI identified bone marrow edema on right greater than left femoral head and neck as sign of bilateral TOH.

**Discussion:** First:pain wasn't in obturator territory; femoral roots, which appeared to be involved, don't descend in the true pelvis, making compression injury unlikely. Second: SA is a safe procedure for CS, although not free from risks. Peripheral neuropathies can occur but their incidence is very low. They are due to trauma by needles. Because of body habitus changes in pregnancy SA for CS should be done below L3 and gently (4). In our case SA had no complications so we didn't found any case/effect relationship.

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Learning points: Subarachnoid anesthesia, Pain, Pregnancy.

#### 04AP02-2

# Evaluation of the active warming effects on maternal and neonatal outcomes during cesarean delivery

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**Background and Goal of Study**: According to the Curley's definition the normothermia corresponds to a core temperature between  $36,6^{\circ}\text{C} \pm 0,38^{\circ}\text{C}$ . Mild hypothermia can cause cardiovascular, hematological, metabolic and hormonal alterations. Maternal hypothermia is common during cesarean delivery and it can exercise influence over neonatal temperature, umbilical acidosis and lower Apgar score at birth. A prospective randomized trial of healthy term parturients undergoing cesarean delivery was designed to assess the incidence of hypothermia and the impact of active warming on maternal and neonatal outcomes.

Materials and Methods: Sixty-seven healthy women undergoing cesarean delivery with spinal anesthesia were randomly assigned to receive either warmed IV fluid and lower body forced-air warmer (AW) or no warming, IV fluid infused at environmental temperature (NW). A forehead zero-heat-flux sensor was used to measure core temperature at baseline and every ten minutes intraoperatively until the operating room exit. Neonatal axillary temperature was also measured. Perioperative shivering (Bedside Shivering Assessment Scale: 0-3), thermal comfort scores (TCS:0-100 scale), Apgar scores, and umbilical cord blood gas analysis were recorded.

Results and Discussion: The baseline data were similar between the two groups. The AW group (32 patients) had a higher temperature compared with the NW group (35 patients) at the operating room exit (36.7°C ± 0.32°C vs 36.28°C ± 0.35°C; p< 0.001). In four NW patients the temperature significantly decreased from 30 minutes after neuraxial anesthesia until the operating room exit (30 min vs baseline: 35.62°C ± 0.20°C vs 36.75°C ± 0.13°C; p< 0.001). These patients experienced also shivering (2 score). The TCS was higher in AW vs NW group during the study period (at 30 min: p<0.001). Neonatal hypothermia was observed in twenty (57%) newborns of the NW group. The Apgar scores and the umbilical cord blood gas analysis were similar between groups.

**Conclusion**: The active warming utilizing combined IV fluid and forced-air warming is effective in decreasing the incidence of maternal and neonatal hypothermia as well as maternal shivering during cesarean delivery. Therefore the maternal comfort and the neonatal outcome are improved.

## 04AP02-3

# Clinical effects of waiting patients in sitting position for one minute after spinal anesthesia in cesarean section

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Background and Goal of Study: Spinal anesthesia (SA) may increase risk for hypotension (hT) in cesarean section (C/S). Several techniques including volume expansion, leg rising, elastic bandage, prophylactic vasopressor use, divided doses of local anesthetics have been used; however, there is no single technique that eliminates risk for hT.

We aimed to investigate effects of waiting in sitting position for one minute after SA on development of hT and its hemodynamic effects and block characteristics in C/S **Materials and Methods**: Overall 225 ASA I-II patients (aged 18-45 years) scheduled for elective C/S were randomly assigned into 3 groups: group 1 (n=75), supine position after waiting in sitting position for one minute following intrathecal (IT) 12.5 mg heavy bupivacaine (HB); group 2 (n=75), supine position after IT 10 mg HB: group 3 (n=75), supine position after IT 12.5 mg HB

SA was achieved by 26 G Q needle at L3-4 with sitting position. Onset of sensory block (SB), time to T6 SB, maximum level of SB, duration of SB and MB; HR and MAP were recorded. Ephedrine (10 mg; IV) was given in case of hT. Total amount of ephedrine, time to need for ephedrine, nausea and pain scores were recorded **Results and Discussion**: The hT incidence was lower in group 1 (52.8%) than in groups 2 (58.6%) and 3 (72.2%) with a significant difference between groups 1 and 3 (p<0.05). Time to first ephedrine was longer in group 1 (7.5±5.1 min) than group 3

(5.6±5.0 min) while total amount of ephedrine was lower in group 1 (17.8±9.5) than group 3 (25.5±14.1) (p<0.016).

Time to T6 SB was significantly shorter in group 3 (4.1±1.4 min) than groups 2 (4.9±1.8 min) and 1 (5.0±1.6 min). Maximum SB level was higher in group 3

2 (4.9±1.8 min) and 1 (5.0±1.6 min). Maximum SB level was higher in group 3 (T3.5±1.1) than groups 2 (T4.1±1.1) and 1 (T4±0.9) (p<0.016). Duration of SB was shorter in group 2 (250±53.9 min and 8.5±20.9 min) than groups 1 (307.4±55.9 and 101.6±22.6 min) and 3 (290.5±53.2 min and 101.5±20 min p<0.16).

There was no difference in nausea but pain scores were higher in group 2 compared

There was no difference in nausea but pain scores were nigher in group 2 compared to 3 (p<0.05). Need for additional analgesic was significantly higher in group 2 compared to 3 while need for antiemetic was significantly higher in group 3 than group 2 (p<0.05).

**Conclusion:** Waiting patients for 1 min. at sitting position after IT 12.5 mg HB could be advantageous regarding development of hT when compared to conventional methods in elective C/S with similar effectiveness compared to low dose HB.

### 04AP02-4

Initial and total bupivacaine dose for cesarean section using continuous spinal anesthesia in super morbidly obese parturients: a tale of two cases

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Background: The super morbidly obese parturients (BMI >50) for cesarean section present a number of challenges for the anesthesia provider. Continuous spinal

present a number of challenges for the anesthesia provider. Continuous spinal anesthesia (CSA) offers an effective alternative neuraxial anesthetic technique in super morbidly obese parturients.

Case Report: Case 1: 28 y/o, G1P0, 39 weeks gestation, height 165 cm, weight

186 kg (BMI 68) scheduled for elective cesarean section. CSA was placed in sitting position at L3-L4 level (confirmed by ultrasound). The subarachnoid space was entered with an 18ga. 3½-inch Tuohy and then 20ga. soft tip epidural catheter was inserted, with 5 cm left in the subarachnoid space. Once the catheter was secured in place and the patient positioned supine with left lateral uterine displacement, a mixture of 1mL of plain bupivacaine 0.25% and 0.4mL (20 μg) of fentanyl was injected as an initial dose. Additional 1mL doses of plain bupivacaine 0.25% were injected every 5 minutes until the desired surgical level (T4) was achieved. Initial bupivacaine dose=15mg for T4 blocked, and total bupivacaine dose=17.5 mg for surgical duration of 72 minutes.

Case 2: 35 y/o, G2P0, 381/2 weeks gestation, height 165cm, weight 200kg (BMI 73) scheduled for elective cesarean section. The CSA was placed at the same level L3-L4 level and by the same way as above. Initial bupivacaine dose=5mg for T4 blocked, and total bupivacaine dose=10mg for surgical duration of 78 minutes. Both CSA were redosed as needed to maintain the surgical level. No anesthetic complications were reported.

Discussion: Current data does not support a reduction in the spinal dose of hyperbaric bupivacaine in the obese parturient but as shown in this report, a single shot spinal anesthesia using the same dose (12mg) as in the nonobese parturients could have potentially caused a high spinal (case 2) or inadequate anesthesia for the surgery (case 1). Although, we cannot pinpoint the exact cause of the disparity of the bupivacaine dose used in these cases, one possible explanation could be due to the difference in the spread of local anesthetics spread through the CSF with CSA technique as shown in some studies.

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**Learning points**: CSA is a safe alternative anesthesia technique for cesarean section in super morbidly obese parturients because it offers the ability to carefully titrate and maintain a dependable level of surgical anesthesia.

### 04AP02-5

# Comparison of 2-chloroprocaine 3% versus levobupivacaine 0.5% for neuraxial anaesthesia during caesarean section: a failed randomised controlled trial

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Background and Goal of Study: Levobupivacaine is routinely used for epidural anaesthesia during labor. However, when urgent caesarean section is needed in parturients who already have an epidural catheter, a rapid and an adequate extension of the epidural block to a surgical block is mandatory. Due to its rapid speed of onset, we hypothesized that 2-chloroprocaine might be a better choice in this setting. The aim of the present controlled, randomised study was to investigate the clinical efficacy and safety of 2-chloroprocaine 3% compared with levobupivacaine 0.5% for epidural anaesthesia during elective caesarean section.

Materials and Methods: Fifty ASA I parturients scheduled for elective caesarean section delivery were planned to be randomly allocated by sealed envelope system to two groups: one group received 2-chloroprocaine 3% 13 ml with 10 mcg sufentanil, the other group received the same amount in ml levobupivacaine 0,5% after a test bolus of 3 ml lidocaine 2% with epinephrine was given. Motor and sensory blockade were assessed every two minutes. Drops of ethyl chloride allowed evaluation of both cold and light touch sensation. The speed of onset was defined as the time taken to loss of cold sensation at thoracic dermatome 4 (T4).

Results and Discussion: Recruitment was stopped prematurely for safety reasons after including five parturients: two parturients were included in the levobupivacaine group, three in the chloroprocaine group. The onset time of 2-chloroprocaine 3% was 8, 10 and 10 minutes, for levobupivacaine 10 minutes for the first parturient and 20 minutes for the second after a 5 ml rescue bolus. Supplemental intravenous alfentanil was needed in all but one parturient (levobupivacaine group). Epidural anaesthesia was unsuccessful for surgery and needed conversion to general anaesthesia in two patients, one in both groups.

Previous studies comparing 2-chloroprocaine with other anaesthetic solutions for epidural use were inconclusive and questioned its use for epidural surgical anaesthesia. In this study, the success rate was so poor that the study was stopped prematurely.

**Conclusion**: Based on the high failure rate, the use of 2-chloroprocaine 3% for neuraxial anaesthesia during caesarean section cannot be recommended.

# 04AP02-6

Comparison the effect of general anesthesia versus spinal anesthesia on maternal hemodynamic parameters, neonatal apgar score and umblical vein gas analysis during placenta accreta cesarean section and hysterectomy

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Background and Goal of Study: Placenta Accreta (PA)has became one of the most challenging situations for anesthesiologists. Although Spinal Anesthesia (SA) is the most popular anesthetic method for Cesarean Section(C/S), in case of PA, General Anesthesia (GA)is commonly applied. However in this method, the surgeon has to deliver baby as soon as possible. After delivery, invaded placenta bleeding actively, that could effect maternal hemodynamics, blood product transfusion which carry their own complications. We decided to assess the effects of these two anesthetic method on mother and fetus during PA cesarean section and hysterectomy

Materials and Methods:In this randomized clinical trial, considering inclusion, exclusion criteria and informed consent, 48 patients were enrolled and divided into two group by block randomization. GA group:Standard rapid sequence induction of anesthesia, maintaining via volatile anesthetic agents. SA Group:Subarachnoid injection of 10mgr Bupivacaine 0. 5% combined with 25 µgr Fentanyl. Maternal and fetal parameters recorded in each group and compared.

Results and Discussion: In this study, basal maternal age, BMI, HR and MAP in two groups were equal; p>0. 05. Serum Hb before and 6hr postoperative didn't significantly deiffer: p>0. 05. The mean(±SD) of administered crystalloid fluids during surgery in GA group was 3. 6±0. 480 liter, and 2. 7±0. 280 lit in SA group; p<0. 001. PRBC were transfused in 79. 2% of GA group and 25% of SA group; p<0. 001. FFP were transfused in 37. 5% of GA group and 0% of SA group; p=0. 002. Mean surgery duration was 100. 4±16. 5 min versus 84. 3±14. 8 min in SA group; p=0. 001. Maternl HR at certain intervals in SA group were significantly lower than GA group: p<0. 05. For MAP only at 3rd and 5th minutes lower values recorded in SA group: p<0. 05, 1st and 5th min Apgar score and umbilical vein pH showed no significant difference; p>0. 05. Infundibulopelvic ligament ligation time(IPLLT); time interval between induction of GA or SA and IPL ligation; was 8±0. 5min in GA group and 4.5±0.6min in SA group, p<0.001. Birth time is longer in SA group (p<0.001). Indeed in SA surgeon starts hysterectomy by round and IP ligament ligation, then after immediately baby delivered but in GA fetal safety has the most priority. As IPL cotain blood supply to the uterus, not as much as uterine artery, IPLL could reduce hemorrhage without any adverse effect on fetus.

Conclusion:SA showed better maternal and equal fetal outcome in C/S of PA.

# 04AP02-7

# Safety of high-dose rocuronium for emergency cesarean sections anesthesia: a retrospective multivariable analysis of neonatal and maternal outcomes

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Background and Goal of Study: High-dose rocuronium (Rb) for emergency ceasarean sections (c-sec) is often used instead of suxamethonium (Sx) for rapid sequence induction because of the noninferiority of maternal intubating conditions. However, there are no pricise studies in neonatal outcome with neuromuscular function, especially when they are non-reassuring in utero. The aim of this study was to determine whether high-dose Rb confer benefit both in maternal and neonatal outcomes for emergency c-sec. In our previous study, as Apgar score was a total score, we investigated the breakdown of the score on a larger sample. Materials and Methods: We analysed Rb group (n=90) and Sx group (n=56), total 146 emergency c-sec patients from 2010 to 2016. After preoxygenation anaesthesia was induced with thiopental or propofol and muscle relaxant (Rb 0.9-1.4 mg/kg, Sx 1.0-1.8mg/kg). About 60 seconds later, intubation was performed. Both group were reversed with sugamadex or neostigmine, before extubation. We assessed the number of intubation attempts and residual neuromuscular blockade at end of surgery. Neonates were assessed using Apgar score (5-items), with or without intubation in operating theatre. Fisher's exact test, t-test and binomial logistic regression analysis was used. Significance was designed at p<0.05.

Results and Discussion: There was significantly difference between Rb and Sx regarding naonates Activity (<2 point, Rb:58/90, Sx:26/56; p=0.03). 1-min and 5-min total Apgar score was similar between the groups. Failed first intubation attempts did not differ between the groups (Rb:0/90, Sx:1/56; ns). Only 1 case in Rb group failed extubation attempt by hypermagnesemia (Mg). Lower neonates body weight (pre-term) and high-dose Rb were independent risk factor of lower 1-min muscle Activity and intubation (respectively, p=0.03, p<0.01). Conversely chorioamnionitis, Mg and delivery time from incision were not significant. In full-term subgroup analysis (Rb:30, Sx:45), high-dose Rb was also independent risk factor for 1-min Activity (<2, p=0.023).

Conclusion(s): Although the use of high-dose Rb was not associated with lower Apgar score, 1-min muscle Activity was lower compared with Sx in both uni and multivariate analysis. The clinical significance of this is unclear, but high-dose Rb may lead to side-effect such as intubation for pre-term infants.

References: 1. Rocuronium (Org 9426) for caesarean section. Abouleish E, et al. Br J Anaesth.

### 04AP02-8

Analysis of hemodynamic profiles in term pregnancies receiving subarachnoid blockade for cesarean section: A randomized comparison trial between left uterine displacement vs. without left uterine displacement maneuver

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Background and Goal of Study: Theoretically technique which was purposed to augment cardiac output (CO) in a term pregnancy who receive subarachnoid blockade (SB) for cesarean section (CS) is the left uterine displacement maneuver (LUD). However, benefit of the LUD to intraoperative hemodynamic profiles had never been clarified. Goal of this study is to compare differences in hemodynamic profiles of term pregnancies who underwent cesarean section with- vs. without LUD maneuver.

Materials and Methods: We studied hemodynamic profiles in sixty term-pregnancies who underwent elective CS under SB using non-invasive CO monitor (Nexfin™). All 60 patients were randomized into two groups, which were LUD group (received 15-30 degree of LUD after SB, n=30) and non-LUD group (no LUD after SB, n=30). Patient's hemodynamic variables including systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR), CO, systemic vascular resistance (SVR), and left ventricular contractility index (dP/dT) were measured continuously since pre-SB till the end of surgery. Primary outcome was incidence of maternal systolic hypotension within 5-min following SB, secondary outcome were differences in intraoperative hemodynamic variables between two groups of patients. Incidence of maternal systolic hypotension analyzed using a Chi-square test, and differences in hemodynamic profiles between two patient groups analyzed using Mann-Whitney U test.

Results and Discussion: While there was no difference in baseline characteristics between two groups of patients, the patients in LUD groups had significantly lower incidence of maternal systolic hypotension (16.7%) than patients in non-LUD group (53.3%) (p=0.003) (Fig.1). In pre-fetal delivery phase, patients in LUD groups had significantly higher CO (7.2 vs. 6.3 L/m, p=0.016) (Fig.2), higher dP/dT (806 vs. 583 mmHg/sec, p=0.02), and lower SVR (818 vs. 909 dynes.s.cm<sup>-5</sup>, p=0.04) than patients in non-LUD groups. In post-fetal delivery phase, the patients received LUD had significantly lower MAP (74 vs. 83 mmHg, p=0.03) and lower SVR (670 vs. 729 dynes.s.cm<sup>-5</sup>, p=0.03), while there was no difference in CO and HR between two groups.

**Conclusion**: In term pregnancy patients who received SB for elective CS, performing LUD was associated with lower incidence of maternal systolic hypotension. Potential benefits to cardiovascular system of LUD was confined in pre-delivery phase.

# 04AP02-9

Bispectral index values (BIS) during general anaesthesia in caesarean section with propofol or thiopental as induction agents. Are the BIS values related to maternal cortisol or b-endorphin plasma levels?

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Background and Goal of Study: Although regional anesthesia is indicated for caesarean section, general anesthesia can still be used in emergencies, in patients with coagulopathies, spinal abnormalities, in women with placenta accrete or when the parturient strongly refuses the use of any regional technique. In this study we investigated the adequacy of general anesthesia administered in women belonging to some of the above categories, and compared propofol and thiopental when they are used for induction of anesthesia. Depth of anesthesia was evaluated using the bispectral index (BIS). We also evaluated maternal cortisol and b-endorphin plasma levels, during the period from induction of anesthesia to delivery

Materials and Methods: After providing a written informed consent, 25 women were randomly allocated into two groups. Group A(n=13) received thiopental(4mg/kg) and rocuronium 0,6mg/kg for the induction and Group B(n=12) propofol(2mg/kg) and rocuronium 0,6mg/kg. Anesthesia was maintained by sevoflurane 1% and N<sub>2</sub>O:O<sub>2</sub> 1:1 in both two groups and fentanil 5mcg/kg was administered after delivery. Bispectral index values (BIS) were recorded at intervals of one minute, starting 1 min before the induction, until the end of the surgery. We also recorded systolic, diastolic blood pressure and heart rate. A radial artery was inserted before the induction(T1), directly after intubation(T2) and during uterine incision and delivery of the newborn(T3). All data were compared between the two groups.

Results and Discussion: Women who received propofol(group B) had significantly lower BIS values during the period from the induction of anesthesia until the delivery. Group B also had significantly lower b-endorphin levels after intubation (11.95±7.16 v/s 20.27±11.04 p=0,002) and during uterine incision for the delivery (22.98±12.41 v/s 30.34±14.74 p=0,003), compared to group A. There were no statistically significant differences in cortisol levels between the groups. For the statistical analysis we used a multivariate analysis of variance.

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**Conclusion**: Propofol 2mg/kg, when used for the induction of anesthesia in cesarean section, provides lower BIS values compared to thiopental 4mg/kg, during the period from induction to delivery. Lower b-endorphin levels in the same group are probably related to lower BIS values.

#### 04AP02-10

# Pre-oxygenation and apnoeic oxygenation using Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE )during cesarean section under general anaesthesia

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**Background and Goal of Study**: Introduction: Due to physiological changes in pregnancy, the incidence of difficult intubation in obstetrics is 1:390 as compared to 1:2000 in general population. Hypoxia is one of the leading causes of anesthesia-related injury. Avoidance of hypoxemia is key to preventing detrimental outcomes when a prolonged intubation is encountered.

Rapid sequence induction is standard for both elective and emergency cesarean sections. Pre-oxygenation allows the creation of an oxygen reservoir thus reducing the rapid onset of hypoxemia during the apneic period. Apnoeic oxygenation transnasally at high flow rate has been shown to be beneficial in delaying intubation in patients with respiratory failure.OAA/DAS airway guidelines recommend nasal oxygen supplement. We conducted a prospective observational study using THRIVE for preoxygenation and apnoeic oxygenation during cesarean section.

Materials and Methods: All cesarean sections under general anesthesia using THRIVE between January till June 2017 were included.THRIVE was commenced from the time on arrival in theatre using optiflow nasal cannula at a rate of 30 l/min. At the time of induction, flow increases at a rate of 70 l/min followed by rapid sequence induction. Jaw thrust was performed immediately after the patient became unconscious and maintained throughout the apnoeic period to ensure upper airway patency. Nasal oxygenation was maintained at a rate of 70 l/min throughout apnea time which referred to time between muscle relaxant administration and the start of positive pressure ventilation.

Results and Discussion: In this study, 38 patients were included who underwent cesarean section using THRIVE during general anesthesia. Maternal BMI range from 19 -42.3 kg/m2. Intubation was attempted twice in 7 patients and thrice in one patient. Mean pre-oxygenation time was 5 minutes range being (3-12min). Median apnea time was 77 seconds, (longest 240 seconds). One patient experienced desaturation of 90% due to bronchospasm after apnea time of 160 seconds. There were no untoward neonatal outcomes among those patients. THRIVE is well tolerated by awake patients and can be used effectively for obstetric GAs.

**Conclusion:** We found that THRIVE allows pre-oxygenation to start sooner and also extend the safe apnea window with less pressure in emergency difficult intubation situation, although it has a limited role in bronchospasm.

### 04AP03-1

# Impact and effectiveness in pregnant women of a collective meeting on labour Epidural Analgesia

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**Background and Goal of Study**: In France, each centre can choose the optimal way to inform about Labour Epidural Analgesia (LEA), including through collective meetings. Objective: Evaluation of parturients' knowledge a priori, just after collective briefing to estimate its effectiveness and after a free interval.

Materials and Methods: A prospective monocentric study was conducted in our institution, from October 2015 to April 2016. Three self-questionnaires were given to parturients: the first, Q1, carried out before the information meeting; the second, Q2, completed immediately after the information meeting; the third, Q3, performed after a free interval, just before the anaesthesia visit. The questionnaire consisted in 29 closed-ended questions about LEA in obstetrics. Parturients' socio-demographic characteristics were collected. Level of parturients' knowledge was assessed before and after information meeting through the questionnaires. Subgroup analysis were performed according to LEA history, level of education and age. For statistical analysis we used either Student or Wilcoxon test. p <0.05 was considered statistically significant.

Results and Discussion: 296 parturients answered at least one questionnaire: 268 to Q1, 279 to Q2 and 98 to Q3. 93 parturients responded to the three questionnaires. At Q1 the global rate of correct answers was 41%. In subgroup analysis, the rate of correct answers was higher in parturients with an LEA history (p <0.001), in parturients aged > 35 years (p = 0.01), and in parturients with an education level > A-level + 2 (p = 0.002). The global rate of correct answers was improved after meeting (p <0.0001), and remained better in parturients with education level > A-level +2 (p<0.0001) (fig. 1). There was no difference between global rate of correct answers at Q2 and Q3 (p = 0.21). Median time between the information meeting and anaesthesia visit was 57 days.

**Conclusion**: The information provided during a collective meeting about LEA is relatively well understood and retained in the long term. Pre-meeting knowledge is influenced by LEA history, education level, and age.

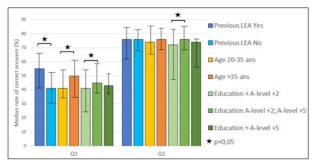


Figure 1: Variability of answers for <u>parturients</u> who responded to Q1 and Q2 (median rates [Interquartile Range] of correct answers in %).  $\bigstar$ : significant p < 0.05. The category [age < 20] is not represented because of its small size (n = 1)

# 04AP03-2

# The effect of different local anaesthetics and their doses, used for labour pain relief with PCEA, on foetus: a randomized double blind controlled trial

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**Background and Goal of Study**: Low concentrations of local anaesthetis (LA) are increasingly popular of epidural labour analgesia. It is supposed that lower LA concentration is associated with rarer neonatal side effects and better obstetric outcomes. The goal was to evaluate the effect of different LA and their doses on foetus

Materials and Methods: A randomized controlled trial of healthy primiparas was carried out at 2014-2016. Labour pain was relieved with LA and opioid fentanyl. The patients were allocated into 6 groups: B1-bupivacaine (B)0.0625%, B2-B0.1%, B3-0.125%, L1-levobupivacaine (L) 0.0625%, L2-0.1%, L3-0.125%. Umbilical cord blood gas was collected after delivery.

**Results and Discussion**: 237 patients were enrolled, 9 patients were excluded according to study protocol. Groups were comparable according to ASA class, age, gestetional age, BMI, duration of delivery stages. Birth weight and Apgar score in1 and 5 minutes between groups don't differ. Mode of delivery, foetal bradycardia episodes, meconium in amniotic fluid and newborn  $O_2$  request are presented in

		Mode of delivery n(%)		Foetal bradycardia n(%)	Meconium in amniotic fluid n(%)	New- born O <sub>2</sub> request n(%)
	Vaginal	Instrumental	Caesarean			
B0.0625%	31(88.6)	0	4(11.4)	6(17.1)	5(14.3)	1(2.9)
B0.1%	38(88.4)	4(9.3)	1(2.3)	8(18.6)	8(18.6)	6(14)
B0.125%	30(71.4)	1(2.4)	11(26.2)	10(23.8)	8(19)	4(9.5)
L0.0625%	33(84.6)	1(2.6)	5(12.8)	4(10.3)	6(15.4)	2(5.1)
L0.1%	28(71.8)	2(5.2)	9(23.1)	8(20.5)	8(20.5)	7(17.9)
L0.125%	33(84.6)	0	6(15.4)	3(7.7)	6(15.4)	0
Р	0.04			0.35	0.97	0.04

Umbilical pH and lactates between groups are similar. The correlation between total dose of LAs and umbilical cord gas pH is weak, but significant (r=-0.18; p=0.02). Linear logistic regression revealed that the increase of total dose of LA in 10 mg determines decrease of pH in 0.04 (p=0.03). Dose limit of LA, when influence to umbilical cord blood gas pH, is made - 62.19 mg.

Conclusion(s): increasing dose of LA affects mode of delivery and increase foetal acidosis

### 04AP03-3

# Spinal cord injury and labour: is epidural anaesthesia the best option?

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Background: Physiologic manifestations of spinal cord injury (SCI) can complicate management during labour and delivery. Autonomic dysreflexia (AD) represents an imbalanced reflex sympathetic discharge occurring in patients with SCI at or above the level of splanchnic sympathetic outflow, leading to potentially life-threatening hypertension and vasoconstriction [1].

Case Report: A 28-year-old female with past history of traumatic dorsal spinal cord injury that resulted in loss of motor function below T9 and sparing of sensory function (American Spinal Injury Association Grade B) was admitted at thirty-nine weeks of gestation with regular and painful uterine contractile activity. Considering teratogenicity, antispasmodic chronic medication was suspended soon in the first trimester of pregnancy. After considering options to control obstetric pain and explain them to the patient, an informed consent was obtained and patient was monitored. A lumbar epidural technique was performed without difficulties through midline approach in L3-L4 space, followed by an initial bolus of 16 mg of ropivacaine 2% and a perfusion of (8-12mg/h). Adequacy of analgesia was closely monitored by assessing haemodynamic status and pain associated with uterine contractions. Labour progressed uneventfully culminating in an eutocic delivery of a healthy new-horn

**Discussion**: Anaesthetic management of obstetric patients with SCI may be difficult. Evidence recommends adequate analgesia in women with SCI during labour and delivery even if they lack sensation. Neuraxial anaesthesia specifically epidural approach has proven efficacy for preventing AD. Its mechanism resides upon blocking afferent stimuli that arise from pelvic organs triggered by surgical stimulation and manual manipulation of the uterus. In spite of that, technical difficulties may arise as a result of kyphoscoliosis, previous spinal surgery and difficult positioning due to spasms and bony deformities. The height of neuraxial block may also be unpredictable and impossible to evaluate. Alternatives to epidural block must be considered in the case of patient refusal, contraindication or unsuccessful technique.

#### References:

1. Sharif H, Hou S. Autonomic dysreflexia: a cardiovascular disorder following spinal cord injury. Neural Regeneration Research.2017;12(9)

Learning points: AD and muscular rigidity associated with previous SCI may be successfully managed with epidural anaesthesia. Close monitoring is mandatory.

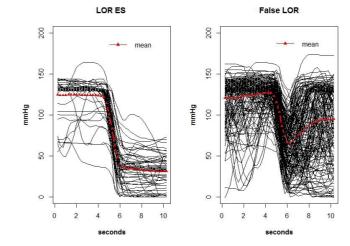
### 04AP03-4

# Compuflo Epidural Instrument is capable of discriminating false LOR during difficult epidural placement for labor analgesia

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Background and Goal of Study: Difficult epidural placement is one of the most challenging issues in epidural technique especially for trainees. The Compuflo Epidural Instrument has been successfully utilized to objectively identify the epidural space<sup>1</sup>. The aim of this study was to evaluate the performance of Compuflo when used as a rescue tool for difficult epidural placement.



Materials and Methods: We obtained IRB approval and patient informed consent. For the purpose of this study we enrolled only parturients for whom two needle re-insertions were required during the epidural procedure for labor analgesia. Compuflo was used from the third attempt as a rescue tool. The primary goal was to gauge the ability of the Compuflo to differentiate false LOR. The number of epidural attempts and successful epidural analgesia (VAPS <10 after 20 minutes) were also noted. A sample size of 50 observations to set 80% test power and a 95% significance was required. Statistical analysis was performed with unpaired t-test. Results and Discussion: We studied 56 consecutive patients. All the blocks performed with the Compuflo were successful after only one attempt in all the cases. During the epidural insertion the device registered 175 false losses of resistance (LOR). The pressure curves of false LOR were significantly different from the true

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Conclusion: Compuflo can discriminate false from true LOR to identify the epidural space and therefore may assist the physician in difficult cases, reducing the number of attempts and producing successful epidural block.

References:1.Ghelber O. et Al RAPM 2008

#### 04AP03-5

LOR (P<0.000)

Epidural space identification using a new device (Compuflo® Milestone Scientific Livingston NJ) for labor analgesia. Is it worth it? Case report of a Dural tap

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Background: Many techniques were described to identify the epidural space (ES)¹. The loss of resistance (LOR) techniques, the most frequent, can still be equivocal². New devices were recently commercialized: COMPUFLO® Milestone Scientific Livingston, NJ) (fig.1), measures and displays pressures while saline is injected by a computerized pump³. After inserting the Tuohy needle (TN) into the skin, the device is connected to it, and the pump detects the increasing pressure until the TN reaches the ligamentum flavum (LF). When the TN enters the ES, a drop of pressure to less than 20 mmHg for at least 5 seconds is observed.

Case report: We present the case of a 39-weeks' gestation secundiparous parturient (BMI 21Kg/m²), who asked for epidural labor analgesia. She did not present risk factors for difficult epidural puncture. In a sitting position, local anesthetic was infiltrated in the L3-L4 interspace, the TN was inserted into the LF and the COMPUFLO® system was connected, following the technical advices of the company (https://www.milestonescientific.com/products/compuflo-epidural). Pressure raised up to 127 mmHg, as the TN advanced, and dropped to 43 mmHg (Fig.2). Since the threshold of 20 mmHg was not reached, like in other patients, we decided to progress the TN, and an additional pressure decrease was recorded. The line was then disconnected to insert the epidural catheter, but cerebrospinal fluid flowed through the TN, which was the sign of a dural tap. The TN was immediately removed and a new epidural was performed one space above with no further complications during labour. 24 hours later, the patient complained of postdural puncture headache, which was successfully treated with an epidural blood patch (EBP).

**Discussion:** The performance of COMPUFLO® was validated in pregnant patients in a pilot study, where mean pressures of ES were described as 8 mmHg (95% CI: 6-11mmHg)³. This Objective and visual method to identify the ES is attractive, but the safety of this device must be confirmed to recommend it in all pregnant patients. **References:** 

1.Elsharkawy H, et al. J Anaesthesiol Clin Pharmacol 2017;33:16-27.

2.Brogly N, et al. Anesth Analg 2017; (in press).

3.Guelber O, et al.Regional Anesthesia and Pain Medicine 2008;33: 346-352. **Learning points:** Objective continuous measures of pressure in ES can facilitate

accurancy of performance among different operators. These new technologies can be helpful for epidural blocks in difficult patients and for EBP.

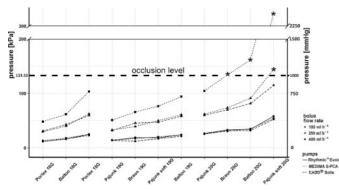
#### 04AP03-6

# Does epidural catheter size and infusion rate affect injection pressure in different programmed intermittent epidural bolus regimens? An in vitro study

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Background and Goal of Study: The optimal programmed intermittent epidural bolus (PIEB) regimen for labour analgesia remains unknown. Some studies indicate that better drug spread in the epidural space results from greater injection pressure; however, there have been few reports regarding the maximum pressure generated during an epidural bolus injection using different catheters and flow rates, although this was addressed by a recent review of labour analgesia.

The purpose of this study was to assess the effect of different epidural catheter gauge and infusion rate combinations on the bolus injection pressure generated by various infusion pumps capable of delivering a programmed intermittent bolus.

Materials and Methods: We evaluated the flow and pressure characteristics of 11 commonly used epidural catheters combined with three different infusion pumps able to deliver epidural infusions according to the PIEB regimen. Pressure changes were measured over time at flow rates of 100, 250 and 400 ml·h-1 and with a bolus volume of 10 ml.

Results and Discussion: We performed 660 measurements. The mean maximal pressure generated during bolus injection was 86-863 mmHg and varied according to the catheter, flow rate and pump combination used. Six statistical models were verified, for each combination of flow rate (100 and 250 ml·h-1) and catheter gauge (18G, 19G and 20G). The interaction term was significant in all conducted analyses (p<.001 for all). Higher pressure was associated with higher flow rates and higher catheter gauges, as well as use of wire reinforcement, in some cases triggering the occlusion pump alarm.

Conclusion: Significant differences were observed in the in vitro maximum pressure value among the various catheter and flow rate combinations used in PIEB regimens. The optimal flow rate, catheter and pump infusion pattern combination may allow for delivery of the high pressure bolus without triggering the occlusion alarm, thus producing the optimal analgesic effect for labouring parturients with epidurals and reducing the anesthetists' workload.

# 04AP03-7

Impact of labor epidural analgesia on maternal satisfaction and childbirth expectation: Experience at a Tertiary Care Center - Preliminary results of a prospective observational study

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Background and Goal of Study: Maternal satisfaction with labor analgesia is a complex and multifactorial concept that varies according to educational level, profession, labor length, previous experiences, expectations, doubts and myths. Healthcare centralization in pregnant women forces the personnel to focus on satisfaction

We assessed the sociodemographic characteristics of our mother-to-be population and the impact of labor epidural analgesia (LEA) on satisfaction and expectations. **Materials and Methods**: An anonymous questionnaire was randomly applied to 150 women who gave birth in our center, from August to December 2017, to obtain information about satisfaction with LEA and anesthesiologists' medical care. Microsoft Excel v15.33 was used for statistics.

Results and Discussion: 113 complete questionnaires were returned: mean age was 31,06±6,57 years (range 17-47); 83% were Portuguese nationals; 53.1% had a college degree, 26.5% had the 9th grade or less; 68% were employed; 51.3% were primiparas.

Only 15% had a previous anesthesiology appointment, however, all of them felt clarified about labor analgesia and the role of the anesthesiologist during childbirth. From the remaining 85%, only 10.6% admitted to have doubts, and all of them felt reasonably to completely clarified by the anesthesiologist. The overall satisfaction related to the birth experience was good or excellent in 86.7% of women.

LEA was performed in 92.9% of cases. Among the cases that LEA was not performed, 62.5% were because of pregnant choice, and all considered to have no doubts about LEA. Considering satisfaction with LEA, 36.2% accounted excellent and 50.5% good. Regarding LEA satisfaction versus expectations: 38.1% higher than expected, 49.5% same as expected and 12.4% lower than expected. 91.3% felt accompanied by the anesthesiologist during labor and 99% found this monitoring to be important. 97.1% would advise LEA to relatives or friends.

Conclusion: The overall satisfaction level with childbirth and LEA is very high in our center. Most women choose LEA.

Sociodemographic factors do not seem to affect these results.

We consider worrisome the fact that only a small percentage of women are referenced to an anesthesiology appointment before labor and there seems to exist a false perception of literacy surrounding LEA, which compels us to a new observational study.

#### 04AP03-8

The effect of labor epidural analgesia on obstetric outcomes among asylum seekers:

A retrospective cohort study

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Background and Goal of Study: Research has shown racial and ethnic disparities with the use of neuraxial anesthesia for labor and cesarean delivery. In this study we examined the maternal outcomes and anesthetic management in a cohort of Eritrean asylum seekers, particularly whether the use of epidural labor analgesia decreased postpartum complications among the study cohort.

Materials and Methods: In this 10-year retrospective cohort study the medical records of all Eritrean asylum seekers with singleton pregnancies delivering at Rabin Medical Center between the years 2012-2017 were reviewed. The study cohort was divided according to asylum seekers undergoing vaginal delivery with epidural analgesia (EA) and asylum seekers undergoing a vaginal delivery without EA. Demographic, obstetric, anesthetic and neonatal data was collected and documented, in order to compare the maternal between the two groups. Results and Discussion: Overall 839 deliveries were included in the study. Of them, 336(40.0%) received epidural analgesia and 503(60.0%) did not. Women who received EA were younger (28.1±6.5 vs. 29.7±6.1 years, p<0.001) with higher rates of nulliparity (87 vs. 77%, p=0.001). Parturients who received EA presented lower rates of cesarean birth (15% vs 20%, p=0.04) and general anesthesia (0% vs. 11.3%, p&lt:0.001). However, parturients with EA had higher rates of instrumental delivery (25% vs 10%, p<0.001), minor tears (11% vs 20%, p&lt;0.001) and epiphysiotomy (35% vs 25%, p<0.001). No difference was found between groups in rates of 3rd and 4th degree perineal tears or PPH or neonatal outcome. Using a logistic regression analysis, epidural analgesia was found to be associated with lower rates of cesarean birth (aOR 0.594 95% CI 0.389-0.909, p=0.016) but higher rates of instrumental delivery (aOR=3.317.95% CL 2.094 - 5.253 p&lt:0.001)

Conclusion: In a cohort of Eritrean asylum seekers epidural labor analgesia use was associated with a reduced risk for cesarean section and general anesthesia but increased rate of instrumental delivery. These findings highlight the importance of providing prenatal education for this population on the significance of EA and further study on anesthetic management in this patient population.

#### 04AP03-9

Epidural analgesia in labor: PIEB (PROGRAMMED INTERMITTENT EPIDURAL BOLUS) versus PCIEB (PATIENT CONTROLLED INTERMITTENT EPIDURAL BOLUS). Which one is the best technique?

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**Background and Goal of Study**: Patient controlled epidural analgesia is established technique for labor pain. In this randomized study we compared analgesic efficacy, total consumption and labor outcome in women who received PIEB or PCIEB for maintenance of labor analgesia.

Materials and Methods: Nulliparous, term women and spontaneous and induced labor were enrolled in the study. Epidural analgesia was started and maintained with Levobupivacaine 0,0625% and fentanyl 5 mcg/ml. Starting dose was 15 ml. Insufficient analgesia (NRS>4) was trated by extra bolus of 5 ml. If parturients still felt pain 20 minutes after, an additional bolus of 5 ml was administred. If parturients still felt pain 15 minutes after, the analgesia was considered failed. Then, parturients were randomly assigned to receive PIEB (10 ml every hour beginning 60 minutesafter the initial dose) or PCIEB (PCIEB A:10 ml patient triggered bolus

with a 50 minutes lock-out interval, beginning 50 minutes after first bolus; PCIEB B: 15 ml patient-triggered bolus with a 60 minutes lock-out interval, beginning 60 minutes after first bolus). The efficacy of analgesia, NRS, anesthetic consumption, incidence of motor block (modified Bromage score), fetal outcome (APGAR score), parturient and medical staff satisfaction (score 1-5) and side effects, were studied. Results and Discussion: We studied 30 parturients (PIEB=10; PCIEB A=10; PCIEB B=10). PIEB and PCIEB B resulted in greater analgesic effect (NRS: PIEB 1,37±0,69; PCIEB A 3,8±2,7; PCIEB B 2,5±0,5; p<0,05, PIEB and PCIEB b vs PCIEB A) and parturient satisfaction compared with PCIEB A (PIEB 4,5±0,5; PCIEB A 2,3±1,2; PCIEB B 4; p<0,05, PIEB and PCIEB B vs PCIEB A). Anesthetic consumption was major in PIEB group (PIEB 50ml±15; PCIEB A 30 ml±4; PCIEB B 22,5±7,5; p<0,05 PIEB vs PCIEB A and PCIEB B), data associated with a longer duration of labor. Only PCIEB A required additional PCEA boluses during labor. No differences in Bromage score, fetal outcome. No instrumental delivery applied. Only one caesarean section, in PIEB group, for dystocia labor.

Conclusion: In major finding of this study was the less satisfaction and more NRS in PCIEB A compared with the othergroups. We believe that PCIEB B can be a valid technique as an alternative to the well established PIEB technique especially in terms of further reduction of anesthetic.

### 04AP04-1

# Incidence of post-dural puncture headache as a marker of quality in obstetric anesthesiology

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Background and Goal of Study: Postdural puncture headache (PDPH) is the most common complication after neuraxial anesthesia, especially in obstetric anesthesia. The incidence of PDPH related to obstetric anesthesia established by the Serious Complication Repository Project developed by the Society for Obstetric Anesthesia and Perinatology of USA was 0,7%. An audit was carried out to determine the incidence and management of PDPH in parturients undergoing central neuroaxial block (CNB) technique over a 2-years period.

**Materials and Methods**: We have conducted a retrospective audit of labor analgesia and C-section anesthesia database records from July 2015 to June 2017. PDPH cases were selected and data regarding CNE technique, type and effectiveness of treatment were recorded.

Results and Discussion: A total of 2920 CNB techniques records were reviewed. Twenty-nine PDPH cases were identified (an incidence of 0.99%). Woman's median age was 30 years and median body mass index was 30.1kg/m²; 62% delivered vaginally. Regarding CNB technique there were 8 spinal (28%), 20 epidural (69%) and 1 combined spinal epidural (3%) block. Conservative therapies such as bed rest, intravenous hydration, caffeine supplementation and analgesic medication were prescribed in all cases. Paracetamol and non-steroidal anti-inflammatory drugs were the most commonly used medications. Five women (17%) received an epidural blood patch (EPB) which led to complete relief of all symptoms within 24-48h. The average time for performing an EPB after the institution of conservative treatment was 4 days (range, 2-5).

The incidence of PDPH was similar to that reported in the literature. Despite its high success rate, there were few cases where an EPB was performed and a delay in relation to what is determined in service's protocol (48h after ineffectiveness of conservative therapies). There were no cases of sphenopalatine ganglion block and new therapies like gabapentin or pregabalin were neither considered.

**Conclusion**: PDPH remains a major problem in obstetric population. Regardless its low incidence and usually benign evolution, PDHD is still a cause of significant morbidity in parturients and is considered a specific marker of quality in obstetric anesthesiology. Audits are important to enhance the care of patients by systematically reviewing medical practice and modifying it where necessary.

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#### 04AP04-2

Is spinal anaesthesia a good plan post dural puncture with a large bore needle? A case report of a failed spinal

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**Background:** Accidental dural puncture during epidural insertion is a known complication. The incidence of accidental dural puncture can be up to 0.73% [1]. It is not uncommon for patients to present for emergency lower segment caesarean section (LSCS) following an accidental dural puncture, hence it is important to be prepared for a situation like this.

Case Report: A 32-year-old, ASA1, primigravida had labour induced at 39 weeks gestation. An intrathecal catheter was inserted post accidental dural puncture during epidural insertion with an 18G Tuohy needle. 14 hours later, it was discovered that the catheter had dislodged. Coincidentally, she had to undergo LSCS for failure to progress in labour. A single shot spinal was performed. Following a change in resistance felt when the dura was breeched with a 27G Whitacre needle and clear cerebrospinal fluid (CSF) seen, 2.3ml of 0.5% heavy bupivacaine, 15mcg

of fentanyl and 100mcg of morphine was given. Subsequently, the patient was only unable to move her hips. There was also a loss of sensation to cold till T4, but she could feel sharp sensation when the incision site was tested with forceps 10 minutes later. The spinal was deemed inadequate for surgery and she was placed under general anesthesia for the surgery. Post operatively, she had no motor weakness and no sensory level.

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**Discussion**: A regional technique is preferred for LSCS, thus it is important to report this case as it may impact the anesthetic technique chosen. Literature search on Pubmed did not review any similar cases. Some reasons postulated for the failure of spinal anaesthesia in our patient includes misleading tactile feel of the change in resistance when piercing the dura. The back flow and positive aspiration from the spinal needle may have been the ropivacaine infused. Another possibility is leakage of local anaesthetic out of the previous dural puncture site. Lastly, the CSF volume could be larger due to intrathecal infusion of ropivacaine, hence our patient received a more diluted spinal dose.

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**Learning points**: Awareness of possibility of failed spinal post dural puncture with large bore needles is important. Strategies such as attempting spinal at a different level and insertion of intrathecal or epidural catheter can be used to improve success. General anaesthesia may also be a good first choice.

#### 04AP04-3

# Israeli national survey on treatment and management for parturients suffering from a post dural puncture headache

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**Background and Goal of Study**: The prevalence of Inadvertent Dural Puncture (IDP) in the obstetric population is 1.5%, 60% of whom will go on to develop a post dural puncture (PDPH) Due to the relatively high probability of developing a PDPH, we conducted a national survey, to evaluate various aspects surrounding PDPH, and to examine effective treatment options.

**Materials and Methods**: A national survey was undertaken, in which representatives of obstetrical anesthesia units throughout Israel were contacted to obtain information which included: hospital data, intern training, management of IDP, PDPH and Epidural Blood Patch (EBP) outcomes.

Results and Discussion: A total of 23 hospitals participated in the survey. 87% of hospitals did not perform prophylactic EBP. Most hospitals (78.3%) did not utilize saline injection into the epidural space; however, 4 hospitals (17.4%) did not routinely perform such procedures when an inadvertent dural puncture occurred and one hospital (4.3%) had no consistent pattern of use. In 95.7% of hospitals, in this study cohort, conservative treatment was initiated within 24-48 hours. Conservative treatment included IV Fluids (91.3%), bedrest (73.9%) and caffeine (60.9%). Consent form specifically for EBP was obtained in 39.1% of hospitals, 34.8% utilized the surgical consent form, in the reminder (26.1%) used the epidural consent form.

**Conclusion**: In this national survey, we noted there is no consensus or clear guidelines in the management and treatment of PDPH. While EBP is the Gold Standard of treatment, prophylactic EBP is known to be ineffective. The majority of obstetric units initiate conservative measures within 24-48 hours after which, they performed an EBP which was shown to increases efficacy. In light of results, we hope this survey may provide guidance and lead to improved treatment outcomes.

#### 04AP04-4

# Epidural blood patch and identification of the epidural space – Is there room for improvement?

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Background: Postdural puncture headache (PDPH) is the most common complication after labor neuraxial anaesthesia. Epidural Blood Patch (EBP) is the only effective treatment¹. The identification of the Epidural Space (ES) is important in patients submitted to EBP due to a previous complication of puncture. We report the combined use of two new devices developed to help identify the ES: Accuro® handheld ultrasound system and Compuflo® to perform an EBP.

Case Report: A 36 y.o. woman suffered an accidental dural puncture, during a combined spinal-epidural (CSE) at L3-L4 level for labor analgesia using the loss of resistance (LOR) to air technique. A PDPH appeared and she was offered an EBP. The depth of the ES was evaluated previous to puncture at L3-L4 level in a sitting position using Accuro® handheld ultrasound system (Figure 1). This device uses a piston ultrasound transducer to limit the deleterious effects of grating lobes and off-axis reflectors on bone image quality and facilitates the location and depths of the ES previous to puncture². The ES was then identified using Compuflo®, another disposal based on the LOR to saline technique, which incorporates a pressurizing system of the Tuohy needle and a dynamic pressure sensing technology, allowing a minimal infiltration of saline and a precise identification of the ES. Once the ES was located, 20 ml of fresh autologous blood were injected uneventfully.

**Discussion:** PDPH remains a common complication, a second dural tap is not acceptable. EBP requires a new puncture of the ES, it must be accurate to avoid complications. Preprocedural US imaging improves the performance of epidural anaesthesia, first-attempt epidural success rates and estimates the depth of the ES, yet requires extensive training. Accuro®'s algorithm has a sensitivity and specificity between 85% and 95% to locate the ES². Even though, no differences have been detected between air or saline loss of resistance technique for the onset of the block³, the use of saline with Compuflo® might help to improve the precision of the identification of the ES. The safety and effectiveness of Compuflo® are still under research.

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Learning points: Safe identification of ES before EBP is essential. The use of new technologies can reduce risks and complications related to the technique.

#### 04AP04-5

# Our experience with management of postdural puncture headache

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**Background and Goal of Study**: According to the current bibliography, the incidence of accidental dural puncture (ADP) is around 0,5-2,5% and the appearance of postdural puncture headache (PDPH) is near 85% of the cases. If left untreated, 85% of PDPH resolve within 6-8 weeks. Epidural blood patching is the most reliable method of treatment, relieving 65-70% of headaches after the first treatment.

Given the quotidian of the epidural technique and the comorbidity associated to PDPH we posed to analyze the characteristics of pain and the treatment performed. **Materials and Methods**: We did a retrospective observational study of all gestations in which epidural anesthesia was used during labor from 2009 to 2017. During this period all cases of ADP and PDH were compiled through an individualized form. At our center the patient is informed of the technique and its possible complications and signs an informed consent.

Nowadays, we do not have an updated protocol of management of postdural puncture headache in obstetrics.

. We analyzed pain time duration, severity, when we used blood patch and how many we needed to relief the symptoms.

Results and Discussion: We analyzed 14255 deliveries and 7121 epidural anesthesia. A total of 94 ADP cases were compiled, which shows a total ADP incidence of 1,32%. The appearance of PDPH was observed in 66 patients, 70,2% of the total compared with a maximum of 88% of cases found in the bibliography. Of these 66 patients, 69,7% presented headache during the first 24 hours (compared to 49% in the bibliography) and 71,2% during more than 24 hours. The headache was mild on the 40,9%, moderate on the 31,8% and severe on the 13,6% (compared to 48% found in the bibliography).

The use of the blood patch under 48 hours never took place and only 36,4% had it after 48 hours. In only two patients (8%) we needed a second blood patch. In the bibliography we found that 30% needed a second blood patch.

Conclusion: The incidence of ADP in our center is near the ones observed in the

available literature.

We found differences in the classification of pain severity, having a lot less seve

We found differences in the classification of pain severity, having a lot less severe headache. We should analyze why.

The fact that we lack a protocol may lead to that we never use a blood patch after the 48 first hours after the beginning of pain.

We think that the goal should be having a protocol in handling the PDPH because poor management could lead to a bad mother-infant bonding, long mobilization and a prolonged hospital stay.

# 04AP04-6

Study of the incidence of accidental dural punctures (ADP) in relation to the body mass index (BMI) in the Obstetric Anaesthesiology Service of the General University Hospital Gregorio Marañón

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Background: The performance of an epidural technique for labor is an essential part of the obstetric patient's pain management. In our center, this procedure is performed for more than 90% of the patients who attend delivery. Despite being a safe technique, occasionally an accidental dural puncture (ADP)can be occur, with an incidence that varies between 0.2-4%. This complication can have important clinical repercussions such as the occurrence of a post-puncture headache (PPHA). The goal of our study is to determine the relationship between the incidence of ADP

and the BMI of the patients.

Materials and Methods: Descriptive, observational cross-sectional study where we collected information on 27094 epidurals between June 2010 and March 2017. In all the epidurals performed the informed consent is obtained before the realization of the technique. Afterwards, a survey is filled in with the following data: age, ASA, weight, height, week of pregnancy and obstetric formula. Later, data related to the anesthetic technique is filled in: epidural, spinal technique, if the loss of ressistant was done with air or physiological saline solution, number of spaces punctured, place of puncture, position of the patient, complications(blood puncture, paresthesias, intravascular or painful injection...).Subsequently we calculated the BMI of the patients, relating it to the incidence of ADP, considering a low BMI below18.5, normal 18.5-24.99, overweight 25-29.99, obesity above 30 and morbid obesity above40.

Results and Discussion: Between June 2010 and May 2017, 27094 women in labor received epidural analgesia. A total of 147 ADPs have been found, with an incidence of 0.54%. Weight and height data of 99 patients have been collected. With a normal BMI we found 30 ADP (29.7%), with a BMI of overweight there were 42(41.58%), with obesity 25 (24.75%) and 2 were patients with morbid obesity (1.98%). Epidural for labor is the analgesic technique of choice, is safe and effective but we must not forget that it is not free of complications. ADP can produce PPHA that conditions a great discomfort to the patient, the need of treatment that can range from iv or oral analgesia to the realization of a blood patch; increasing the length of hospital stay. This complication is related to the caliber of the needle, the position, weight and age of the woman; among other factors.

**Conclusion:** Prevalence of ADP is similar in our hospital to other series. We can conclude that ADP is more frequent in patients with a BMI greater than 25(68.31% of cases).

#### 04AP04-7

## Risk factors for recurrence of post-dural puncture headache following blood patch in obstetric patients

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The blood patch technique is currently the reference method in the treatment of postdural puncture headache (PPDH) after medication failure, although the demonstration of its effective efficacy is only fairly recent. However, many areas of shadows persist concerning: its efficiency rate (60 to 95% depending on the studies), or the percentage of cases requiring a repetition of the procedure (15 to 29%). The goal of our study at the HUG maternity was to estimate the incidence of postblood patch failure defined as the persistence of symptoms (attenuated or not) at 1 week after the first blood patch and requiring additional treatment (second blood patch or conservative therapy). The aim of this work was to determine predictive factors for failure of the initial blood patch in order to identify more quickly the patients at risk.

Over a period from 2001 to 2015, were analyzed retrospectively the data of parturients including pre, per and postpartum and having had a local regional anesthesia for delivery assistance.

These data included information on anesthesia, maternal satisfaction but also complications such as the epidural breach or nerve lesions. For our study, we retrieved all patients who had an identified dural perforation (with a spinal or epidural needle, or a catheter) followed by typical PDPH treated with a BP. For all these patients, we determined risk factors for recurrent PDPH by comparing patients and procedures characteristics of patients with or without recurrent symptoms after the BP. We used Chi-square, T-test and OR with 95% CI to compare groups.

196 patients (0.48%) with PDPH were included in our study among a cohort of 40379 parturients. Of these, 87 (44.4%) had persistent symptoms after the initial blood patch and 32 (16.6%) required a second blood patch. Risk factors for symptom persistence after the first blood patch were identified: migraine OR 8.0 95% Ci [1.0-67.7] P = 0.02, pulsatile headache OR 3 95% CI [1.3-8.4] P = 0.08, a presence of photophobia OR 2.9 95% CI [0.9-8.9] P = 0.04.

Careful monitoring and clear information should be given in the presence of these risk factors on the greater likelihood of repeating the gesture and may need to lead the practitioner to perform the bloodpatch earlier.

Finally, may be that an injection of a larger volume of blood during the first bloodpatch could in these patients at risk, reduce the recurrence of PDPH.

# 04AP04-8

Type of obstetric anesthesia/analgesia does not affect disease course in multiple sclerosis parturients: 10-year retrospective trial

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Background and Goal of Study: Multiple sclerosis often occurs in young women and the effect of obstetric anesthesia/analgesia on the disease is poorly understood. No previous study has investigated disease course of labouring women in the Czech Republic. We aimed to describe occurence or absence of relapses in 6-month postpartum period in parturients with and without obstetric anesthesia/analgesia. Materials and Methods: We retrospectively studied all deliveries in University Hospital Brno in years 2004-2013 (n = 58,455) and identified those of the women with ICD-10 code G35 (MS) recorded anytime in their medical history (n = 428). We included only deliveries of women with confirmed diagnosis at time of labour (n = 70). Statistic analysis was performed by Fischer Exact Test.

**Results and Discussion**: We studied 70 deliveries of 65 women, including 45 vaginal deliveries and 25 Ceasarean deliveries (16 in general anesthesia, 8 in epidural anesthesia and 1 in spinal anesthesia). Epidural obstetric analgesia was performed in 11 deliveries. There was no statistically significant difference in relapse occurence in groups of vaginal delivery (n = 15; 33%) and Cesarean section (n = 10; 40%), p = 0,611. This finding corresponds with outcomes of recent studies showing no significant difference in the rate of relapse between women with obstetric anesthesia/analgesia and those without it.

Conclusion: Type of delivery and type of obstetric anesthesia/analgesia does not alter multiple sclerosis course in 6 months postpartum.

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#### 04AP04-9

Anaesthetic management of a pregnant woman with Chiari Malformation type 1 following failed endotracheal intubation for caesarean section

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Background: Chiari Malformation type 1 (CM-1) is a congenital anomaly where the hindbrain herniates into the foramen magnum. Consensus regarding the mode of delivery and anaesthetic management in patients with CM-1 remains controversial with regards to the risk of raised intracranial pressure (ICP)<sup>1</sup>. We describe a patient with severe CM-1 who had elective caesarean section (CS) under general anaesthesia. Her airway was managed with a supraglottic device (iGel) after endotracheal intubation failed. To our knowledge this is a first report describing use of iGel in a patient with CM-1 during CS.

Case Report: A 32 yo with severe CM-1, extensive cervical syrinx and upper limb weakness was referred to the anaesthetic clinic at 13 weeks of gestation. Other risk factors were BMI of 40 and thrombocytopenia. Airway assessment found Mallampati 4, small mouth opening, big tongue and short thyromental distance. Discussions between anaesthetic, obstetric and neurosurgical teams concluded that the safest mode of delivery was an elective CS under general anaesthesia with neuroprotective measures. On the day of her surgery two senior anaesthetists attempted intubation with laryngoscope and bougie. At the second attempt bleeding in the oropharynx obscured the view. Oxygen saturations fell to 87% and an iGel was inserted as a rescue ventilation strategy. Due to the fact that good ventilation and oxygenation was achieved decision was made to continue the surgery using an iGel. There were no intra- or post-operative concerns and patient was discharged home 2 days later.

**Discussion:** Previous reports describe patients with CM-1 and difficult airway managed with neuroaxial blocks or awake fibreoptic intubation<sup>2</sup>. In our patient regional anaesthesia was contraindicated due to raised ICP and thrombocytopenia. Awake fibreoptic intubation was considered but was abandoned in view of good ventilation achieved with iGel and to minimise any further airway stimulation. After failed intubation the iGel provided good oxygenation but PaCO2 on an arterial blood gas at the end of the surgery was 6.5kPa.

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2. Semple et al. Arnold-Chiari malformation in pregnancy. Anaesth (1996)51:580-Learning points: In case of failed endotracheal intubation an iGel can be successfully used in parturients with CM-1. However, hypercarbia is hard to control and potentially carries the risk of increasing the ICP.

#### 04AP04-10

# Pregnant in pain, but with back surgery – what can we do?

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**Background**: Despite absolute contraindications for neuroaxial block are well defined, there's some controversy for cases of people with previous back surgery. As there's no consensus on this subject, we present a case in which the anesthesiology team and the parturient herself had to weigh in risks versus benefits of this approach.

Case Report: A 26 year old pregnant woman, second gestation, ASA II, was admitted for labor induction. In 2009, she had a car accident which led to back surgery due to T12-L4 fractures, without neurologic deficits. As the labor pain begun, it was discussed with the patient two possible options – remifentanil perfusion or combined spinal epidural technique. This had already been discussed during a preanesthetic consultation. A combined spinal epidural technique was performed and an unintentional dural puncture occurred. As so, analgesia was controlled through an intrathecal catheter. 9 hours later, she was submitted to a caesarean section under intrathecal anesthesia, for obstructed labor. No complications were recorded. 72 hours later, she was discharged, although presenting a mild atypical postdural puncture headache (PDPH) - her headache only aggravate with prolonged orthostatism. On the 6th day, she returned to the hospital with a more severe PDPH. With bed rest and oral analgesia, at day 7 she was asymptomatic.

**Discussion:** Although epidural block could have been insufficient for labor analgesia, with unpredictable pharmacological dispersion, combined spinal epidural approach was chosen for other various reasons: a prolonged labor was predicted (labor induction); pain level expected was higher than usual because of the position required for the birth in addition with instrumented vertebrae. PDHD occurred as a complication that can happen in 2.8-4% in obstetrics (1) and was treated as so. Nevertheless, the need for intrathecal catheter turned out to provide excellent analgesia during labor as well as anesthesia to allow performing the caesarean. Dialogue and discussion with the patient was of essence, apart from the usual informed consent.

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**Learning points**: There is no consensus about neuroaxial technique on patients with back bone surgery, as it is not a contraindication itself but presents a challenge that's neither consensual among the medical community nor always accepted by the patients that suffer this condition.

#### 04AP04-11

When the catheter is not where you expect: a case of subdural anesthesia in an obstetric patient

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**Background**: Subdural anesthesia is a known but relatively infrequent complication of epidural anesthesia in the obstetric population that may be associated with serious consequences. However, because of its broad spectrum of presentation and severity, it is seldom recognized and its true incidence may be higher than what is believed.

Case Report: A 31 year old woman, ASA II, at full term pregnancy, was admitted to the maternity unit in active labor. An epidural catheter was placed for pain relief and later used for anesthesia for an emergent cesarean section due to fetal distress. 20 min into the procedure, the parturient developped upper limb paresthesia and weakness as well as respiratory distress. A rapid sequence induction and intubation was performed for management of the situation, with no further complications.

**Discussion**: Epidural analgesia/anesthesia is a safe choice for labor pain relief but is not exempt of complications, such as subdural anesthesia. In retrospect, our patient had some signs and symptoms that lead us to diagnose a subdural placement of the catheter: atypical pattern of spread, slower than usual onset and inadequate pain relief.

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**Learning points**: Subdural anesthesia is a known complication of neuraxial techniques but is relatively easy to miss. Bearing this in mind, we should be aware of the signs and symptoms that may alert us to this possibility.

#### 04AP05-2

# General or regional anaesthesia for postpartum haemorrhage

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Background and Goal of Study: First line surgical treatment for postpartum haemorrhage (PPH) following vaginal delivery is manual emptying of the uterine cavity. Anaesthesia is provided as regional anaesthesia (spinal/epidural) or general anaesthesia. Method depends on airway risk assessment, circulatory instability due to haemorrhage, and local tradition. We aim to describe the Danish national variation in choice of anaesthesia for PPH. We hypothesized that small centres with few annual deliveries were more likely to choose general anaesthesia.

Materials and Methods: Using the National Danish Patient Register we defined our population by the SKS procedure codes KMBA10,30,30A: manual removal of placenta, placental parts or manual exploration of the uterus due to continuous bleeding after placental delivery performed during 2010 to 2015. The Danish Anaesthesia Database (DAD) contains information on mode of anaesthesia. A merge between the two registries was performed. Logistic regression was used (p<0.001).

Results and Discussion: Denmark had a total of 11,053 PPH treatment procedures in 27 different centres complicating 3% of deliveries during 2010 to 2015. Three centres did not report to DAD and some centres did not report or exist during the entire period. Mode of anaesthesia was obtained for 5,750 (52%) procedures. We found a significant increase in the use of regional anaesthesia during the period and a corresponding decrease in the use of general anaesthesia Small centres had a significantly higher proportion of patients receiving general anaesthesia. Large centres had a significantly higher proportion receiving regional anaesthesia. We found no difference in the proportion of deliveries complicated by PPH treatment procedures between centres or during the period. Regional anaesthesia is increasingly being used in the treatment of PPH. This tendency follows the recommendation for caesarean section due to increased risk related to tracheal intubation. However, regional anaesthesia may cause circulatory collapse with severe haemorrhage. Thus, the higher proportion of patients receiving general anaesthesia in small centres could suggest that inexperience at the initial circulatory assessment prompts more patients to be given general anaesthesia

Conclusion: Small delivery centres are more likely to choose general anaesthesia for PPH treatment procedures.

### 04AP05-3

# Strategic management of critical obstetric hemorrhage with disseminated intravascular coagulation by using a portable fibrinogen measuring device

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**Background**: In the case of obstetric disseminated intravascular coagulation (DIC), strategic management, including transfusion of blood products and supplementation of coagulation factors, is needed. Laboratory-based tests are long turnaround and unsuitable for emergency use. Here we report a case of critical obstetric hemorrhage with >10L blood loss which was strategically managed by using a portable fibrinogen measuring device.

Case Report: A 32-year-old woman (G2,P2) with MD twins at 22 weeks of pregnancy was diagnosed with placental abruption and underwent urgent cesarean section under general anesthesia. After the operation, she was transferred to our hospital because of postoperative vaginal bleeding. At the previous hospital, an estimated blood loss was 8375g, and aggressive blood transfusion (20U of RBC, 30U of FFP, and 20U of PLT) and supplementation of coagulation factors (2mg of rFVIIa and 3000U of ATIII) had been performed. Upon her arrival at our hospital, a portable fibrinogen measuring device revealed a plasma fibrinogen concentration of 243mg/dl. However, we decided to administer 3g of fibrinogen in case of possible hyperfibrinolysis. Later, laboratory tests reported lowered Hb (6.2g/dl) and Plt (23,000/mm3), so blood transfusion was started with PLT followed by RBC. Simultaneously, FFP was administered to keep plasma fibrinogen>200mg/dl by using the portable device. After stabilizing hemodynamics and coagulation, operative compressive uterine sutures was performed under general anesthesia.

In our hospital, an estimated blood loss were 2310g, and 12U of RBC, 12U of FFP, and 20U of PLT were administered. In spite of massive hemorrhage exceeding 10L, she was extubated at the end of the operation, and discharged on POD7.

**Discussion**: In the case of postpartum hemorrhage, an appropriate evaluation of a varying coagulation status by conventional laboratory tests has been difficult1). However, point of care measurement of fibrinogen concentration using a newly developed portable fibrinogen measuring device was very useful to confirm that her clotting function was acceptable and to make a strategic transfusion of blood products.

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**Learning points**: Strategic and appropriate management of critical obstetric hemorrhage becomes possible by using a portable fibrinogen measuring device.

# 04AP05-5

# Can early administration of fibrinogen improve post partum hemorrhage? A Prospective observational study

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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, 33 patients were included (12 patients en group E and 21 patients in group L). Blood loss was correlated to the delay of fibrinogen administration. (Pearson correlation coefficient was 0.688) Blood loss was 2486 ml in group E versus 5310ml in group L (p=0.002). Red blood cell transfusion requirements was 4.58 units/patient in group E versus 8.14 in group L (p=0.022)

Conclusion(s): Early administration of fibrinogen seems to reduce blood loss and transfusions after uterine atony in cesarean section delivery.

## 04AP05-6

# Change in postpartum haemorrhage treatment strategy may decrease massive transfusions

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Background and Goal of Study: Severe postpartum haemorrhage is still the leading cause of maternal morbidity also in high-income countries. Implementation of new treatment strategies of early antifibrinolytic agent and fibrinogen concentrate administration together with new surgical and angiological techniques may already have made a difference. We investigated how transfusion, fluid and medical therapy have changed over six years and whether these changes have had an effect on total blood loss and transfusion requirements, incidence of massive bleedings and transfusions, intensive care admissions and morbidity.

Materials and Methods: All severe postpartum haemorrhage (≥1500 ml) cases (n=1141) in 2009-2015 were identified from a tertiary hospital's computerized database. Their background, long-term illnesses, medication, pregnancy and delivery data, data on treatment of bleeding, laboratory values, intensive care admissions and possible complications were recorded. SPSS version 23 was used for statistical analyses: Kruskal-Wallis test was used to compare medians of different numerical variables grouped by each year studied and Chi-Square test or logistic regression analysis was used for binominal variables to examine the significance of changes from year to another.

Results and Discussion: Numbers of massive bleedings (≥5000ml) and massive transfusions (≥10 units of red blood cells in 24 hours) decreased during the study

period (5,2 $\Rightarrow$ 0,6% and 5,8 $\Rightarrow$ 2,4%; p=0.005 and 0.019, respectively). Number of intensive care admissions also showed a decreasing trend (7,9 $\Rightarrow$ 2,4%). Median amount of blood loss did not change significantly (p=0.629), nor the median of red cell units transfused per patient, though there was a decreasing trend. The percentage of patients receiving tranexamic acid rose from 7,8 % to 88,8% (p=0.000). A statistically non-significant rise occurred in the number of patients receiving fibrinogen concentrate (2,6 $\Rightarrow$ 7,6 %). The median amount of pooled apheresis plasma units transferred per patient dropped from 4 to 2 in the last two years (p=0.014), while percentage of patients receiving it remained rather constant (16,9-24,5 %, p=0.689).

**Conclusion**: Less massive transfusions and bleedings were seen towards the end of the study period and the median amount of plasma used per patient has dropped: the earlier and increasing use of antifibrinolytic and hemostatic agents may have contributed to this and the strategy proposed recently seems legitimized.

#### 04AP05-7

# Interest in pelvic packing after hysterectomy for obstetrical haemostasis in maternal rescue: A retrospective study

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Background and Goal of Study: Severe postpartum haemorrhage is the leading cause of maternal mortality and morbidity worldwide. Surgical treatment may be indicated and may include a haemostatic hysterectomy in cases of unsuccessful conservative treatments. However, there is a risk of persistent haemorrhage after haemostatic hysterectomy when severe coagulation disorders occur. Pelvic packing can be an alternate life saving technique to control haemorrhage, especially if angiography and embolization is not immediately available.

The main of this study was to evaluate the possible benefit of the pelvic packing technique after haemostatic hysterectomy associated with coagulation disorders in the immediate post partum.

Materials and Methods: We conducted a retrospective survey on hospital records of patients who underwent haemostatic hysterectomy for an obstetric cause. The study period ranged from January 1998 to December 2016. The files of the selected patients were analyzed for the aetiologies of bleeding, treatment strategies and the indications of packing.

Results: During the study period only 32 files were recorded. Caesarean delivery occurred in 84% (27 cases) of the cases. The aetiologies of bleeding were dominated by uterine atony and retro placental hematoma. Initial medical and surgical management was proved to be insufficient and the transition to a complementary surgical treatment was indicated. Pelvic packing indications were taken collectively. Large compresses were used for Pelvic packing and a drain was left in place in 71% of cases. The duration of the packing was less than 24 hours in 1 cases, between 24 and 48 hours in 14 cases and between 48 and 72 hours in 13 cases. In one case a surgical revision was necessary after packing in the presence of hemodynamic disorders requiring ligation of the hypogastric artery. Embolization was needed in one case. Postoperative complications were postoperative fever (7 cases), parietal infection (2 cases), postoperative urinary infection (1 case) and deep vein thrombosis (1 case). There were no maternal deaths.

**Conclusion**: Pelvic packing seems appropriate in case of uncontrollable bleeding after haemostatic hysterectomy associated with persistent coagulation disorders especially if angiography and embolization is not immediately available. In our study, this technique was effective with a success rate of 93%.

# 04AP05-8

# Amniotic fluid embolism: A Case of Successful Cardiac Ultrasound and Rotational Thromboelastometry (ROTEM) Guided Resuscitation in a Patient Undergoing Caesarean Section

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**Background:** Amniotic fluid embolism (AFE) is rare but life-threatening condition. Predominant characteristics are abrupt onset of respiratory failure, circulatory collapse and disseminated intravascular coagulopathy (DIC) (1, 2).

We present a patient with an AFE who developed hypoxia, hypotension and coagulopathy during CS procedure.

Case Report: A 27-year old primigravida at 31 5/7 weeks of gestation underwent urgent CS. After induction of anaesthesia, the drop in blood saturation and increased airway pressure was observed. The patient was treated for suspected bronchospasm with salbutamol and aminophylline. Hypotension was detected, coupled with rapid blood pressure drop and loss of systolic measurement. Because of potential anaphylactic reaction, tachycardic and hypotensive patient was treated with the infusion of adrenaline.

Cardiac ultrasound showed normal right ventricle size with normal pressure, small,

completely empty and hyperdymanic left ventricle, vena cava inferior was collapsed. Fluid resuscitation and infusion of phenylephrine was started, followed by norepinephrine infusion. Blood for laboratory examination was sampled and blood for transfusion ordered. When CS procedure was completed, bleeding started from the wound. At the same time, ROTEM analysis indicated fibrinolysis and lab blood examination results showed hemoconcentration. Tranexamic acid was applied to stop bleeding. General oedema appeared. Sedated patient was transported to the ICU and after 12 hours extubated.

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**Discussion**: The underlying reason for cardiocirculatory collapse in our case remain uncertain. Cardiac ultrasound might become one of the power tools to answer clinical questions and guide subsequent management in obsteric patient (3). For point of care therapy in peripartum haemorrhage and coagulopathy Rotem is essencial. **References**:

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**Learning points:** Cardiac ultrasound examination and ROTEM results guide to better decision making and faster patient treatment. Both technics contribute to successful solved case.

#### 04AP05-9

# Von Willebrand disease in pregnancy: Is it neuraxial anesthesia safe? - A case report

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Background: Pregnancy and delivery are considered an important hemostatic challenge for women with von Willebrand disease (VWD). Treatment is rarely required to manage delivery in type 1 VWD patients. Usually, patients with dysfunctional (type 2) or severe (type 3) VWD require replacement treatment to avoid immediate or delayed bleeding, even though FVIII procoagulant activity (FVIII:C) is corrected by the end of pregnancy in type 2. We present the case of a primigravida with type 2M VWDin whom a combined spinal epidural was safely performed

Case Report: A 29 year old pregnant patient, ASA II, with VWD familiar history, was referred to immunohemotherapy at 14 weeks of pregnancy. Her laboratory results were as follows: VWF functional (VWFf) 11%, FVIII 51% and VWF antigen (VWF:Ag) 48%. She was diagnosed with VWD type 2M by genetic study.

At 38 weeks gestation, she was admitted to our hospital in active labor. She was managed under a multidisciplinary team which included obstetricians, immunohemotherapist, anaesthetists and neonatologists. The laboratory results on admission were: VWFf 44%, FVIII 156% and VWF:Ag 151%. The immunohemotherapist proposed administration of VWF Wilate® for bleeding prevention and confirmation of laboratory results before performing neuroaxial anesthesia. After Wilate® administration, the results were: VWFf 67%, FVIII 165% and VWF:Ag 166%. According to the immunohemotherapist the technique could be performed safely as the risk of bleeding into the epidural space was minimal. She had a forceps delivery for fetal bradycardia without complications. The patient was discharged on the 6th day of puerperium without complications. The laboratory results stand at normal levels (VWFf>42%; FVIII>80%; VWF:Ag >42%).

**Discussion:** VWD is the most common inherited bleeding disorder that may result in various bleeding complications in a parturient because of hemostatic challenges during pregnancy. There are no studies defining guidelines for the use of regional anesthesia during labor and delivery in women with VWD and there is no consensus on safe VWF and FVIII levels for placement of an epidural catheter. The current evidence is limited to case reports of women with VWD who received epidural anesthesia without bleeding complications.

**Learning points**: Our case report highlights the importance of advanced planning, careful patient assessment and multidisciplinary approach for the successful regional anesthesia based on clinical experience.

#### 04AP05-10

# Cesarian section in a patient diagnosed with congenital shortage of coagulation factors v and vii and a arteriovenous malformation partially embolized

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**Background**: Arteriovenous malformation is a rare condition during pregnancy, so the bleeding disorders are. Literature shows only case reports about these two simultaneaous conditions.

Case Report: 30 years old primigravid patient is admitted to labour with fetal delayed intrauterine growth. Previously diagnosed with congenital deficit of coagulation factors V and VII and a partially embolized arteriovenous malformation (AVM). After a multidisciplinary assesment we decided to perform an elective cesarian section in order to prevent valsalva manouvers and having in mind the fact that neuroaxial procedures are contraindicated due to the patients hematological disorder. Elective C-section was performed under general anesthesia and standard monitorization after previous factor VII replacement and a multiple dose of tranexamic acid. No increased blood loss was recorded, anesthetic eduction was uneventfull and neurological postoperative assessment was normal. The patient

and the newborn were discharged without any complications at third day. **Discussion**: Few evidence is available about the correct management of AVM and haematologycal dyscrasia during pregnancy, wether vaginal delivery or elective C section is prefered for the patients carrying a avm is still unknown.

Because of small samples and sparse data about the treatment of AVM rupture during pregnancy and puerperium, the management of these patients is very difficult and controversial.

Since the highest risk period for avm rupture is the third trimester, delivery and puerperium, exhaustive hemodynamic stability is recomended. Achieving an hemodynamic control in the peripartum period relies on pain relief. Neuroaxial techniques might be contraindicated when bleeding disorders are given.

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**Learning points**: Multidisciplinary assessment and careful decision taking is needed when there is bleeding risk and MAV rupture risk at the same time. Having a plan and avoiding emergent performance might be key for a safe outcome.

#### 04AP05-11

# Epidural management in a parturient with severe immune thrombocytopenia

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Background: Insertion and removal of epidural catheters in severe thrombocytopenia are at risk of epidural haematomas. In immune thrombocytopenia (ITP), platelet transfusion may be ineffective due to rapid platelet destruction. We present a case report in which an epidural catheter was inserted in an obstetric patient with ITP and its management.

Case Report: A 38 year old lady in term labour requested for analgesia. Her antenatal and medical history was uneventful. As her platelet count at her booking visit and at 1.5 months prior did not reveal any thrombocytopenia, she received a lumbar combined spinal-epidural. The epidural space was found using loss of resistance to saline with an 18 gauge Tuohy needle and intrathecal space entered with a 27 gauge Whitacre needle. Subsequently, a full blood count showed severe thrombocytopenia (38,000 per microliter) and was confirmed by a repeated result of 26,000. The patient had no history of bleeding tendencies. Examination was negative for haemorrhage, neurological deficits or bruising at the epidural site. Vaginal delivery had blood loss of 300ml. Her lower limbs' neurological status was monitored. Haematology diagnosed ITP and started oral Prednisolone 60 mg/day. A unit of pooled platelets was given with platelets rising to 74,000 and a second unit given before catheter removal. 48 hours of monitoring was negative for neurological deficits or signs of an epidural haematoma.

**Discussion**: ITP causes autoimmune platelet destruction. Epidural hematoma risk from neuraxial procedure in parturients with platelets  $\geq$  70,000 is 0.2% but unclear at lower levels and estimated at 3% for 50,000 to 69,000 and 11% for  $\leq$  49,000. ITP therapy (steroids) has slow onset (5 days). IV immunoglobulin has faster onset (2 days) but reserved for severe bleeding. Recovery of platelet levels is

unpredictable for both.

Platelet transfusion is reserved for severe bleeding as destruction is rapid and platelet rise is unpredictable. In this case, transfusion produced a rise in platelets

adequate for catheter removal. However, delayed neuraxial bleeding may occur.

Learning points: Epidural catheter removal in ITP is challenging due to unpredictable and slow effect of therapy on platelet count. Transfused platelets are rapidly destroyed. By monitoring platelet counts after transfusion and vigilance, this case shows the use and removal of an epidural in severe thrombocytopenia

# 04AP06-1

# Anaesthetic management in advanced lung cancer during pregnancy

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**Background**: Even though lung cancer in obstetric population has been increasing in the last years, it is still considered a rare entity, with very limited published experience on anaesthetic management.

Case Report:A 42-year-old pregnant woman at 30 + 4 weeks of gestation presented severe acute respiratory failure secondary to pulmonary embolism. She reported a four-week history of chest and back pain. After initial stabilization and anticoagulant therapy prescription, a diagnosis of stage IV ALK+ lung cancer was made. Diagnostic imaging studies showed a large mass in the left lung involving mediastinal elements, carcinomatous lymphangitis and brain, liver and bone metastases (dorsal, lumbar and sacral spine lesions). A multidisciplinary team of anesthesiologists, obstetricians, oncologists and neonatologists, decided to perform an elective caesarean section to improve the patient's respiratory function and to start the chemotherapy treatment. The impossibility of performing a regional technique, led us to use general anaesthesia (GA) with invasive monitoring of blood pressure and cardiac output. Thiopental, fentanyl and rocuronium were chosen for a rapid sequence anaesthetic induction, and remifentanyl and propofol infusion for anaesthesia maintenance. We used protective ventilation without PEEP. The patient remained haemodynamically stable. Anaesthesia and surgery were uneventful.

**Discussion:** Our main challenge was to decide whether GA was the best posible option in this case considering the high hemodynamical, respiratory and neurological risk of our patient with the GA, but we had no choice because of the presence of spinal and brain metastases, that contraindicated the neuraxial techniques, the gold standard technique in cesarean sections in an expectant who presents with lung cancer.

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Learning points: Pregnancy complicated with lung cancer has been rarely reported and published anaesthesia data are limited, specially about GA. However, the incidence is now increasing. The management of a pregnant woman with advanced lung cancer should be planned with a multidisciplinary team. Regional anaesthesia is known to be the gold standard anaesthetic technique but is normally contraindicated with spinal and/or brain metastases. This condition requires a careful anaesthetic management

#### 04AP06-2

# Anesthetic management of a pregnant patient with fabry's disease

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Background: Fabry's disease (FD) is a rare systemic X-linked disease, even though its real incidence is unknown. It is related to a glycosphingolipid metabolism disorder in the alpha-galactosidase A enzyme, causing an accumulation of glycosphingolipids in the lysosomes. This results in anatomic abnormalities and organ dysfunction that can increase the risk of anesthesia complications. Clinical picture combines neurological (Fabry's pain crises), dermatologic, renal, cardiovascular (hypertrophic cardiomyopathy, valvular disease, conduction disorder, coronary heart disease) and cerebrovascular affectations. Epidural block is debated in patients with neurological diseases and recommendations are not unequivocal.

Case Report: A 27 y.o. pregnant patient (38 weeks of gestation) with known FD asked for labour analgesia. Her clinical symptoms were fatigue, irritable bowel, fingers, hands and legs pain, hearing loss, dyslexia and migraine, with no treatment. Preoperative evaluation showed ASA II, BMI 34, proteinuria (667 mg/24 hs), important oedema in face and lower limbs, difficult airway and ventilation predictors (Mallampati III, interincisor distance < 3 cm, poor cervical mobility, bite test grade II and obesity). Due to the increased possibility of difficult airway, we decided to insert an epidural catheter for labour pain relief, to avoid general anaesthesia in case of a C-section. Finally, a C-section was needed for non-progressive labour. Anaesthesia was provided via the previously placed epidural catheter. There were no complications. The epidural catheter was removed 24h after surgery, and the patient was discharged home uneventfully on the 3rd postoperative day.

**Discussion**: Cases of FD submitted to other interventions usually require the use of video laryngoscopes or supraglottic devices due to difficult airway, but for obstetric patients, general anaesthesia must be avoided when possible.

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Learning points: An exhaustive preoperative evaluation is paramount to design the anaesthetic plan. Epidural anaesthesia was used with success without any change in the clinical status and permitted to avoid a general anaesthesia and its inherent concerns in this pregnant patient with FD. To our knowledge, this is the first report of neuro-axial regional anaesthesia performed in a parturient with FD.

# 04AP06-3

# Anesthetic management in a pregnant patient with CADASIL

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Background: Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) is an inherited cerebral small vessel disease caused by NOTCH3 gene mutations. Cerebral infarctions result from thickening and fibrosis of the walls of small and medium-sized arteries. Clinically, CADASIL is associated with progressive dementia, mood disorders, history of migrane with aura, and recurrent subcortical cerebral infarctions on neuroimaging. Women with CADASIL are frequently considered at high risk of systemic vascular events during pregnancy and often prescribed with antithrombotic drugs.

Case Report: We report a case of a 42 year-old primigravida at 35 weeks gestation diagnosed with CADASIL. Last episode of a migraine with left hemiparesis recovered without changes in cerebral MRI was 15 days ago. History of allergy to acetylsalicylic acid, asthma, hypothyroidism in substitutive therapy and gestational diabetes was recorded. In treatment with levothyroxine and Tinzaparin 7000UI sc/24h. She arrives to our center for the start of labor (the last dose of heparin was given 24 hours ago). A multidisciplinary team with obstetricians, anesthesiologists and pediatricians schedule an elective cesarean section to reduce labor time and time without receiving anticoagulant treatment. Upon completing the preoperative fasting we proceeded to hydration with 500ml of HES. A subarachnoid block is performed at L3-L4 level. Using a 25G Whitacre needle, 10 mg of hyperbaric bupivacaine with 20 mcg of fentanyl is injected into intrathecal space. Monitorization with ECG, oxygen saturation and noninvasive blood pressure is performed. The patient remains hemodynamically stable during the procedure without requiring any vasoactive drugs. At the end of the intervention, she is transferred to a semicritical unit for postoperative control. 24 hours later, we reinitiate the usual anticoagulant treatment and the patient is transferred to a conventional hospitalization unit and 48 hours later she is discharged.

Discussion and learning points: Perioperative management was uneventful. We highlight the value of managing these patients under regional anesthesia, as these enable a better control of hemodynamic stability leading to adequate cerebral perfusion, key to avoid an increase in the effects of chronic arteriopathy in patients with CADASIL. A close cooperation in team is essential because the management of diseases with limited literature is a challenge.

## 04AP06-4

# Hemodynamic Monitoring for Fetal Surgery: Open versus Fetoscopic Repair of Myelomeningocele

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Background: Myelomeningocele (MMC), a severe form of spina bifida, is characterized by protrusion of the meninges and spinal cord through a defect in the vertebral column. MMC occurs in approximately 1 in 3,000 live births in the United States. Procedure-associated maternal and fetal risks were determined for both open and fetoscopic repair of MMC. However to date, there has been no comparison of intraoperative hemodynamic management. We have recently published the results of the conformational analysis of perioperative data during fetoscopic surgery (3). In this case series we aimed to evaluate the stability of hemodynamic parameters and blood gas values during open fetal surgery.

Case Report: The patients' written informed consents were taken. We analysed the data of 3 patients undergoing open fetal surgery for myelomeningocele at 26 weeks' gestation. The mean age was 33.3 ± 4.3 years. Patients had no significant medical history. The PICCO, monitor was used for the hemodynamic monitoring. We analysed the data before surgery, during surgery at 1st hour and immediately after surgical procedure. We also analysed the blood gas parameters. An epidural catheter was inserted in all patients at L4-5 levels under local anesthesia before the induction. Fetal cardiac activity was monitored during fetal surgery to assess fetal viability and well-being, and intermittent fetal umbilical blood flow was measured. Afterwards, peak systolic (PS) and end-diastolic (ED) umbilical blood flows were measured and flow patterns were recorded during anesthesia induction (T,), fetal meningocele repair (T<sub>a</sub>) and after the uterus was closed (T<sub>a</sub>). Preoperative and postoperative hemodynamic data of the patients showed no significant difference (Table 1). During anesthesia and surgery, umbilical blood flows, especially diastolic flow may decelerate. These changes are reversible, and return to normal after surgery (Table 2). There was no intra- or postoperative complication.

**Discussion**: Recently we evaluated the outcome of patients undergoing minimally invasive fetal surgery. In both open and fetoscopic procedures, the umbilical blood flows and the hemodynamic parameters didnot change significantly. In conclusion, by using the PICCO<sub>2</sub> monitoring system, optimal goal directed anesthetic management provides optimal maintenance of fetal and maternal well-being.

#### 04AP06-5

# Anaesthesia for cesarian section in a patient with portal hypertension caused by Schistossomiasis. Case report

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**Background**: Schistosomiasis (Katayama fever) results from infection with the parasitic flatworms Schistosoma mansoni. It is a common infection in tropical countries where bodies of water are infested with snails of the Biomphalaria genera (intermediate host). The disease affects mainly children and childbearing woman who cook, wash clothes or work near contaminated lakes or rivers. Pregnant woman of endemic regions may have chronic or acute forms of disease <sup>1,2</sup>. The liver disfunction can cause coagulation disorders and bleeding, usual complications that can worsen obstetric risk.

Case Report: DSS, age 30, 73kg of weight and 150 cm of height, BMI 32,4 kg/m2, physical status ASA III, 36 weeks of gestational age, with a previous diagnosis of cirrhosis with portal hypertension due to schistosomiasis. The patient had recent episodes of oropharingeal hemorrhage caused by esophageal varices. As fetal monitoring showed recurrent signs of fetal distress, the obstetric team decided to nterrupt the pregnancy at once by cesarian section. She had a previously obstetric history (7 years earlier) of urgent C-section at 36 weeks due to fetal distress and intense oral bleeding when general anesthesia was performed for the birth of her first child. At that time, she was diagnosed and treated for Schistosomiasis with praziguantel. Actual physical exam without significant alterations, except for mild anemia. Mallampatti 3. In use of propranolol and ferrous sulphate. The abdominal echography showed signs of liver cirrhosis, portal hypertension with splenomegaly. Digestive Endoscopy evidenced multiple esophageal varices with signs of recent bleeding. Coagulation tests were at normal range, except platelet count: 73,000. Liver laboratory tests were normal. We indicated spinal anestesia with 27 G needle, 12mg of heavy bupivacaine 0,5%, 20mcg fentanyl and 60mcg morphine. Standard monitoring, a large venous peripheral cateter and urinary output was done. The surgery was devoid of complications. Apgar: 10 and 10.

**Discussion**: The anaesthetic tecnique was chosen based on clinical manifestatons, lack of laboratory exams that would contraindicate a neuroaxial block and avoiding the need of a difficult airway management in a pregnant woman with general anaesthesia.

1.Friedman JF, Mital P, Kanzaria HK, Olds GR, Kurtis JD. Schistosomiasis and pregnancy. Trends Parasitol. 2007;23(4):159-64.

Learning points: Obstetric anaesthesia with hepatic disease and low platelet

#### 04AP06-6

References

# Caesarean delivery in pregnancy complicated by Buerger's disease

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**Background**: Buerger's disease (BD) or thromboangiitis obliterans is an inflammatory occlusive vascular disease affecting small and medium vessels in the distal upper and lower extremities [1]. Since BD often develops in men, it is extremely rare for a pregnant patient to be complicated with BD [1]. A literature review only revealed 4 other case of BD in pregnant patients.

Case Report: A 40-year-old multigravida with previous caesearean delivery presented to the obstetric clinic at 34 weeks gestation for premature rupture of membrane and subsequently labour pain. She is a smoker with BD and gestational diabetes on diet control. She was on enoxaparin and aspirin, but stopped 3 months and 2 days ago respectively. An urgent category 3 Caesearean delivery was planned. After anaesthetic consult, the patient opted for general anaesthesia, due to her concerns on bleeding and small risk of spinal haematoma due to current aspirin use. She underwent rapid sequence induction with cricoid pressure, 250mg thiopentone and 100mg succinylcholine with easy intubation and airway was secured with size 7 endotracheal tube. She received intravenous 10mg morphine and patient controlled morphine analgesia for postoperative pain relief. She was able to breastfeed, ambulate and was discharge well on the 3rd postoperative day. Discussion: In patients who are receiving antithrombotics, there may be higher bleeding risk and discussion on anesthetic technique should be offered. Other considerations for patients with BD includes difficulty in intravenous and intra-arterial line insertion. BD can affect cerebral, coronary, renal and mesenteric vessels as well [2]. Consequently, patients could also be at increased risk of cerebral or myocardial nfarction. Obstetric discussion on potential intrauterine growth restriction and the implications on anaesthetic technique should also be considered.

#### eferences:

1. Kikuchi N, et al. (2006). Int J Gynaecol Obstet. 94(1):62-6

2. Aszalos C, et al. (2016). Orv Hetil. 157(30):1207-11.

**Learning points:** BD is extremely rare in pregnant patients. They could be on medications that increase the risk of bleeding and could be a contraindication to regional anaesthesia. Careful management of obstetric patients with BD is important as this may affect maternal and foetal outcomes.

#### 04AP06-7

# Anaesthetic Management of a Parturient with Pyogenic Ventriculitis for Caesarean Delivery

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**Introduction**: Acute CNS infections in pregnancy are rare but associated with significant morbidity and mortality<sup>1,3</sup>. We present the unusual case of pyogenic ventriculitis secondary to sinusitis in a parturient, and subsequent anaesthetic management for caesarean delivery.

Case report: A 24 years old female (G2, P1), presented at 36 weeks gestation with a severe headache. CT brain confirmed evidence of sinusitis and oral antibiotics were commenced. Two weeks later, at 38 weeks gestation, she represented with worsening occipital headache, nausea and neck stiffness. The patient was apyrexic, WCC 12.2 x 10<sup>9</sup>/L and CRP 20 U/L. She was referred for urgent neurology assessment. CT intracranial venogram was negative for venous sinus thrombosis but demonstrated frontal, ethmoidal and maxillary sinusitis. New onset of pyrexia and change in behaviour despite antibiotics prompted further investigation, and a lumbar puncture revealed purulent CSF. Bacterial meningitis secondary to sinusitis (Streptococcus Constellatus) was diagnosed and treated with triple antibiotic therapy (Ceftriaxone, Vancomycin, Amoxicillin), Subsequent MRI(DWI) brain showed purulent fluid levels within the dependent lateral ventricles, revising the diagnosis to ventriculitis (figure 1,2). At 39 weeks the patient underwent uneventful LSCS under SAB. At the time of the spinal anaesthesia procedure, the CSF sample was clear and a sample was resent for culture and microscopy prior to local anaesthetic administration

**Discussion:** Bacterial Ventriculitis /meningitis is a medical emergency. Signs and symptoms may be masked in pregnancy. Changes in neurology or behaviour warrant urgent attention<sup>1, 2</sup>. Prompt recognition and appropriate antibiotic choice/ duration are paramount for an optimal patient outcome. Spinal anaesthesia may be safely administered in patients undergoing treatment for ventriculitis. Six weeks of intravenous antibiotic therapy and on-going neurology assessment is required for this specific central nervous system infection at risk of hydrocephalus<sup>3</sup>. **References:** 

1.Glimaker M, Johansson B, Grindborg O, et al. Clin Infect Dise 2015;60:1162-69 2.Hughes DC, Raghavan A, Mordekar SR et al. Postgrad Med J 2010;86:478-85 3.Bodilsen J, Schonheyder HC, Nielsen H. BMC Infect Dis 2013;13:321 Learning points:

Obstetric patients may mask serious infections. A low threshold for further investigation and multidisciplinary input should be undertaken to aid prompt diagnosis and treatment.

## 04AP06-8

# Regional anesthesia for C-section in parturient with congenital heart disease (CHD) and implantable cardioverter defibirillator (ICD): a case report

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Introduction: The increased survival of patients with CHD, presents us more often parturient women with this type of condition. A multidisciplinary team is needed to asses the severity of the condition and the clinical situation, allowing us to choose the best anaesthetic plan.

DESCRIPTION: We present a33 year-old pregnant woman, with a bicorialbiamniotic twin pregnancy,1st twin in buttocks. She has a previous history of CHD (surgically corrected transposition of the great vessels) and free pulmonary insufficiency.4years ago she suffered a witnessed extrahospital cardiac arrest (first rythm VF recovered).ICD placement was indicated for secondary prevention. In May2016she received a Melody prosthesis due to pulmonary insufficiency. She was followed up in the high risk pregnancy clinic, remanning asymptomatic with good functional class. The most remarkable findings were the echocardiogram that shows akinesia of the basal half of the septum with anomalous movement of the rest of it. RV was slightly dilated and hypertrophic with preservation of global systolic function. After assessment by cardiology, obstetrics, anesthesiology and neonatology services, a c-section was scheduled on week36.In the operating room, the patient was monitored and combined anesthesia was done: epidural catheter was placed at L2-L3 and spinal anesthesia at L4-L5 with 10mg of hyperbaric0.5%bupivacaine and10mcg of fentanyl. The c-section procedure was uneventful. Postoperatively she was transferred to the recovery unit where the ICD was reprogrammed and remained stable.

**Discussion:**In the western world, CHD is the most frequent cardiovascular disorder in pregnancy(up to82% of cases). An adequate evaluation of the pregnant woman is essential to know her functional class, in addition to all the tests that we must request (echocardiogram, ECG, stress test). If the patient presents a corrected or no-risk HD, spontaneous vaginal delivery will be decided, considering c-section for high risk cases. Arrhythmias are the most frequent cardiac complications during pregnancy and the use of ICD is safe. We will choose the type of anesthesia depending on the heart disease(risk of arrhythmia vs contractility). It is also important to maintain adequate postoperative control.

**Conclusion:** Patients with CHD and ICD for arrhythmias are patients whose delivery plan must be individualized. If the baseline heart disease is corrected and the patient is clinically asymptomatic, the chances are that a natural vaginal delivery may take place.

#### 04AP06-9

Unexpected cardiac arrest following spinal anaesthesia for elective caesarean section

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Background: Cardiac arrest following regional anaesthesia for caesarean section though rare is the worst possible complication, especially so in a young parturient. Case Report: A 30 year old gravida3para2 with no past medical history and two previous uneventful caesarean sections under regional anaesthesia had spinal anaesthesia for caesarean section following two failed CSE attempts and two failed SSS attempts with 0.5% hyperbaric bupivacaine 2.2 ml + fentanyl 15 mcg + morphine 100 mcg. Block height achieved at 5 min was C4. At 9 min, BP decreased from 125/80 preoperatively to 110/25 while HR stayed at 105/min associated with severe nausea followed soon by loss of consciousness and asystole. As there was no pulse or breathing. CPR was commenced immediately with 100% oxygen via bag mask. Intravenous (iv) atropine 0.6 mg was given with return of spontaneous circulation, sinus rhythm and consciousness after 15 sec. At 24 min, BP was 110/28. At 28 min, surgery commenced. At 29 min, when BP decreased to 55/25 with HR 115/min, iv phenylephrine total 300 mcg, ephedrine total 15 mg and gelafundin 500 ml were given. At 34 min. BP was 80/35 and HR 125/min. At 35 min. baby was delivered with Apgar score 8/9. At 39 min, BP was 120/55, HR 125/min and S<sub>p</sub>O2 100%. At 48 min. umbilical cord arterial pH was 7.27. At 51 min. umbilical cord venous pH was 7.276. She had an uncomplicated course thereafter

**Discussion**: Successful resuscitation requires an understanding of the probable causes. The probable cause in this patient was a high neuraxial block with reduced venous return, possibly triggering a Bezold-Jarisch reflex with a profound bradycardia and hypotension, and suppression of  $T_{1,4}$  cardiac sympathetics. Thus, CPR together with iv atropine 0.6 mg was beneficial. Iv adrenaline 1 mg or iv vasopressin 40 U may also be used¹. The high block could have been due to unintended epidural volume extension during the failed CSE attempts. Frequency of arrest for patients during spinal anaesthesia is about 2.9/10,000 and hospital survival for regional anaesthesia is about 65% (Kopp et al).

#### References:

1. Moitra VK, Einav S, Thies KC, et al. Cardiac arrest in the operating room: Resuscitation and management for the anaesthesiologist: Part 1. Anesth Analg 2017

**Learning points**: One should always have a ready individualised management plan for a successful outcome.

## 04AP06-10

# Anesthesia for cesarean delivery in a patient with ALCAPA syndrome

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Introduction: Anomalous left coronary artery arising from the pulmonary artery (ALCAPA), is a rare congenital anomaly and more so in the adult. Such malformation produces myocardial ischemia that may lead to ischemic cardiomyopathy. There have been only a few reports of ALCAPA in pregnancy. We describe a successful anesthetic management of a pregnant woman with a rare high-risk cardiovascular disease.

Case Report: A 29-year-old female with ALCAPA syndrome, diagnosed in context of a cardiac arrest, underwent surgical repair and placement of an implantable cardioverter defibrillator (ICD). Three weeks after the surgery she got pregnant. During pregnancy, the patient experienced two episodes of polymorphic ventricular tachycardia/ventricular fibrillation, one self-limited and the other requiring defibrillation. No other complications were reported. In a multidisciplinary team discussion it was decided to performan elective C-section at 38-weeks gestation. Preoperative assessment revealed an ASAIII pregnant patient, with an enlargement of left chambers, moderate mitral insufficiency, interventricular septum hypokinesis and an ejection fraction of 53%. We performed a slowly titrated anesthetic epidural Standard monitoring was used. It was a single try median approach technique at L3-L4 level, with fractionated administration of 75mg of Ropivacaine0.75% and 0.01mg of Sufentanil to achieve a T4 anesthesia level. During a unique moderate hypotensive episode, was required to administer slowly reduced volumes of crystalloid and 100mcg of phenylephrine. No electrocautery was used, therefore it wasn't necessary to disable anti-tachyarrhythmia therapy. The first 24hours of the puerperium were in a post-anesthetic care unit. The puerperium was uneventful.

**Discussion:** Pregnancy and delivery are associated with several cardiocirculatory changes that can significantly impact underlying cardiac disease. A team of providers should develop an individualized management plan antepartum, including during pregnancy, labor and puerperium. We considered that a neuraxial anesthetic technique was the best option, because a titrated epidural technique can establish a slower onset of the surgical block with minimal hemodynamic changes.

Learning Points: Peripartum obstetric and cardiac complications in pregnant woman with ALPACA syndrome may require urgent intervention. Interdisciplinary communication and preparation are critically important for success of both surgical and anesthetic procedures.

# 04AP06-12

# Labor analgesia in pregnant women with HELLP syndrome and Multiple Sclerosis

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**Background**: The Hemolysis Elevated Liver enzymes Low Platelets (HELLP) syndrome is an advanced stage of preeclampsia, leading to high maternal (24%) and perinatal (up to 40%) mortality. [1] On the other hand, Multiple Sclerosis (MS) is a chronic autoimmune condition of the central nervous system (CNS), leading to demyelination and neuronal injury. Current guidelines for neuroaxial analgesia in these patients are still ambiguous. We intend to report the labor analgesia management of a patient with both conditions.

Case Report: First pregnancy, 36 years old, ASA III, diagnosed with MS and chronic hypertension. At 30 weeks gestation, the hypertension worsened with frequent hypertensive crisis accompanied by headache and photophobia. Laboratory results indicated a HELLP syndrome with thrombocytopenia (94.000). Given the severity, the pregnant was proposed to labor induction. Considering the reasonable level of platelets and the lack of evidence against neuroaxial techniques in MS patients, we decided to propose epidural analgesia. We administered 10 mcg sufentanil and 6 mL ropivacaine 0.2%; additional bolus of 10 mL ropivacaine 0.2% were given as needed. Good analgesia was achieved and there were no hemodynamic or neurologic complications. Both the birth and immediate postpartum period were uneventful.

Discussion: As there are no specific guidelines to the anesthetic approach, it is necessary to perform a thorough evaluation of each case. Given the length and pain associated with labor induction we have eliminated the remifentanil option. Also in order to avoid the potential neurotoxic effects of local anesthetics on demyelinated nerves, we decided to proceed with epidural analgesia instead of combined spinal epidural technique (the most common technique in our center). In addition, the placement of an epidural catheter becomes an advantage in the event of a cesarean section, especially in poorly controlled hypertension and HELLP syndrome.

1. Del-Rio-Vellosillo, M; Garcia-Medina J. Anesthetic considerations in HELLP syndrome. Acta Anaesthesiol Scand. 2016 Feb;60(2):144-57

Learning points: The ideal anesthetic management for these patients is still unknown. Neuroaxial analgesia can be successfully used as long as there is a careful preoperative assessment and a close monitoring and care of the patient in the peripartum period. HELLP syndrome is not a contraindication to neuroaxial technique as long as no coagulopathy is present.

#### 04AP07-2

## Time intervals of anaesthesia-induction time and decisionto-delivery in different urgency categories for caesarean section

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Background and Goal of Study: Regional anaesthesia (RA) is a first choice for category 1 to 3 urgency caesarean sections (CS). However, general anaesthesia (GA) is sometimes performed expecting shorter delivery time. The goal of our study was to evaluate time differences between GA and RA in each urgency category (LIC) of CS

Materials and Methods: A prospective study was carried out in LUHS, Dept. of Obstetrics from January to December, 2016. CS were classified using Lucas fourgrade classification system. Intervals of anaesthesia-induction time and decision-to-delivery were compared between spinal anaesthesia (SA), GA and epidural anaesthesia (EA) in each UC.

Results and Discussion: There were 1677 CS included in our study. UC I - 124 (8.0%), UC II - 344 (22.3%), UC III - 431 (25.7%) and UC IV - 643 (41.7%) patients. SA was performed to 1226 (73.2%), GA - 194 (11.6%), EA to 254 (15.2%) patients. Intervals of anaesthesia-induction time and decision-to-delivery between SA, GA, EA in different UC are shown in table 1. Table 1. Time intervals between SA, GA and EA in different UC. \* Significant difference.

Urgency category	Type of anaesthesia	Anaesthesia- induction time (min)	Decision-to-delivery interva (min)
I	SA	6.14±1.10 (34)*	46.76±19.73 (34)*
1	GA	2.07±1.85 (67)*	25.46±13.34 (67)*
I	EA	13.86±3.32 (22)*	27.68±8.13 (22)*
II	SA	6.82±2.13 (190)*	59.90±46.67 (177)*
II	GA	4.02±4.21 (34)*	69.39±92.97 (33)

I	EA	13.21±4.04 (120)*	37.31±19.03 (120)*
II	SA	7.18±2.45 (327)*	74.27±52.85 (268)*
II	GA	2.83±2.23 (36)*	67.72±48.43 (29)*
II	EA	13.74±3.18 (66)*	40.96±23.99*
V	SA	9.48±4.53 (603)	120.08±111.03 (12)
V	GA	9.91±7.51 (37)	131.00 (1)
V	EA	13.33±2.88 (3)	(0)

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**Conclusion**:GA has the shortest anaesthesia-induction time interval and EA has the shortest decision-delivery interval in UC I-III CS.

### 04AP07-3

# Hemodynamic optimization with non-invasive continuous monitoring system in non-emergent caesarean delivery undergoing subarachnoid anesthesia

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Background and Goal of Study: During pregnancy, physiologically, there is a progressive adaptation of the maternal cardiovascular system for proper fetal development. Hemodynamic changes occur related to cardiac output and systemic vascular resistance. In the caesarean delivery undergoing subarachnoid anesthesia, these changes are accentuated due to the sympathetic blockade established, which may lead to hyper or hypodynamic states. The ClearSight® is a continuous non-invasive monitoring system that allows to know the baseline hemodynamic status of the patient and optimize the use of fluids and vasopressors, which was performed empirically until now. In this way we can prevent the signs and symptoms of hypotension that can appear because of the sympathetic blockade of the subarachnoid anesthesia, to the blood loss after delivery or to the administration of uterotonics. The goal of this preliminary study is to describe the hemodynamic changes produced in pregnant women undergoing non-emergent caesarean delivery with subarachnoid anesthesia.

Materials and Methods: A prospective study of 20 patients monitored by ClearSight® during the entire intervention was carried out. Instead of hemodynamic parameters, we collected Apgar, pH and fetal oxigen saturation, fluids, type and doses of vasopressors.

Results and Discussion: It was observed that the 100% had a baseline cardiac index> 3.5 l/min/m2. After performing the subarachnoid anesthesia, 10% had a cardiac index <3.5 l/min/m2. On the other hand, we observed a 5% of patients with an IC< 3.5 l/min/m2 after fetal extraction, and other 5% with administration of uterotonics. Until today, the vasopressor of choice has been phenylephrine, since ephedrine can produce fetal acidosis. Nevertheless ephedrine was used as a vasopressor in patients with a low cardiac index, since it is known that phenylephrine decreases cardiac output. Using phenylephrine in these patients could aggravate the hemodynamic status in case of hypodinamia and it could affect the uteroplacental perfusion and fetal well-being.

Conclusion: In conclusion, despite of there is a small percentage of hypodinamic states during pregnancy, using a non-invasive and continuous monitor system we can detect it and choose the best therapy in order to guarantee the cardiac output and fetal well-being. More randomized prospective studies with adequate n are needed to confirm these first results.

#### 04AP07-4

# Highly sensitive cardiac troponin T as a marker of postoperative myocardial Injury after caesarean section

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**Background and Goal of Study**: Cardio vascular disease is a leading cause of maternal mortality. Our objective was to assess the incidence of subclinical myocardial ischemia amongst parturient, as evidenced by a raised highly sensitive troponin T (hsTnT) in the post-partum period after cesarean section under spinal anesthesia.

Materials and Methods: This is a single-center prospective observational study conducted over a 2 months period. After consent of the parturient, elective or emergent caesareans section under spinal anaesthesia were included. The hsTnT level was assessed at 2, 8 and 24 hours after delivery. Continuous ST segment monitoring was performed during intervention and 24h after.

**Results**: One hundred and eighty-nine patients were enrolled. The mean age was 32.4 ±5.7 years. Risk factors for coronary heart disease were found in 19.8 %. Twenty-nine (15,3%) parturients had significantly increased postoperative hsTnT.

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35,45pg / ml at H8 and 22.14± 22, 54pg / ml at H24. No ST-segment depression

Highly sensitive troponin T elevation after delivery was associated with perioperative tachycardia and preeclampsia. All positive patients were referred to cardiology department. In 2 patients echocardiography showed hypertrophic cardiomyopathy Conclusion(s): Highly sensitive troponin T is a reliable biomarker with high sensitivity and negative predictive values compared with conventional troponin (cTn). For the diagnosis of acute myocardial infarction (AMI), hsTnT offers excellent diagnostic performance and some evidence exists for a better diagnostic accuracy than cTn. In our study, we found a significant increase in serum hsTnT levels in 15.3% of caesarean sections. Preeclampsia and hemodynamic instability were the risk factors for sub-clinical myocardial injury after caesarean section under spinal

### 04AP07-5

### Plasma Concentrations of N-Terminal Pro-B-Type Natriuretic Peptide after caesarean section under spinal anaesthesia

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Background and Goal of Study: N-terminal pro-B-type natriuretic peptide (NT-pro BNP) is a powerful predictor of cardiovascular outcome in many circumstances. Plasma concentrations of NT-pro BNP have been shown to reflect cardiac dysfunction and volume overload. During spinal anaesthesia for caesarean section, hemodynamic changes and the effects of various treatment regimens on NT-pro BNP are not studied

The aim of this study was to assess serum levels of NT-pro BNP after caesarean delivery under spinal anaesthesia.

Materials and Methods: We conduct a prospective observational study at a tertiary level hospital over a period of 2 months. The study was approved by the hospital ethics committee. After receipt of informed consent, healthy pregnant women proposed for caesarean sections under spinal anaesthesia were included. NT pro BNP level were measured at 2, 8 and 24 hours after delivery.

Results: One hundred and eighty-nine patients were enrolled in this study. The mean age was 32.4±5.7 vears. The mean gestational age was 36.48 ±1.55 weeks of gestation. Fifty-six parturients (29.6%) showed a significant increase in NT pro BNP level in postpartum period. Two of these patients had a history of treated mitral valvular disease. The mean value of NTpro BNP was 341.7 ± 571.5pg /ml at H2, 571.8 ±1591.18 pg/ ml at H8 and 388 ±1941.15 pg/ ml at H24. The NTpro BNP elevation was associated with a Body Mass Index greater than 30 kg/m2, ephedrine dose more than 30mg and oxytocin dose higher than 25UI, preeclampsia and hemodynamic instability. Echocardiography performed subsequently in positive patients showed hypertrophic cardiomyopathy in all preeclamptic patients and was normal in the remaining patients.

Conclusion: In our study, a significant increase in serum levels of NT pro BNP was observed in 29.6% of study patients. These results may reflect myocardium damage during cesarean delivery due to hemodynamic instability especially in presence of preeclampsia, which suggest that this peptide acts as a biomarker for high risk pregnancies.

# 04AP07-6

The effectiveness of analgesia and the activity of TAP-block patients in comparison with prolonged epidural analgesia: a randomized, prospective, controlled trial

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Background and Goal of Study: Postoperative anesthesia in obstetrics has always been relevant. There is a central and peripheral neuraxial blockade, as well as multimodal analogsia in the arsenal of an anesthesiologist for confronting postoperative pain. Each method has its strengths and weaknesses. We have compared the effectiveness of analgesia and the degree of activity of women in labor after peripheral and central neuraxial blockades - the lateral TAP block verses prolonged epidural analgesia. Period of mobility activation within the ward as well as the intensity of pain on the Visual Analog Scale (VAS) were subject to assessment Materials and Methods: The study included women at the age from 18 to 43 with full gestational term (38-42 weeks) without major somatic pathology, primiparous and multiparous for urgent or planned Cesarean section (CS). The method of anesthesia has been spinal anesthesia. 158 patients undergoing CS under spinal anesthesia were randomized to postoperatively receive prolonged epidural anesthesia (Group E, n=76) or ultrasound-guided transversus abdominis plane (TAP) block (Group T, n=82). The control group of patients under multimodal analgesia included 79 persons. 2.5 hours after admission to the ward in group T the TAP block was carried out at a single dose bilaterally ultrasound-guided with

In those patients the mean hsTnT levels was 45.79± 42.2pg/ml at H2. 32.16 ± a solution of Ropivacaine 0.375% 20 ml with Dexamethasone 4 mg. In group E. a solution of Ropivacaine 0.2% 10 ml bolus was injected into the epidural catheter and subsequently every 2 hours at the same dosages. In cases of insufficient level of anesthesia, both groups received Tramadol, as well as Paracetamol upon request. The pain level at rest and on coughing was assessed on VAS, the period of mobilization in the ward was also recorded

Results: Pain relief in the group E was significantly higher (VAS 1-3cm) as compared to group T-(VAS 3-5cm). Group T patients required more analgesics. However, patients of group T walked through the ward 2 hours after the blockade. When assessing the level of pain and activity 36 hours after CS, group E was significantly inferior (VAS 6-9cm, minimal activity in the ward) to group T (VAS 3-5cm and complete serving of self and newborn)

Conclusion: Prolonged epidural analgesia gives higher level of pain relief compared to TAP block but adversely impacts ambulating. The TAP block provides early mobility of patients, contributing to further convalescence, which is a priority of the Fast Track concept.

#### 04AP07-7

Comparing the effects of general and spinal anaesthesia on the postoperative pain intensity in patients undergoing emergent or elective caesarean section

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Background and Goal of Study: Pain experienced in the post-caesarean section period is closely related to the preoperative anxiety, urgency of the procedure and anaesthesia method used (1,2). The effects of the preoperative anxiety and anaesthesia methods (general versus regional anaesthesia) on the post-caesarean pain intensity have been previously investigated, but studies comparing the effects of regional and general anaesthesia in elective and emergent caesarean sections (CS) are lacking (3). The main objective of this study is to compare the effects of general and spinal anaesthesia on postoperative pain intensity and analgesic agent equirements in patients scheduled for emergent or elective CS. The secondary aim is to determine the satisfaction of the patients, in the postoperative period.

Materials and Methods: A prospective, observational study of patients undergoing emergent or elective caesarean delivery under spinal or general anaesthesia Postoperative pain intensity and analgesic requirements, postoperative complications and patients' satisfactions were evaluated for up to 48 h after surgery Results and Discussion: This is a total of 212 parturients were enrolled: 104 (51 electives, 54 emergents) patients received general and 108 (53 electives, 51 emergents) patients received spinal anaesthesia. Patients in the emergent CS groups under spinal and general anaesthesia had higher 11-point Numeric Rating Scale (NRS) scores during the first 24 h after surgery, when compared to patients with elective CS groups. In addition, NRS pain scores were significantly increased in the emergent CS group, when compared to the elective CS under regional anaesthesia during the first postoperative 24 h. Postoperative analgesic requirements were not significantly different between patients underwent for emergent or elective CS

Conclusion: The effects of general and spinal anaesthesia on postoperative pain were not comparable in emergent and elective CS performed under general or spinal anaesthesia. Therefore, the influence of these methods on postoperative pain intensity should not be a determining factor in choosing the anaesthesia method in emergent and elective CS.

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#### 04AP07-8

# Chronic postsurgical pain after caesarean section

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Background and Goal of Study: Caesarean section (CS) has been linked to chronic postsurgical pain (CPSP). The reported incidence of CPSP after CS ranges from 0 to 56%1. The aim of this study was to detect the incidence of CPSP after CS at a Spanish tertiary referral Hospital and to describe its characteristics.

Materials and Methods: A prospective observational descriptive monocentric study was conducted (January -April 2017) at La Paz University Hospital -Madrid (Spain). Consenting consecutive parturients were included after urgent or scheduled CS. We recorded age, obstetric history, medical and surgical history and current medication. Surgical and anaesthetic management in the operation room were assessed. Analgesia requirements and pain (using a Visual Analogue Scale (VAS) and DN22 questionnaire) were evaluated in the early postoperative period. Late pain was assessed thanks to VAS scale, BPI (Brief Pain Inventory) 3 and DN2 questionnaires at 3 months

The results were analysed with parametric tests for quantitative variables, while Fisher's test or Chi-square test were used for Qualitative variables. P<0,05 was considered statistically significant.

Results and Discussion: From a total of 109 patients included, 13 (12%) reported a VAS>3 at 3 months. Eleven had more pain at movement, and 2 at rest. According to the DN2 Questionnaire, no patient with CPSP showed criteria for neuropathic pain (DN2≥3). However, some patients described neuropathic symptoms: Numbness (14) and pins-and-needles (17).

BPI was > 3/10 in all patients with CPSP, indicating an impact on their quality of life: General activity (6), mood (3), walking ability (7), normal work (2), relations with other people (1), sleep (2), enjoyment of life (1).

Compared with other studies and meta-analysis, the incidence of CPSP after CS at our hospital was found to be equivalent (12%) to that of other centres1.

Conclusion: PSCP after CS affected 12% of patients in our cohort, and did not show neuropathic characteristics; nonetheless, it had a clear impact on the patient's quality of life. Future analysis will allow us to find risk factors related to CPSP after

#### References

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#### 04AP07-9

### Acute pain assesment after elective caesarean delivery

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Background and Goal of Study: Nowadays the number of caesarean delivery has increased dramatically. Although, high quality postoperative analgesia is essential, guite often the pain relief is not reached adequately. Therefore, the aim was to assess the analgesia quality provided after caesarean delivery.

Materials and Methods: In prospective research were included 22 adult elective parturients. The exclusion criteria were mental disease, twin pregnancy, alcohol abuse. All patients received single shot spinal anaesthesia with Bupivacain 10 mg and Phentanyl 10 mkg. After the delivery standardized analgesia regime was used with non-steroidal anti-inflammatory Supp. Diclacofenac 100mg p/r combined with Paracetamole 1g p/o every 12 hours. Rescue analgesia with Sol. Promedol 2% -1ml i/v was administered if pain intensity reached > 4 evaluated by VAS. Patients were asked to rate their maximum pain in the last 24 hours postoperatively using standardized pain assessment questionnaire. Primary outcome was to assess maximum pain intensity at 24 hours postoperatively. Secondary outcomes included the time needed for rescue analgesia

Results and Discussion: Totally, 22 patients were included, with a mean age of 33 ± 6.6 years. The average duration of spinal anaesthesia was 120 ± 30 minutes and caesarean section time 50 ± 20 minutes. The first complains of the pain appeared in 180  $\pm$  90 minutes reaching VAS 7-10 in 60 % (n = 13) of cases, VAS 4-6 in 27% (n = 6) and 13% (n = 3) was mentioned light pain 1-3 VAS. Rescue analgesia was asked in 48.8% and was treated in less than 30 minutes in 82%, in 30 min. up to 1 hour in 4.4% and in more than 1 hour in 13.6% cases, 82% (n =20) of parturients were satisfied with analgesia quality

Conclusion: The pain after elective caesarean delivery is poorly treated because 60% of parturients complained of severe pain 24 hours postoperatively. Nevertheless, rescue analgesia was administered timely. Therefore, most of the parturients were satisfied with the pain management.

# 04AP07-10

# Does a TAP block after C-section reduce the incidence of nausea and/or vomiting compared to intrathecal morphine?

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Background and Goal of Study: Severe pain occurs in more than 10% of patients within the 36 hours after caesarean section (CS). Intrathecal morphine (ITM) is an efficacious treatment of post caesarean pain; however the risk of postoperative nausea or vomiting (PONV) has a negative impact on maternal satisfaction. Transversus Abdominis Plane (TAP) block is an established alternative treatment [1]. Its efficacy is limited by its short-lasting effect, but can be prolonged by adjunction of clonidine [2]. We tested the hypothesis that a TAP block with clonidine reduces the incidence of PONV compared to ITM. As secondary aims, we studied adverse effects and efficacy of TAP block versus ITM.

Materials and Methods: 182 patients who underwent elective CS where randomized (double-blind) in 2 groups: either 100 µg of ITM, or TAP Block with 20 ml of Ropivacaine 0.375% + 75 µg of clonidine (with corresponding placebo/ sham procedures). The primary outcome was the cumulative incidence of PONV at 24 hours. We also reported the cumulative incidence of treated PONV sedation. hypotension, bradycardia, respiratory depression, pain at rest and on movement and morphine consumption at 6h and 24h.

Results and Discussion: 93 patients were allocated in the TAP group and 89 in the ITM group. At 24 hours, the cumulative incidence of PONV was not significatively different: 13/92 patients (14.1%) in TAP group and 21/88 patients (23.9%) in ITM group (p=0.11). However, significatively more patients needed treatment of PONV in ITM group: 19.3% versus 8.7%, (p=0.05). Pain score at rest at 6H was

significatively lower in ITM group (p<0.0001), so as cumulative morphine consumption at 24 h (7 mg vs 17.5 mg, p<0.0001). No differences for other pain scores were found. There was significatively more hypotension in TAP group, with 50 /92 patients (54.3%) in TAP group, versus 26/89 patients (29.2%) in ITM group (p=0.0006).

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Conclusion: TAP Block does not reduce the incidence of PONV at 24H, although fewer patients need treatment of PONV. Even with clonidine adjunction, TAP is less efficacious than ITM, and causes more hypotension. As multiple studies confirm that a TAP Block reduces post caesarean pain when compared to control [1], it can be recommended where ITM cannot be used, but will not replace ITM as the standard analgesic for CS. References:

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#### 04AP07-11

### Chronic pain after caesarean section: prevalence, impact and risk factors

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Background and Goal of Study: Chronic post-surgical pain (CPSP), as defined by International Association for the Study of Pain, is pain that persists for more than 3 months after surgery and other causes are excluded. The caesarean section (CS) is one of the most performed surgeries currently and it is therefore fundamental to know the incidence and impact of chronic pain after CS and how to prevent it. The aim of this study was to examine the prevalence and impact of CPSP after CS and to evaluate potential risk factors.

Materials and Methods: Women undergoing CS between January and June 2016 were included and interviewed by telephone one year after and data from our Acute Pain Unit database was consulted. Questions were about preoperative demographic and psychological factors, intraoperative clinical factors, acute postoperative pain and pain after 3, 6 and 12 months. Pain was evaluated with Visual Analogical Scale (VAS) from 0 to 10 and we used Brief Pain Inventory (BPI) to assess impact on daily ife. We considered CPSP if VAS>0 after 3 months.

Results and Discussion: During the study period, 220 women underwent CS, which correspond to 28% of all deliveries and 131 answered our interview. The mean age was 33±4 years, mean body mass index 29±4kg/cm2, most had concluded high school or had a graduation and median gestational age was 38 weeks (range 30-42). Twelve percent had history of anxiety or depression, 12% had previous chronic pain, 20% had previous CS or abdominal surgery, 83% breastfed and 7% had postpartum depression. CS was emergent in 76%. Pfannenstiel incision was used in 100% and staple suture in 64%. Anaesthesia technique was epidural in 64%, combined in 14%, general anaesthesia in 12% and spinal in 10%. The prevalence of CPSP was 19% and there was significant association with higher gestational age (p=0.003) and superior VAS on movement one day after CS (p=0.044). Main locations of pain were incision area and lower back region. BPI results showed that CPSP did not have influence on the activities of daily living.

Conclusion: Although prevalence of CPSP after CS was 19%, for most women included it did not have impact in their lives. Women with higher average pain intensity on movement within 24 h postoperatively have a greater risk of CPSP after CS and therefore attempts to better manage postoperative pain are needed in CPSP prevention

# 04AP08-1

# Ex-Utero Intrapartum Treatment (EXIT) procedure – A challenge to the Anesthesiologist

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Background: EXIT procedure is a rare technique consisting of fetal partial externalization from uterine cavity during delivery that maintains uteroplacental circulation while managing life-threatening conditions. The anesthetic management is different from that of conventional caesarean section. We present a case of a pregnant woman, whose fetus was prenatally diagnosed with a cervical lymphangioma.

Case Report: A female patient, 37 year-old, primipara, 37 week-pregnancy, ASA II, was listed to elective caesarean with EXIT procedure by a multidisciplinary team including anesthesiologists, obstetricians, neonatologists, pediatric surgeons, pneumologists and otolaryngologists.

An arterial line and two peripheral intravenous lines were placed before induction. Aspiration and antibiotic prophylaxis were made and remifentanil perfusion was initiated. Endotracheal intubation was done after propofol and rocuronium administration by a rapid sequence induction. General anesthesia was maintained

with sevoflurane and remifentanil. After uterine incision, fetal head, trunk and upper limbs were delivered and the newborn was intubated with a 3.5mm uncuffed tracheal tube by a neonatologist at the second attempt. Once the fetal airway was assured and the positive-pressure ventilation was satisfactory the umbilical cord was divided and the neonate was fully delivered. Additional resuscitative efforts were not required. The time from uterine incision to cord clamp was about 4 minutes. Operation time was 55 minutes. Both mother and neonate tolerated the EXIT procedure well.

**Discussion**: EXIT procedure allows ensuring fetal airway patency prior to delivery when there is an airway obstruction due to congenital malformations.

Anesthesia differs substantially from the required for a conventional caesarean section. A general anesthesia using high concentrations of halogenated agents to get a deep uterine relaxation, uteroplacental circulation preservation and fetal immobility is the recommended technique.

Once the fetus airway is safe and the cord clamped, halogenated levels should be immediately lowered and oxytocin perfusion initiated to control uterine relaxation that is associated with bleeding risk.

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Learning points: The anesthetic management of EXIT procedure is challenging concerning all its particularities. Only with a trained multidisciplinary team, we can achieve a favorable outcome for the mother and fetus.

## 04AP08-2

# Anaesthetic management of a 24 week pregnant polytraumatized patient undergoing an emergent craniotomy with premature birth threat

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**Background**: The management of a pregnant trauma patient has some considerations as alterations in maternal physiology and anatomy, exposure to radiation and teratogens, the assesment of fetal well-being and other problems as Rh isoimmunization, placental abruption, and preterm labour.

Case Report: 28year-old woman in her 24th week of gestation suffered a severe traumatic brain injury (TBI) and the CT showed an epidural hematoma. An emergent craniotomy was performed and then otorhinolaryngology stoped an arterial bleeding due to left sphenoid sinus lesion. Two blood concentrates uncrossmatched (O-) were administered due to a decrease in hemoglobin (9.4 to 8.9g/gL). Thromboelastometry was performed with all the values in normal range. During the surgery, 2L of crystalloids were used resulting in unresponsive hypotension, noradrenaline was initiated to maintain BP. Fetal cardiotocography was monitored continuously by an obstetrician. During surgery presented a premature birth threat and tocolytic treatment was started with indomethacin, pulmonary maturation with betamethasone and fetal neuroprotection with magnesium sulfate. After surgery, in ICU, uterine contractions didn't stop and atosiban was added. All tocolytic drugs were stopped on the third day. After 10 days she was extubated without neurologic disorders. She was discharged to home one week later. The baby was born in the 38th week of gestation with correct Apgar score.

**Discussion**: In a major trauma, the stabilization and care of the pregnant women is the priority and if the fetus is viable (>23 weeks), continuous fetal heart rate and uterine contraction monitoring must be done. If a pregnant patient presents a premature birth threat under the 24th week of gestation, tocolytic drugs must be started with indomethacin and if contractions don't stop, atosiban should be added. Pulmonary maturation with corticoids and neuroprotection with magnesium sulfate should be started as well. In our case, contractions could be stopped with these treatments, and baby was born in the 38th week without alterations. There are other issues that must be controlled like uteroplacental perfussion (trying to not to use vasopressors), avoid rhesus D (Rh) alloimmunization in Rh-negative mothers or consider physiological changes during pregnancy.

# Learning point:

- 1. Pregnant women is the priority
- 2. Start tocolytic treatment and maturation when premature birth threat appears
- 3. Consider physiological changes during pregnancy.

### 04AP08-3

# Myelomeningocele (MMC) in utero repair. Perioperative management. Case report

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**Background**: MMC is a neural tube defect that affects approximately 5-10 pregnancies per 10,000 in the United States. There is evidence showing that prenatal repair might be a better choice than postnatal repair<sup>1</sup>.

Case Report: A 38 years old patient was scheduled for fetal MMC in utero repair. The fetus presented a lumbosacral MMC and Arnold Chiari type II malformation. Magnesium sulfate was administered for fetal neuroprotection. We provided a latex free environment (LFE). Uterine relaxation (UR) was achieved by indomethacin, atosiban, nitroglycerin and sevoflurane. Rapid sequence intubation was performed using fentanyl, propofol and rocuronium. Anesthesia maintenance was achieved by target controlled infusion (TCI) of remifentanil, sevoflurane and fentanyl. Bispectral Index (BIS) was used to monitor depth of anesthesia. As there is a known risk of pulmonary edema¹, we decided to maintain a goal directed fluid management, using EV1000® to estimate systolic volume variation and cardiac output. Norepinephrine was used to maintain maternal blood pressure. Fentanyl, atropine and vecuronium were administered intramuscularly to the fetus. Fetal heart rate was registered by echocardiography. Surgery was completed without any maternal or fetal complications.

Discussion: There are several important topics that need to be taken into consideration in fetal surgery: preterm neuroprotection, UR, fetal and mother anesthesia and monitoring, LFE and avoiding preterm labor. Sevoflurane has been used in fetal surgery for UR. Since there is an FDA warning regarding impaired brain development in children following exposure to certain anesthetic agents, we decided to use a multimodal strategy for UR in order to reduce exposure to sevoflurane. Remifentanil and sevoflurane pass through the placenta, however, they do not provide adequate fetal immobilization, therefore additional drugs are needed for fetal anesthesia. Maintaining a LFE seems reasonable in order to prevent MMC patients exposure to latex.

References:

 Ferschl, M., Ball, R., Lee, H. & Rollins, M. D. Anesthesia for in utero repair of myelomeningocele. Anesthesiology 118, 1211–1223 (2013).

**Learning points**: LFE should be considered to prevent fetus sensitization. A multimodal approach for UR reduces fetal exposure to sevoflurane. Atosiban might be a good choice for UR.

#### 04AP08-4

# Anesthetic management with goal-directed fluid therapy (GDT) for an ex-utero intrapartum treatment (EXIT) procedure: a case report

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Background: Prenatal imaging allows the early diagnostic of some neonatal malformations. Therefore, surgeries have been performed in fetuses either intrauterus or just before fetal extraction during delivery. The ex-utero intrapartum treatment (EXIT) procedure is an uncommon intervention to secure the fetal airway while placental blood circulation is maintained to prevent fetal hypoxemia and organ injuries with subsequent delivery. The purpose of this case report is to discuss the use of goal-directed fluid therapy (GDT) in an EXIT procedure to maintain adequate placental perfusion during the maternal profound anesthesia.

Case Report: An EXIT procedure was performed in a 42 years old patient, G3P1A1, ASA I, at 32 weeks of gestation. The obstetric ultrasound suggested polyhydramnios and a cervical mass that could obliterate the fetal airway. The patient was monitored with invasive arterial pressure, ECG, end-tidal CO₂ and pulse oximetry. Throughout the procedure, intravenous fluid administration was guided by the stroke volume variation (SVV<10%), cardiac index (CI>2,5 l/min/m²) and mean arterial pressure (MAP>70 mmHg) measured by Flotrac™ System. General anesthesia was initiated with fentanyl, propofol and rocuronium and maintained with sevoflurane and remifentanil until fetal cephalic portion was exposed. Fetal oral-tracheal intubation was successful within the first minute and was followed by total delivery of the child. From this moment, sevoflurane was shifted to propofol and the cesarean section was terminated. The mother was extubated uneventfully and three days later the child had the cervical tumor removed.

Discussion: EXIT procedures have been indicated to reduce the rate of fetal morbidity and mortality and to prevent fetal asphyxia when severe cervical tumors are diagnosed prenatally. The depth of maternal anesthesia can lead to hypotension and uteroplacental hypoperfusion, which may induce fetal cardiovascular insufficiency. The GDT contributes to an assertive fluid therapy to maintain properly cardiac output and systolic volume variation, therefore, reducing the use of vasopressors.

#### References:

1. Braden A. et al. Anesthetic management of an ex utero intrapartum treatment procedure: a novel balanced approach. J Clin Anes 2016; 31: 60–3.

Learning points: These strategies maintain the placental perfusion optimal within the most physiologic response, despite the necessity of the profound anesthesia and bleeding risk associated with EXIT procedures.

### 04AP08-5

## Ventriculoperitoneal shunt due to Paracoccidiomicosis: Anaesthetic management in the obstetric patient

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**Background:** Hydrocephalic women with cerebrospinal fluid (CSF) shunts are rare cases in obstetrics and still there are doubts regarding the mode of delivery and anaesthesia

Case report: A 24-year-old woman was hospitalized for labour in 41.0 week gestation. She had a history of brain paracoccidiomicosis infection 8 years ago with chronic hydrocephalus that was treated with trimpetoprim-sulfametoxazol and ventriculo-peritoneal shunt (VPS). Preanaesthesic evaluation and analytic results were normal without leukocytosis or infection markers. Malfunction VPS signs were not observed. Neurosurgical consultation suggested vaginal delivery. The patient requested for epidural analgesia at 4 cm of cervical dilatation which was inserted under a strictly aseptic technique and prophylactic antibiotics. A continuous perfusion+PCEA of L-bupivacaine 1.25mg/ml + fentanyl 1.5mcg/ml was established. Her labour and delivery were uneventful with normal neurological examination after epidural catheter removal.

Discussion: Hydrocephalus is an abnormal accumulation of cerebrospinal fluid (CDF), expansion of the cerebral ventricles and increased intracranial pressure (ICP). There are many possible causes, and one of the less common is cerebral coccidiomicosis. Treatment involves diverting CSF to relieve pressure with a VPS. Shunt malfunction occurs in 81% 1 with obstruction in 56% of them Risk of malfunction is greater during pregnancy 2 secondary to the increased intraabdominal pressure because of the gravid uterus. It has been reported to occur in about 29% of cases 3. Close neurological examination is important before choosing anaesthetic management. Special attention is required when symptoms of increased ICP (headache, nausea, vomiting, drowsiness, gaze paresis, ataxia and seizures) are present. They may be due to pre-eclampsia and an appropriate workup should be obtained. In that case radiological studies should be considered3. There are just a few cases in literature about labour's anaesthetic management. Anaesthetic choice depends on VPS function and ICP Neuraxial anaesthesia in women with shunt failure can increase ICP and brain herniation risk so general anaesthesia and caesarean delivery (CD) are preferred. Epidural anaesthesia is the preferred one in women with normofunctioning CSF shunt and no neurological symptoms for labour analgesia or CD3.

**Learning points**: Anaesthetic management in obstetric patients with VPS depends on shunt function and the neurological condition.

### 04AP08-6

#### A rare case of a 34 years old parturient with elephantiasis

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**Background**: Elephantiasis may occur due to parasites or to exposure to soil, rich in iron,aluminum, clay, potassium or other metals(podoconiasis). It is a tropical disease, very rare in Greece.The aim of this case report is the anaesthetic management of a parturient with elephantiasis.

Case Report: A 34 years old primigravita parturient is scheduled for elective cesarian section at 38<sup>th</sup> week of gestation. The elephantiasis appeared at the age of 7. After an ancle injury, an inflammation fired the appearance of the oedama. Initially, the oedema concerned only the right leg but the last year it appeared to the left leg,as well. Her condition began to deteriorate when she became pregnant. She gained 50 kiligrams (her weight was 135kgr) most of them were due to the extensive leg oedema, which rendered her incapable even for walking. She presented diabetes and hypothyreodism during her pregnancy. She was under thyroxine and she was euthyrodic.Her airway seemed manageable (Mallampanti I-II). The cesarean section performed under general anaesthesia keeping low the

airway pressure (up to 20mmHg) and PEEP 5mmHg.After injection of ranitide and metoclopramide, propofol 200mg and succinylcholine 100mg were given for intubation. Anaesthesia was maintained with O2/N2O (50%/50%) and sevoflurane 1%.After the delivery of the baby, she received morphine 5 mg for analgesia, atracurium 50 mgr, paracetamol 1gr and ondansetron 4 mgr. The neonate's APGAR score was 7, 7, 10 at 1st, 5th, and 10th min. respectively, after delivery. She recovered well. without complications.

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**Discussion**: The targets in this case were:1) to avoid worsening the oedema 2) not to impair the lymphatic contractile activity. Performing regional anaesthesia, we were aware of vasodilation and fluid overloading for treating possible hypotension. On the other hand, local aneasthetics have shown a decrease in lymphatic function<sup>1,2</sup>. General anaesthesia with low PEEP and low intrathoracic pressure do not affect oedema and lymph flow<sup>3</sup>.

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- 2. D. Newton et al. BJA, 2005;94:662-7
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**Learning points**: In cases of lymphatic disorders we must be aware of worsening the oedema. it is important to keep low PEEP and low intrathoracic pressure, when general anaesthesia is administered.

### 04AP08-7

# Critical management of the pregnant patient with an atypic hemolytic uremic syndrome

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**Background**: Up to 86% of patients with hemolytic uremic syndrome (HUS) secondary to pregnancy have mutations in the alternative pathway of complement, the underlying disease being an atypical HUS (aHUS)². It is an ultra-rare disease that usually evolves to terminal chronic renal failure, which makes it an easily underdiagnosed and potentially lethal pathology¹.

Case Report: Pregnant woman of 19+4 weeks that consults in the Emergency Room for right lumbar pain, micturition syndrome and fever. The sediment is compatible with urinary tract infection, which is corroborated with abdominal ultrasounds. E. coli is isolated, both in blood and urine cultures, so it is admitted under suspicion of acute obstructive pyelonephritis. The physical state and the analytical tests corroborate severe sepsis. She is transferred to the intensive unit care with perfusion of Noradrenaline at 0.8mg/h. It appears hemolytic intravascular anemia with negative Coombs, worsening thrombocytopenia and renal function. The schistocyte visualization, with negative Adamts13, confirms aHUS. Immunoglobulin 1g/kg is administered, achieving normalization in 14 days. In week 38+6, cesarean section is scheduled, which takes place without incidents, under intradural anesthesia.

**Discussion**: aHUS is an entity that is defined by the clinical triad of non-autoimmune hemolytic anemia, thrombocytopenia and acute renal failure. The choice of the anesthetic technique in pregnant women with thrombocytopenia is multifactorial. The number of circulating platelets and their function determines the safety of regional anesthesia<sup>3</sup>. Subarachnoid blockade with small caliber needles makes it a much less traumatic technique and a good choice for patients with aHUS. General anesthesia will be a good alternative in caesarean sections if there is evidence of bleeding or coaculation alteration.

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2 Saad AF et al. Pregnancy-Associated Atypical Hemolytic-Uremic Syndrome. AJP Rep. 2016 Mar 6(1):e125-8

3 Kam PC. Thrombocytopenia in the parturient. Anaesthesia. 2004 Mar;59(3):255-

**Learning points**: In every pregnant woman affected by HUS, a thorough preanesthetic evaluation must be carried out, weighing the advantages and disadvantages of the different anesthetic techniques. The safest anesthetic management depends on a deep knowledge of the disease and its implications.

#### 4AP08-8

# Anaesthetic management of an onfalopagus conjoined twin delivery

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**Background**: The incidence of conjoined twins is in 1 in 50.000 to 100.000 pregnancies or 1 in 650 to 900 monozygotic twin pregnancies. Antenatal care and delivery depends on the place and extent of union. Obstetric complications for both mother and babies are common.

Case Report: A 30-year-old (G2P1) was diagnosed with a conjoined twin pregnancy at 12 weeks of gestation by ultrasound scan (US). Later MRI revealed an OCT pregnancy. They shared the liver, and they could not tell whether they shared the colon or not. The first twin presented a TGA

They planned an elective caesarean delivery at 35+4 weeks of gestation. They made a Pfannestiel type skin incision, and a transverse Kerr uterine incision.

After considering every factor, the anesthesis team decided that a combined spinal.

After considering every factor, the anesthesia team decided that a combined spinalepidural technique would be the best option. We had cross-matched prepared blood and a rapid iv infusor, in case of massive obstetric hemorrhage. We made sure everything was ready in case general anesthesia was needed.

The mother was premedicated with ranitidine and metoclopramide, she had two large iv lines inserted. A CSE was sited at L3-L4 space in the sitting position and 0.5% hyperbaric bupivacaine 9mg + Fentanyl 20mcg was administered intrathecally. We repositioned the patient in a supine reverse Trendelenburg with left uterine displacement, and administered 0.75% Ropivacaine 6 ml through the epidural catheter, achieving a sensory block up to T4.

The caesarean delivery proved successful without any of the possible events taking place. The uterus contraction was good after the administration of 100 mcg of Carbetocin.

**Discussion**: We report the successful delivery of OCT. We are absolutely certain that the multidisciplinary antenatal approach contributed to the successful outcome in the case. We chose the CSE for several reasons, the mother wanted to be awake, moreover if the delivery turned out to be difficult, the epidural catheter allows to enhance the sensory block.

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- 2. Baruah S, Downey G P. The value of multidisciplinary working: a report on the management of conjoined twins. J Obstet Gynaecol 2003; 23: 311–2.

**Learning points**: We find that in our case the key point was the multidisciplinary planning, and making sure that all the necessary equipment was ready in case of need.

#### 04AP08-9

# Approach to a Parturient with Arnold Chiari Malformation: A Team Controversy

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**Background**: Arnold Chiari Malformation (ACM) is a displacement of cerebellar tonsils below the foramen magnum, with risk of cerebral herniation. Labor increases this risk due to acute changes in intracranial pressure (ICP). Anesthetic management in parturients with non-surgically corrected ACM is controversial. Case Report: 35yo, 70kg, ASA II, GIIPI, active phase of labor, without previous

evaluation by Anesthesiology. Prior to pregnancy, a CT scan due to intense occipital headaches showed displacement of the cerebellar tonsils, presuming ACM. No further evaluation was performed despite intermittent headache. The case was discussed with Neurosurgery, and disagreement between Obstetrics and Anesthesia presented in terms of type of delivery. Urgent c-section was performed under general anesthesia (GA) due to fetal bradycardia. After standard monitoring, rapid sequence induction with propofol, fentanyl, lidocaine and rocuronium was used. Laryngoscopy performed with McCoy blade, neck in neutral position, and intubation executed without difficulty. Surgery and awakening occurred without complications, neuromuscular blockade reversed with sugammadex. Newborn's APGAR index was 5/10/10.The mother was hospitalized for 5 days, with no neurological deficits or other complications.

**Discussion**: Anesthetic plan for patients with ACM includes evading elevation of ICP or changes in cranio-spinal pressure gradients.<sup>2</sup> Cervical positioning may influence the position of the cerebellar tonsils, and hyperflexion or hyperextension should be avoided during airway approach.<sup>3</sup> Patients with minimal and asymptomatic cerebellar descent, neuroaxis approach may be reasonable. However, considering that caudal cerebellar movement may occur after dura puncture with large caliber needles, it is crucial to be aware and act quickly if neurological symptoms appear.<sup>1</sup> GA allows more thorough hemodynamic control, maintaining normocapnia through invasive ventilation thus minimizing sudden increases in intracranial pressure.<sup>2</sup>

#### References:

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- Anesth Pain Med 2012;7:166-169.
   Childs Nerv Syst.2016;32(3):527-30.
- **Learning points**: The challenge in the anesthetic approach to parturients with ACM is to avoid variations in intracranial or intraspinal pressure. Airway may be an additional challenge, requiring careful placement and minimization of stimuli. Evaluation of parturients with ACM should be done by a multidisciplinary team involving Obstetrician. Anesthesiologist and Neurosurgeon.

#### 04AP08-10

#### Klippel-Trenaunay Syndrome in Anesthesiology

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Background: Klippel-Trenaunay Syndrome (KTS) is an infrequent non-hereditary congenital malformation caused by mutations in PIK3CA gene, causing soft and bone tissue hypertrophy affecting lower limbs, cutaneous hemangiomas and varicosities. Spinal spaces can be affected, as well as pelvic organs and congulations are observed due to alterations in hemostasis and coagulation, presenting many challenges to the anesthesiology during labor.

Case Report: 30-year-old primiparous woman, 38+3 weeks, with KTS. Left leg hypertrophy. A few years ago, femur elongation with skin grafting was performed due to malleolar ulcer, with general anesthesia and no incidences. Nowadays, patient was having medical follow ups with no treatment. Patient presented worsening with lumbar pain and paresthesia in her lower limb. Physical examination and echography ruled out vascular malformations, and labor was scheduled due to worsening. MR images were studied, and arteriovenous fistulae were found at the cauda equina level and after assessing benefit/risk balance, we decided not to perform epidural anesthesia for labor. C-section was indicated due to failure to progress. In the OR, vital constants and laboratory tests were checked, with normal results. General anesthesia was performed with fentanyl, Propofol and rocuronium. The baby presented Apgar of 9 and 10 after first and fifth minute. There were no complications such as massive hemorrhage in the perioperative period and no intrabdominal vascular malformations were observed.

**Discussion**: KTS may be associated with vascular malformations in the CNS, as well as hemostasis alterations, that may contraindicate locoregional anesthesia. Presence of arteriovenous fistulae in cauda equina ruled out axial anesthesia in our patient. Nowadays, this kind of anesthesia is acceptor for these patients, if vascular spinal malformations had been ruled out by imaging techniques. This is the reason why an interdisciplinary managing before labor are needed to know the extension of the disease and to perform and individualized anesthesia.

#### References:

 Sivaprakasam MJ, Dolak JA. Considérations anesthésiques et obstétriques chez une parturiente atteinte du syndrome de Klippel-Trenaunay. Can J Anesth. 2006;53(5):487-91.

**Learning points**: Labor management with TKS is a challenge for anesthesiologist. It is necessary to rule out vascular malformations in the epidural space with imaging tests before performing spinal techniques.

### 04AP08-11

# Lipid-emulsions as an adjuvant treatment for amniotic fluid embolism

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**Background:** Amniotic fluid embolism (AFE) can occur during pregnancy or shortly after delivery, with an incidence of 1,7-6,6/100.000 deliveries (1). It provokes an inflammatory and anaphylactoid response leading to cardiogenic shock, respiratory failure, coagulopathy and coma. We report the case of an AFE, which resulted in a cardiac arrest. The administration of lipid emulsion possibly helped in the recovery of the parturient

Case Report: A 33 year-old woman (G5A2C2) with destational diabetes attended the obstetric emergency department of our hospital for her 3rd delivery. An emergency cesarean delivery was indicated due fetal distress. A spinal anaesthesia (hyperbaric bupivacaine 8mg plus 20mg fentanyl), with insertion of an epidural catheter for postoperative analgesia was performed using a combined technique uneventfully. After fetal extraction and during placental extraction, the patient presented a sudden dyspnea and a refractory hypotension, which did not respond to vasoactive agents and resulted in a severe bradycardia and a cardiac arrest. The advanced cardiopulmonary resuscitation was started using epinephrine. hydrocortisone and amiodarone. The patient recovered a pulse activity after minutes, and an 250ml intravenous infusion of 20% intra-lipid emulsion was administered over 15 minutes (0.25mL/kg/min). At the end of surgery, a pulmonary CT-Scan was performed to discard pulmonary embolism. The patient was then transferred to the maternal intensive care unit under mechanical ventilation. EKG, troponins and blood tests values remained normal, and no cardiac. respiratory or neurological damage was encountered. On day 1, patient showed a complete recovery and she was extubated. On day 2 was discharged from ICU. Discussion: In AFE, inflammatory mediators produce a pulmonary vasoconstriction that can lead to pulmonary hypertension, right ventricle failure and myocardial depression (2). A clinical trial in rats shows that lipid emulsion solutions suppress/reduce inflammation, fibrosis and hypertrophy in both lungs and heart (3). This effect might have helped in the recovery of our patient. Learning points: Lipid-emulsion solutions could have a role for treatment and prevention of complications of AFE. Further studies should be done to assess this point.

#### References:

- 1. Sultan P et al. Curr Opinion Anaesthesiology. 2016 Jun;29(3):288-96
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- 3. Umar S et al. Hypertension. 2011 Sep;58(3):512-8

#### 04AP08-12

# Anesthesia for cesarean delivery in a patient with an intramedullary glioblastoma

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Introduction: Primary spinal glioblastoma (GBM)is rare and has a poor prognosis. There are reports of pregnant patients with malignant central nervous system tumors who require an early delivery of the fetus before definite therapy can be administered to the mother. To our knowledge neither the association of GBM with pregnancy nor the anesthetic management of pregnant woman with GBM purposed for C-section have been previously described.

Case Report: A 33-year-old female, G2P1, diagnosed at 20-week gestation with an intramedullary glioblastoma grade IV extending from C6 to T3, was admitted for elective cesarean delivery at 29-week gestation. The patient medical history was otherwise unremarkable. Surgical history included a decompressive laminectomy and partial removal of the tumor at 23-week gestation. Preoperative assessment revealed an AIS D tetraparesis (motor level by C5/C6 and sensitive level by C7). There was also a significant limitation of neck mobility. Laboratory studies showed an anemia. General anesthesia was performed. Monitoring included pulse oximetry, invasive blood pressure, 5-lead electrocardiogram, depth of anesthesia, neuromuscular block and urine output. RSI was realized with bolus doses of propofol and rocuronium. Tracheal intubation with videolaryngoscopy was successfully attained. Anesthesia was maintained with nitrous oxide and sevoflurane and supplemented with fentanyl after baby delivery. The male infant had Apgar scores of 5/7/8 at 1/5/10 min. Neuromuscular block was reversed using sugamadex and the patient was extubated and carried to the intensive care unit without incident. The mother was discharged after 19 days with a similar neurologic condition.

Discussion: C-section under neuraxial anesthesia remains the mainstay of management in parturients. However, a pre-existing neurologic disorder is a risk factor for neurologic complications associated with regional anesthesia. In fact, most authors consider that a spinal cord tumor is a contraindication to regional anesthesia. Also, parturients who have had recent surgery on their vertebral column/neuraxis may be unwilling to have neuraxial anesthesia. We considered that general anesthesia was the best option in our case. Given the increased risk of aspiration RSI was performed. A videolaryngoscope was used for intubation to minimize neck mobilization.

**Learning Points:** We report for the first time the use of general anesthesia as a successful anesthetic technique for pregnant women with GBM.

# 04AP09-1

# Noninvasive respiratory support in the complex of intensive care (IC) management of severe early-onset preeclampsia (PE)

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Background and Goal of Study: Obstructive sleep apnea syndrome (OSA) and small airway obstruction (SAO) are considered to be potential pathogenic ways of PE development since both lead to hypoxia and oxidative stress. At the same time PE itself can provoke early SAO manifestations and aggravate the course of OSA. The aim of this study was to investigate pathogenic justification and efficacy of CPAP as a part of IC of pregnant women with severe early-onset PE.

Materials and Methods: We conducted a monocentre prospective controlled study. All pregnant women with clinically defined severe early PF were divided into two groups: with OSA and without which was confirmed by somnography. Then patients were randomized to receive CPAP in addition to classic therapy, and classic therapy without CPAP. Thus were formed four groups: 1: the presence of OSA with CPAP (N=4); 2: the presence of OSA without CPAP (N=3); 3: non OSA with CPAP (N=11); 4: non OSA without CPAP (N=12). Settings CPAP: PEEP from 7 to 12 mm H2O, warmed humidified atmospheric air (FiO, 21%); every night from 10:00 p.m to 6:00 a.m. Mean arterial blood pressure (MAP), PaO<sub>2</sub>, PvO<sub>2</sub>, arteriovenous oxygen difference (a-vO<sub>2</sub> diff), lactate, cerebral oxygenation (SrO<sub>2</sub>), outcomes such as gestation age, time of prolongation of pregnancy, neonatal outcomes were evaluated. The study was statistically validated using system "STATISTICA 10". Results and Discussion: In groups 1 and 3 there was an increase PaO<sub>2</sub>, PvO<sub>2</sub>, SrO<sub>2</sub> and a decrease in a-vO<sub>2</sub> diff and lactate at 6:00 a.m. in comparison with their level at 10:00 p.m.: there was a decrease in the need for antihypertensive therapy. In the group 4 initial value at 10:00 p.m. did not differ significantly from parameters in groups 1 and 3, but by 6:00 a.m. the dynamics of indicators have been identified. In group 4 there was an decrease PaO2, PvO2, SrO2 and a inrease in a-vO2 diff and lactate at 6:00 a.m. in comparison with their level at 10:00 p.m. The time from hospitalization to delivery in groups 1, 2, 3, 4 were 8, 2, 10, 6 days respectively. The average weight of newborns in all groups was not statistically different. All children born from mothers from groups 1, 3 did not required invasive lung ventilation (ILV), in groups 2, 4 - five children required ILV.

**Conclusion**: CPAP may become a new effective additional method in the intensive care of severe early onset preeclampsia. It is planned to further study.

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### 04AP09-2

# Maternal and neonatal outcomes associated with the use of spinal anesthesia compared with general anesthesia in severe preeclampsia: a retrospective study

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Background and Goal of Study: The clinical spectrum of a patient with eclampsia varies considerably. It's difficult to apply general recommendations for anaesthesia care for these patients. General anaesthesia is often mandatory and the use of regional anaesthesia was reported in case of stable eclampsia

We studied anaesthesia techniques and related morbidity and mortality amongst eclamptic patients in a third level hospital.

Materials and Methods: We conducted a retrospective survey of hospital anaesthesia records of patients with eclampsia who underwent caesarean delivery at a third level hospital over a 13-year span from January 2004 to December 2016. Results: Eighty three eclamptic patients were recorded during our study period. The incidence of eclampsia was 6.39 per 10000 deliveries. In 61 patients (73.5%) general anaesthesia was performed. In those patients, the major events were difficult intubation in 3 patients, aspiration in 2 patients and intra-operative haemorrhage in 2 patients. The hemodynamic effects associated with laryngoscopy and endotracheal intubation revealed a change in the heart rate from 104 ± 10 to 133 ± 17 beats/min and an increase in mean arterial pressure from 94 ± 1.1 to 112 ± 3.2 mm Hq. Median APGAR score at 1and5 min were 7 and 8 respectively.

In 22 patients (26.5%) spinal anaesthesia was performed after stabilization. Computed tomography was performed in 7 patients and was normal in all cases. Only two patients had episodes of hypotension. No patient had a perioperative convulsion. Median APGAR score at 1 and 5 minutes were 8 and 9 respectively. There were no maternal deaths, we reported 5 stillbirths and 2 neonatal deaths, all with general anaesthesia

Conclusion: The risk-benefit profiles of spinal anesthesia and general anesthesia strongly favor the use of spinal anesthesia when feasible. Important factors to consider are the risks of clinically significant maternal hemodynamic derangements, difficult airway management, stroke, spinal/epidural hematoma, and adverse neonatal outcomes. In eclamptic patients, spinal anesthesia–induced hypotension is typically easily treated. The risk of spinal/epidural hematoma is low, and there is no evidence that neonatal outcomes are compromised. In contrast, potential complications of general anesthesia, such as hypertensive crisis, stroke, and difficult airway management, are leading causes of morbidity and mortality in this population.

# 04AP09-3

# Facial Palsy and cranial nerve injuries during pregnancy: a predictive sign of preeclampsia: two cases

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**Background:** Facial palsy (FP) and cranial nerve injuries can occur during pregnancy. They are mostly due to neuraxial anaesthesia, stroke, infections or idiopathic origin even though pregnancy related causes were also described1. We describe 2 cases of FP related to pre-eclampsia (PE).

Case report: 2 patients with 33 weeks triplet pregnancy (P) (patient 1), and 30 weeks single P (patient 2) attended the obstetric emergency department of our tertiary University Hospital. Patient 1 complained of acute unilateral incomplete FP (Pict.1), and patient 2 of incomplete FP plus hypoacusia (Pict. 2). Both presented arterial hypertension (AH) of recent onset and proteinuria, so a diagnosis of PE was done. They were then referred to a high dependency unit for AH control. A caesarean delivery (CD) was perfomed in both patients after foetal maturation (on day 4 & 6 respectively) for difficult AH pharmacological control. After CD, as AH improved, FP and hypoacusia started improving (on day 12 for patient 1 and on day 4 for patient 2) which allowed us and the neurologists to consider them as idiopathic FP related to PE. Recovery was complete after 1 month in patient 1, and 2 weeks in patient 2

**Discussion:** During pregnancy, the risk of FP and other cranial nerves is multiplied by 3. It is more common in the 3rd trimester, and days after delivery1. Some cases of FP were described as the first clinical sign of PE. 30% of pregnant women with FP had PE or gestational hypertension, nearly five times the expected rate2. Other nerve injuries are not so common: facial and acoustic cranial nerves are tightly contained within a nerve sheath. A high blood pressure may contribute to increasing extracellular fluid volume, leading to perineural oedema and a nerve

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compression within the fallopian canal, with a consequent isolated neurological deficit. Sensorineural hearing loss (SNHL) may occur in PE as result of reduced blood flow due to hypercoagulable state and thrombosis, with possible hearing loss and palsy. Recovery reaches 90% in incomplete FP cases. If FP is complete, recovery is only 52%, similar to SNHL3. FP management includes multidisciplinary approach. Prednisone can be used, although its general prescription cannot be recommended. An expectant treatment is recommended for SNHI

1 Ioannis Mylonas et al 2005; 272: 241-43.2 Shmorgun D et al; 2002; 95:359–62.3 N. Mathieu et al 2011; 39:31-33.

### 04AP09-4

# Maternal and Perinatal outcome of Eclampsia at a third level Tunisian hospital: a 12 years review

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Background and Goal of Study: Despite advances in detection and management, preeclampsia/eclampsia remains a common cause of maternal morbidity and death in the world. The aim of this study was to assess the incidence of eclampsia and its

Materials and Methods: We conducted a retrospective survey in a third level Tunisian university teaching hospital from January 2004 to December 2016. We included all patients with the diagnosis of eclampsia. We evaluated clinical profile, maternal and perinatal outcome

Results: In our study period, 129847 deliveries were registered. 83 women with eclampsia were identified. Hence, the incidence of eclampsia was 6.39 per 10000 deliveries. There was a bimodal distribution in age with the highest frequency at 21 and 41 years. All cases of eclampsia occurred before delivery. One quarters of first seizures occurred in hospital. The median gestational age at the time of eclampsia was 35 weeks of gestation. The delivery mode was caesarean section in 100% The recurrence of eclampsia despite magnesium sulfate prevention was observed in 6% of patients. Severe complications of eclampsia were recorded in 10.8% of patients: 4 cases of posterior reversible encephalopathy syndrome, 2 cases of acute pulmonary edema, and 3 cases of HELLP syndrome. No maternal deaths due to eclampsia were recorded. Only 10.8% of new born were preterm. There were 5 stillbirths and 2 neonatal deaths

Conclusion: The incidence of eclampsia was very high probably due to center effect. It's essential to raise awareness among mothers in the community regarding early signs and symptoms of preeclampsia / eclampsia and to design a better tracking system for antenatal care program.

# 04AP09-5

# **HELLP Syndrome: a 5 years retrospective review**

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Background and Goal of Study: HELLP Syndrome is characterized by hemolysis elevated liver enzymes and low platelet levels. It's an important obstetric syndrome with an average maternal mortality rate of 5%. It usually presents with elevated blood pressure and a variety of symptoms. We reviewed the anesthetic management of women diagnosed with HELLP syndrome in our institution in 5 years and describe

Materials and Methods: Retrospective, observational study from January 2012 to December 2016 in women with diagnosis of HELLP syndrome. Data were collected from physical and electronic processes and the following variables were included: Age, obstetric history, type of delivery, anesthetic management, maternal and fetal outcome and complications, ICU admission and discharge date. All data was compiled and analysed using SPSS version 22.

Results and Discussion: There were 12 pregnant women diagnosed with HELLP syndrome in the 5 years period, in a total of 9708 deliveries (0.12%). The syndrome was classified antepartum in 7 patients. The median age was 33 years and 66.6% presented after the 35th week. In 7 cases the syndrome developed in the first pregnancy. All women received corticosteroid treatment and antihypertensive drugs, as well as seizure prophylaxis with magnesium sulfate. Emergency cesarear section was performed in 10 women using general anesthesia in 6 of them. ICU admission was necessary in 4 cases. The median time until discharge was 9 days There were 2 fetal deaths in patients arriving to the hospital with no fetal heart rate in cardiotocography and 1 baby was admitted to NICU after cesarean delivery.

Conclusion: HELLP syndrome is an obstetric emergency in which a multidisciplinary approach (obstetricians, paediatricians and anaesthesiologists) is vital to a successful outcome. Early recognition of signs and symptoms and prompt treatment is necessary to decrease maternal and fetal morbi-mortality.

#### 04AP09-6

Impacts of anaesthesia modes on post-Caesarean section pulmonary oedema in ritodrine-treated pregnant women: a population-based study

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Background and Goal of Study: Ritodrine, a β2-adrenoreceptor agonist, is widely used for tocolysis in pregnant women with premature labour. As β2-adrenoreceptor agonist may cause water retention, previous data indicated that pregnant women using ritodrine may have an increased risk of pulmonary gedema. Clinical data seem to suggest epidural anaesthesia (EA) as the preferred anaesthesia mode for Caesarean section (CS) in ritodrine-treated pregnant women. However, the evidence was mainly derived from small scale clinical observations. To elucidate further, we thus conducted this population-based study using Taiwan's national data. We hypothesized that ritodrine-treated pregnant women receiving EA for CS may have a lower risk of pulmonary oedema than those receiving general anaesthesia (GA) or spinal anaesthesia (SA)

Materials and Methods: We analysed data retrieved from the Longitudinal Health Insurance Database of the National Health Insurance program in Taiwan between 2002 and 2006. Subjects who underwent CS with prior ritodrine use were identified. The primary outcome was pulmonary edema. Multivariate Cox proportional-hazards regression models were performed to estimate the hazard ratios (HRs) and the 95% confidence intervals (CIs).

Results and Discussion: Of the 12,330 subjects included, 1,212 received GA (the GA group), 3,569 received EA (the EA group), and 7,549 received SA (the SA group). Subjects of the 3 groups were significantly different in age, the incidences of using non-steroid anti-inflammatory drugs, opioids, cardiovascular drugs, and steroids, as well as the incidence of multiple gestation, preeclampsia/eclampsia, intrauterine growth restriction, and use of oxytocic drugs (all P<0.05). Our data revealed that the incidences of pulmonary oedema within 30 days after CS of the GA (1.1%) and the EA (0.2%) groups were significantly higher than the SA group (0.1%) (P<0.001). After adjusting for the aforementioned factors that were significantly different, the risk of developing pulmonary oedema within 30 days after CS of the GA (HR=7.30, 95% CI=2.85-8.66, P<0.001) and the EA (HR=2.89, 95% CI = 1.04-8.06, P=0.043) groups were significantly higher than the SA group.

Conclusion: Ritodrine-treated pregnant women receiving GA or EA for CS are associated with a higher risk of developing post-operative pulmonary oedema than those who receiving SA.

### 04AP09-6

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#### 04AP09-7

Older maternal age and cardiovascular and metabolic disease outcomes: A retrospective cohort study using data from population-based electronic medical records

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Background and Goal of Study: In this study we aimed to evaluate whether women with advanced age at their first birth have more intermediate cardiovascular and metabolic health (cardiometabolic) outcomes that occur by age 45.

Materials and Methods: This retrospective, longitudinal, population-based cohort study included women aged 34-39 at baseline (2004-2006) who were followed through until age 45. All data was extracted from a large comprehensive electronic medical record database from Clalit Health Services. Women at baseline were identified as parous or nulliparous and then followed up until 2016 and further divided into three groups: women who gave birth to their first child between the age ages of 34-39, those who gave birth to their first child between the ages of 40-44, and a group of persistent nulliparous women. The rate of both adverse pregnancy events and cardiometabolic diseases at age 45 were compared across these three groups and to women in the general population. Main outcomes measures included type 2 diabetes, obesity, hypertension, cardiovascular disease, and Framingham

Results and Discussion: Over the follow-up, 952 women gave birth for the first time between the ages of 35-39, 673 gave birth between the ages of 40-44, and 8,354 women remained persistently nulliparous. Older women were found to have more gestational diabetes (6.9% vs 4.3%,p-0.036) and preeclampsia (4.0% vs 1.9%, p=0.015) we found no difference between the two parturients groups in the prevalence of cardiovascular and metabolic disease outcomes at age 45. Older parturients also did not have more adverse cardiovascular outcomes when compared to the general population or persistent nulliparas

Conclusion(s): In this study cohort, women who had their first birth at an older age did not have an increased risk for intermediate cardiovascular complications

### 04AP09-8

# Is systematic echocardiography useful in elderly parturients?

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Background and Goal of Study: Maternal mortality in obstetric setting rises significantly in elderly patients and is namely 6 times higher between 40 to 44 years old (y.o.) than between 25 to 29 y.o. This increase is mainly related to cardiovascular diseases, which represent the leading cause of maternal death in high-income countries [1]. Consequently, in our hospital, trans-thoracic echocardiography (TTE) is systematically performed in elderly parturients (older than 40 years) during pregnancy. However, the benefit of such a practice is not demonstrated and no recommendations in the literature support it.

The aim of this study was to evaluate the benefit of systematic TTE in elderly

Materials and Methods: Between July and December 2015, we carried out a retrospective study on 20 consecutive parturients, older than 40 years that had a systematic TTE during pregnancy. Ultrasound characteristics considered to be pathological were: LVEF < 55%, diastolic dysfunction, valvulopathy, sPAP > 35 mmHg, hypo- or a-kinetic areas, pericardial effusion and cardiac cavity size anomaly

Results and Discussion: Among these 20 parturients, 75% were primiparous 10% had a twin pregnancy, 42% had a medically assisted reproduction, 20% had a body mass index (BMI) > 30 kg/m<sup>2</sup> and 10% had a chronic hypertension prior to pregnancy. Seventy percent (n=14) of the TTE were normal. The 6 remaining TTE showed: minimal tricuspid insufficiency (n=2) associated for 1 patient with an aspect of interauricular septal aneurysm without significant shunt, minimal diastolic dysfunction (n=1), minimal mitral insufficiency associated with interauricular septal aneurysm without significant shunt (n=2) and small mitral valve prolapse (n=1). No peri-partum complications occurred in these 20 parturients.

Conclusion: Systematic TTE in elderly parturients, in absence of known heart disease, did not reveal any significant abnormality that modified their peri-partum management. Therefore, this small series does not support planning systematic TTE during pregnancy on the sole basis of advanced age

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#### 04AP09-9

Acute pulmonary oedema in pregnancy: an emerging diagnostic dilemma in a pregnant woman with systemic lupus ervthematosus

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Background: Acute pulmonary edema in pregnancy affects 0.08% of pregnant women1. The most frequent causes are cardiac pathology (26%), the use of tocolytics, excess fluid and preeclampsia. Other causes are severe infection and embolic events. Systemic lupus erythematosus (SLE) can cause valvular involvement and myocarditis with clinical significance in 10% of patients and may progress to dilated cardiomyopathy and acute heart failure (AHF). The echocardiogram allows to distinguish between noncardiac causes and differentiate the cardiac ones in valvular, systolic or diastolic dysfunction, facilitating the etiological diagnosis and therapeutic optimization.

Case Report: This clinical case is based on a 33 year old female, with a 35 weeks pregnancy, which went to the emergency department with a sudden dyspnea after premature rupture of membranes. She had a known known medical history of SLE with slight involvement of the mitral valve, having abandoned follow-up consultation 5 years ago. She spontaneously stopped enoxaparin at 32nd week. The physical examination revealed bilateral pulmonary crackles, SatO2 of 60% while breathing room air and a blood pressure of 158 / 90mmHg. Although oxygen supplementation was started with a non rebreather mask, she remained hypoxemic. Cardiotocography revealed fetal bradycardia. Therapy with unfractionated heparin, furosemide and hydrocortisone was started and emergency cesarean section under general anesthesia was performed. After surgery the patient was transported to the Intensive Care Unit where an echocardiogram was preformed revealing a dilated left ventricle, ejection fraction of 20%, global hypokinesis, severe mitral regurgitation, non-dilated right cavities with good systolic function.

AHF secondary to SLE cardiomyopathy versus peripartum cardiomyopathy. Therapy with beta blocker, ACE inhibitors , furosemide, hydrocortisone and bromocriptine were initiated. There was no need for ventilatory support after 24h and echocardiogram performed on the 6th day revealed improvement in FE (39%). Discussion/Learning points: The use of point of care echocardiography allows the orientation of the possible diagnoses. We consider that point of care transthoracic echocardiography is a useful skill which allows the anesthesiologist to make therapeutic decisions

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## 04AP09-10

Anesthetic management of parturients with severe pulmonary arterial hypertension (pregnancy risk IV WHO) during childbirt

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Background and Goal of Study: Pregnancy with pulmonary arterial hypertension (PAH) have very high risk of acute right-sided heart failure after delivery and may have a sudden death.1 Eisenmenger syndrome (ES) carry the greatest risk of maternal mortality due to heart failure.2 Increasing heart strain and vascular resistance itself may further complicate delivery and increase the right heart strain resulting in emergency Caesarean section (CS) and possible maternal demise. Uterine contractions, especially associated with forceps delivery, also adversely affects on pulmonary circulation.3 The objective was to identify anesthetic management, management and outcomes as suggestion in similar complicated cases because of absence of accepted recommendation in such high cardiac risk

Materials and Methods: A retrospective study included women with PAH which pregnancy risk IV according WHO admitted for delivery into VUH Santaros Clinics from 2014 to 2017 was conducted. Anaesthesia method, process and medical treatment have been analysed due to medical records. There were 4 women 25-35 years of age with severe PAH due to congenital heart disease, 3 of them with ES, 1 with residual PAH after late closure patent ductus arteriosus.

Results and Discussion: Decision was made by multidisciplinary team: 1 parturient - vaginal delivery under epidural analgesia, 3 underwent CS under general anaesthesia (GA). All mothers were managed with oxygen, sildenafil and LMWH, 2-diuretics. Two parturient got iloprost inhalations starting from OR. All 4 women treated in ICU for 3-6 days. In one GA case hemodynamic supported with noradrenaline (40h) and milrinone for 51 hours.

Conclusion: Successful outcomes was dependant on an individualized approach and multidisciplinary team (cardiologist, obstetrician, anaesthesiologists) collaboration and efforts in operating field and ICU. The clinical situation

determined the application of a specific anaesthetic method and GA with adequate pharmacological therapy was the one method in CS.

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### 04AP09-11

# Long Term Outcomes of a Patient with Severe Peripartum Cardiomyopathy Following an Uncomplicated Vaginal Delivery

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**Background**: Peripartum cardiomyopathy (PPCM), a dilated cardiomyopathy (DCM) presenting between 3rd trimester and 5 months postpartum, is a diagnosis of exclusion characterized by <45% ejection fraction (EF) and dilated left ventricle. Presenting symptoms are fatigue, dyspnea and leg swelling, with increased risk for arrhythmias, thromboembolic events and sudden cardiac death.

Case Report: Now 43 years old, a G1P1 woman with pregestational HTN was diagnosed with PPCM 3 months after an uncomplicated vaginal delivery (2004). Worsening postpartum dyspnea had prompted a cardiac ECHO showing global DCM with 30% EF: metoprolol, aspirin and furosemide were started. She developed tricuspid regurgitation (2005), atrial fibrillation (2010), received an automatic implantable cardioverter-defibrillator for 15% EF (2012), and had a DVT (2015). Pulmonary hypertension (pHTN; peak systolic 47mmHg) was diagnosed in 2017, and she was placed on heart transplant waiting list and referred for left ventricular assist device (LVAD). A pre-LVAD ECHO showed 6% EF (Fig.) and CI on catheterization was 0.93 L/min/m<sup>2</sup>. We report here the anesthetic management for LVAD placement and tricuspid annuloplasty under cardiopulmonary bypass (17/10/2017). Pre-induction management included an arterial line, with vasopressors infusions (milrinone, epinephrine, dobutamine). After GA induction, a pulmonary arterial catheter was placed, and inhaled NO was started (20ppm). Chest closure occurred 36h after ICU admission and extubation at 48h. She was discharged on postop day 12 on bumetanide, sildenafil, warfarin and aspirin, and is still awaiting heart transplant

**Discussion**: Long term follow-up of women with PPCM shows recovery in 50% of cases, with 25% stable on medication and 25% progressing into severe heart failure, as this case. Risk factors here for PPCM included African American descent and HTN. Presenting symptoms where shortness of breath during pregnancy, which culminated 3 months postpartum. Over the course of 13 years, she developed severe DCM, tricuspid regurgitation and a DVT. Perioperative management highlights judicious management of extreme heart failure (EF 6%) & moderate pHTN, using a wide array of inotropic drugs, followed by anticoagulation. Literature long term follow-up in women with PPCM is scarce, and there have only been few reports of women receiving LVAD, usually in the immediate postpartum period, with mixed outcomes.

# 04AP09-12

# Anaesthetists'stress test: Pulmonary arterial hypertension (PAH) in pregnancy

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Background: Maternal mortality for pregnant women with PAH remains high. Current guidelines clearly recommend that women with PAH should not become pregnant or terminate pregnancy. However, guidelines for the management of such parturients do not exist. We present the management of two cases at our department

Case Reports: A 40-year-old G2P1 female at 38th week of gestation presented to the emergency room with a complaint of dyspnea at rest. She reported a known asymptomatic mitral valve prolapse and a newly diagnosed mild bronchial asthma. Transthoracic echocardiogram (TTE) showed an estimated pulmonary artery systolic pressure (PASP)=70mmHq. An emergency C-section was decided because

of obstetrical reasons and was performed under low dose spinal anaesthesia because of thrombocytopenia. Immediately after delivery the mother developed pulseless electrical activity. Death was confirmed after 90 minutes of unsuccessful advanced life support.

A 34-year-old G1P0 female at 34th week of gestation was admitted to our high risk pregnancy unit due to intrauterine growth restriction and a current history of atrial septal defect, left to right shunt and estimated PASP=45-50mmHg. Elective C-section was performed successfully under epidural anaesthesia. Admission to the cardiac unit followed uneventfully.

Discussion: Pregnancy in PAH is difficult to deal with. Therapy has to be initiated as soon as possible. Close follow-up by a multidisciplinary team is mandatory. Severity of PAH and functional status of mother definitely affect prognosis. The safest mode of delivery seems to be elective C-section in 32-36 week of gestation. The main anaesthetic goals are avoidance of hypoxaemia, marked reduction in systemic vascular resistance and myocardial depression. Epidural or low-dose combined spinal epidural anaesthesia are preferable to general anaesthesia under meticulous monitoring. The immediate postpartum period is the most common for development of acute right ventricular failure.

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**Learning points**: Early consultation, diagnosis and therapy are crucial in order to optimize patient's clinical status. Elective delivery should be performed under regional anaesthesia. Postpartum period posses the highest incidence of mortality.

#### 04AP10-1

# Effects of epidural and intravenous remifentanil analgesia during labor on neonatal outcome - retrospective observational study

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Background and Goal of Study: We evaluated the clinical outcome of term neonates born to mothers who received epidural analgesia (E) or systemic analgesia with remifentanil (R) during labor.

Materials and Methods: Data was collected retrospectively over the course of one year. We have evaluated the medical records of 247 full term neonates, 208 were born to mothers who received E and 39 to mothers who received R. Data on Apgar scores and perinatal complications (infection, sepsis, hyperbilirubinemia, perinatal injuries, asphyxia), and average hospital stay were collected. Mann-Whitney U test, chi square test, and logistic regression analysis were used where appropriate.

Results and Discussion: Mean Apgar scores in 1st and 5th minute between E and R were similar (8.83 vs. 8.97 P = 0.252; 9.81 vs. 9.87, P = 0.762, respectively). Average neonatal hospital stay was not different between groups (4.19 vs. 4, P = 0.557). The percentage of neonates with any perinatal complication were similar between groups (28.3% vs. 32.5%, P = 0.598). Neonates born by cesarean delivery (CD) had statistically significant worse outcomes compared to neonates that were delivered vaginally (odds ratio 2.8 95%CI [1.30647-6.17692]).

Conclusion: We did not find statistically significant difference in mean Apgar scores and perinatal complications between neonates who received epidural vs. remifentanil analgesia. We measured an increased rate of complications in neonates born via CD. Fetal indications for CD may be a significant confounder explaining this finding. Future studies should have a greater sample size and be powered to detect such associations.

# 04AP10-2

# Are pregnant women satisfied with remifentanil labour analgesia?

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Background and Goal of Study: Remifentanil intravenous patient-controlled analgesia (rIVPCA) has pharmacological properties that make it a popular alternative to epidural labour analgesia. Despite the adverse effects, evidence suggests that rIVPCA is a feasible alternative to neuraxial analgesia when this is contraindicated, unavailable or not preferred by pregnant women. However, there is a lack of evidence of the satisfaction with rIVPCA. The aim of the study was to evaluate satisfaction and pain relief with rIVPCA for labour analgesia.

Materials and Methods: A retrospective descriptive study was undertaken to assess pregnant women satisfaction with rIVPCA in labour pain. All women delivering live births and receiving rIVPCA between January 2016 and June 2017 were included and contacted by telephone to answer a satisfaction questionnaire. Respective clinical records were consulted. The outcomes analysed were overall satisfaction (0=very dissatisfied, 1=dissatisfied, 2=neutral, 3=satisfied, 4=very satisfied), pain relief degree (0= very poor, 1=poor, 2=moderate, 3=good, 4=very good). maternal side effects and neonatal outcome.

Results and Discussion: During the period of the study 3682 births occurred. Only 30 women received rIVPCA and 87% of them (n=26) answered the interview. The mean age was 31.5±3.4, most had concluded high school or had a graduation and 54% were nulliparous. Most had a spontaneous delivery (65%), in 19% was instrumental and 15% ended in caesarean section. The main reason for the choice of this type of analgesia was bleeding disorders (42%). In terms of the overall satisfaction, 4% were very satisfied, 34% satisfied, 19% neutral, 31% dissatisfied and 12% very dissatisfied. The pain relief was good for 8%, moderate for 38%, poor for 23% and very poor for 31%. Fifteen women (58%) would like to repeat this analgesic option. Twelve women had tried epidural analgesia before and 10 of them preferred this analgesia. Side effects occurred in 16 women (62%) with sedation being the most common (46%), followed by dizziness (19%) and nausea (12%). The median Apgar score was 9/10/10. We did not find any association with maternal variables and satisfaction or pain relief scores.

Conclusion: Our study shows that rIVPCA provides modest scores of satisfaction and pain relief with frequent side effects but normal neonatal outcome. More research and possibly more satisfactory analgesic options in alternative to epidural analgesia are needed.

## 04AP10-3

# Patient controlled analgesia with remifentanil versus intermittent epidural boluses for labor analgesia

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**Background and Goal of Study**: Remifentanil is becoming more and more popular for labor analgesia as an alternative for neuroaxial anesthesia. In this study we compare pain scores, patient satisfaction and respiratory side effects between two different types of labor analgesia.

Materials and Methods: 90 patients ASA I or II, primiparous, at term were included in the study and divided in two groups. First group, remifentanil group, RG (45 patients) received intravenous remifentanil on patient control pump in bolus doses. Second group, epidural group, EG (45 patients) received intermittent epidural boluses. We analyzed patient pain scores and satisfaction scores through 2 VAS scales in different time points during labor analgesia. We also measured oxygen saturation (SpO2) and respiration rate continuously.

**Results and Discussion**: Remifentanil was inferior to epidural analgesia with respect to pain scores at all time points, mean values of the VAS pain scores after onset of analgesia in the remifentanil group were  $46.44\pm8.5$ , while in the epidural group they were  $28.33\pm11.8$  (p<0.0001). Satisfaction scores were all the time almost the same in both groups, mean VAS satisfaction scores in the RG were  $93.41\pm9.1$  and in the EG  $94.01\pm9.5$ , with no statistically significant difference in both groups (p = 0.688). Results are presenting significantly lower SpO2 in the RG and significantly more respirations per minute in the EG in all time points after the start of analgesia. Mean SpO2 was  $96.95\pm1.4$  in the RG and  $98.22\pm0.6$  in the EG with statistically significant difference of p<0.00001 and the average number of respirations was  $18.67\pm0.9$  in the RG  $20.85\pm1.4$  in the EG (p<0.0001).

**Conclusion**: Intravenous remifentanil provides satisfactory level of labor analgesia, with lower SpO2 and respiratory rate. It could be an excellent alternative to epidural analgesia but continuous monitoring and oxygen supply is mandatory.

#### 04AP10-4

# Evaluating satisfaction with remifentanil intravenous patient-controlled analgesia with a original Portuguese validated scale

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Background and Goal of Study: Remifentanil intravenous patient-controlled analgesia (RIVPCA) is used as an alternative to neuraxial analgesia when this is contraindicated, unavailable, or not preferred by patient. This study pretends to evaluate pregnant women satisfaction with RIVPCA in labour pain, using the "Experience and Satisfaction with Childbirth Questionnaire" (QESP).

Materials and Methods: QESP is a Portuguese validated instrument with 104 questions organized in 4 domains: experience, satisfaction and expectations (4 point Likert scale) and pain related to labour and immediate postpartum (Likert type scale range from 0 to 10). All women delivering live births and receiving remifentanil IVPCA between January 2016 and June 2017 were included and contacted by telephone and requested to answer that questionnaire.

Results and Discussion: For 50% of interviewed women labour and delivery were better than their expectations, for 31% were worse and for 19% were much worse. However when asked about expectations with the pain felt on those moments, 46% answered that labour and delivery pain was worse than they expected and only 23% said it was better. The majority remember delivery and labour as a little painful and they were a little satisfied. The medians of the average and maximum intensity of pain felt on labour were 8 and 10, and 6 and 9 on delivery, respectively.

**Conclusion**: QESP is an interesting tool to use to evaluate satisfaction with different types of labour analgesia. Our study shows that most women using remifentanil IVPCA are a little satisfied with the pain felt and the childbirth experience was better than they expected.

#### 04AP10-5

# Nitrous oxide as a bridge to epidural labor analgesia in a patient with cerebral palsy

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**Background**: Pain relief during labor has significant impact on the experience and perception of the birth moment. The 50/50 blend of oxygen and nitrous oxide ( $O_2/N_2O$ ) has long been used to control labor pain, today reaching rates of use as great as 70% in some countries.<sup>1-3</sup>

Case Report: This case describes a 29-year-old full term pregnant woman, diagnosed with dyskinetic cerebral palsy, with neurosensory deafness and cognitive impairment. Brief communication was possible. She arrived in the maternity in active labor, showing intense agitation and involuntary arm and back movements. The analgesic options were explained and she consented the use of N<sub>2</sub>O and concomitant epidural analgesia. She was positioned lateral decubitus and monitored. The 50/50 blend of O<sub>2</sub>/N<sub>2</sub>O was instituted with a face mask, while a lumbar epidural catheter was placed. She was instructed how to operate with the facial mask and keep the position. The epidural catheter was placed without complications and pain relief was achieved with Ropivacaine and Sufentanil. O<sub>2</sub>/N<sub>2</sub>O mask was withheld after the procedure.

**Discussion**: Although less efficient than epidural analgesia in pain control, N<sub>2</sub>O has intense analgesic and anxiolytic properties, showing a good safety profile, which makes it a very good agent to control labor pain or as a bridge drug to help positioning for an epidural catheter placement.<sup>3</sup> The pain and anxiety control introduced by N<sub>2</sub>O facilitates correct and stable positioning, valuable factors that improve the success of any epidural technique, specially in situations where unintended movement can compromise safety and produce associated complications.

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**Learning points:** N<sub>2</sub>O has important analgesic and anxiolytic properties, which makes it an interesting drug to use as a bridge to more efficient forms of labor pain control. Future studies should be done to test if the association of an inhaled analgesic technique during the epidural catheter placement leads to significant reduction in the complication rates (p. ex. accidental dural puncture) in agitated patients, or potentiates maternal satisfaction with the procedure.

# 04AP10-6

# Pain management in dystocic deliveries: a pending topic

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Background and Goal of Study: Inappropriate management of pain in the immediate postpartum period could affect the wellbeing of the mother and the newborn. Usually, in women with dystocic delivery, conventional analgesia with non-steroidal anti-inflammatory drugs and paracetamol is not enough. In our center, we use in these patients a system of non-electronic continuous endovenous infusion of analgesia, which allows prefixing of the hourly infusion rate (elastomeric pumps). The aim of the study is to evaluate pain registration in post-partum period and to assess the efficacy of analgesia with elastomeric pumps in dystocic deliveries (forceps or spatulas).

Materials and Methods: A retrospective analysis in women with dystocic deliveries during a period of 6 months was performed. Data collected: type of analgesia (elastomeric pump versus conventional analgesia), pain evaluated with visual analog scale (VAS, 0-10) in the first 48h; and need of analgesic top-ups. To analyse the results, SPSS version 23 was used.

Results and Discussion: 53 women, mean age 33.77 years, were analysed from 1 June until 31 December 2016. 44 were nulliparous. Forceps was performed in 86.79% of births and spatulas in the rest. 44% of women received analgesia through elastomeric pump with tramadol and dexketoprophen. The rest received conventional analgesia with paracetamol 1gr altern with desketoprophen. Pain was registered in 22.64% of cases immediately after delivery, and in 72% of cases during the first 48h afterwards, at the conventional hospital ward. No statistically significant differences were seen between women treated with conventional analgesia vs. those with elastomeric pump (60.71% vs. 54.54%, p>0.05). 82.35% of the women with conventional analgesia asked for extra analgesia compared to 66.66% of those with elastomeric pumps (p = 0.028).

Conclusions: Pain registration is very poor after deliveries. It is crucial for hospitals to improve the culture of avoiding pain in these patients. Pain management after dystocic deliveries with elastomeric pumps seems to be useful. There is less need of extra analgesia in women treated with them. Further studies are needed to confirm these data

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### 04AP10-7

# Neuraxial labor analgesia is associated with decreased risk of postpartum depression: a multi-center, prospective cohort study

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Background and Goal of Study: Postpartum depression is a common psychiatric disorder in women after delivery. Severe labor pain was reported to be associated with the development of postpartum depression. In this study, we investigated whether neuraxial labor analgesia could decrease the risk of postpartum depression. Materials and Methods: 577 nulliparous women who planned to deliver vaginally were enrolled in this multicenter, prospective, observational cohort study. Epidural or combined spinal epidural analgesia was performed in 417 parturients based on their requests, and no analgesics were administered in the other 160 parturients. Data collection including depression assessment with Edinburgh postnatal depression scale (EPDS) was performed before delivery, 1 day and 6 weeks after delivery. A score of ≥ 10 on the EPDS at 6 weeks was defined as postpartum depression. Multivariate logistic regression model was used to assess the association between use of neuraxial labor analgesia and the incidence of postpartum depression.

Results and Discussion: Postpartum depression occurred in 14.9% (62 of 417) of parturients who received neuraxial labor analgesia and in 23.8% (38 of 160) of those who did not (P=0.012). Multivariate logistic regression analysis showed that neuraxial labor analgesia was independently associated with a decreased risk of postpartum depression (OR 0.52, 95% CI 0.30-0.88, p=0.015). A high marital satisfaction scale score before delivery (OR 0.88, 95%CI 0.81-0.96, p=0.003) and exclusive breast-feeding at 6 weeks after delivery (OR 0.48, 95%CI 0.29-0.82, p=0.007) were also associated with decreased risks of postpartum depression whereas a high EPDS score before delivery (OR 1.62, 95%CI 1.44-1.82, p<0.001) newborns readmission to hospital within 42 days postpartum (OR 12.36, 95%CI 2.57-59.33, p=0.002) and the existence of persist pain at 42 days after delivery (OR 1.87, 95% CI 1.07-3.27, p=0.028) were associated with increased risk of postpartum depression. Our results demonstrated that neuraxial labor analgesia may reduce the incidence of postpartum depression. Considering the high incidence and harmful effects of postpartum depression, neuraxial labor analgesia should be highly recommended.

**Conclusion**: Use of neuraxial analgesia during labor was associated with a decreased risk of postpartum depression. Further study is needed to evaluate the impact of neuraxial labor analgesia on long-term outcomes of women and children.

# 04AP10-8

# Labour analgesia:One year of retrospective analysis

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Background and Goal of Study: Labour may be the most painful experience many women experience. Pain relief during labour is a crucial aspect of maternal health. Various techniques both regional and non-regional are available to provide labour analgesia. The choice of analgesic technique depend on the medical status of the patient, anaesthetic and obstetric risk factors, patient preferences, progress of labour and resources at the facility. Neuroaxial analgesia techniques are the gold standard for pain relief during labour and delivery. The objective of this retrospective study is to determine which analgesic labour techniques were employed during 2016, in our institution.

Materials and Methods: After ethical committee approval, the clinical medical records of all women with vaginal delivery (n=1527) from the 1st of January to 31st of December 2016, were analysed and the following data was collected: American Society of Anaesthesiologists (ASA) physical status, age, analgesic technique and reason for non-regional analgesia.

Results and Discussion: In 2016 there were a total of 1960 births, 1527 were vaginal deliveries. Pregnant median age was 31.87+/-5.6. Regarding ASA physical status classification, 79.5% were ASA II and 20.5% ASA III. In 77%(n=1176) of pregnant, regional analgesia (epidural or spinal analgesia) was performed and in 23%(n=351) weren't used regional techniques. Regarding systemic analgesia, Patient Controlled Analgesia with remifentanil was used in 0.33%(n=5) of women. Systemic analgesia was used in those cases in which neuroaxial analgesia is contraindicated, like some situations of coagulopathy and patient refusal. Among the reasons that prevented the use of regional analgesia techniques were, insufficient time due to second stage of labour in 72.6%(n=255), suspicion of chorioamnionitis in 12,2%(n=43), maternal refusal in 11.9%(n=42), thrombocytopenia/coagulopathy in 2.8%(n=10) and in 0.57%(n=1) the presence of lower back tattoo.The main reason not to perform regional analgesia were lack of time due to advanced labour.

A minority of pregnant women have not undergone any analgesic procedure. While remifentanil is a feasible alternative for patients who cannot or do not want to receive epidural analgesia, administration should be monitored closely for potential adverse effects.

Conclusion: In our institution, neuroaxial analgesia are the most frequently employed method for labour analgesia, which is according to the state of art.

### 04AP10-9

# Maternal satisfaction with the epidural analgesia for labor and with the information received about it

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**Background goal of study:** Patient satisfaction" is a multidimensional concept that includes the doctor-patient communication, the attitude of the professional, their technical competence or the affective aspect. Reaching patient expectations was essential for good satisfaction.

The objective of our study was to determine the maternal satisfaction with the epidural analgesia for labor, and to assess if the information received about epidural in the hospital influenced the satisfaction.

Materials and methods: Observational, descriptive study done with a survey, following a validated model (SERVQHOS), in a Spanish tertiary hospital. During a month, 135 questionnaires were answered, 68 patients who had come in the third quarter to the informative talks about epidural analgesia given by the Anesthesia Service, and 67 patients did not. Chi-square tests and Fisher's exact test were used Results and discussion: Overall satisfaction was very high in our simple. 95.5% of patients would recommend the technique in our center and 97% would request it in another pregnancy.100% of the women who came to receive the information to the hospital would recommend the talk, and these were valued by 82.3% with a grade equal to or greater than 8(0-10). At 83.1% of those who did not go to the hospital would have liked to attend. However, there weren't differences in overall satisfaction (91.2% vs 92.5%), neither at the time of recommending (97% vs 94%), or re-using epidural analgesia (97% in both groups), among the patients who attended the informative talks and those who did not.

The variables that most affected the overall satisfaction were related to the outcome of epidural analgesia, so that patients in whom pain relief was better than expected showed greater satisfaction compared to those who did not meet their expectations and assessed the pain control worse than expected:

-Pain control:99% satisfaction vs 64% respectively, p<0.001.

-The time that passed since the epidural was administered until the pain was relieved:99% vs 71.4%, p<0.001.

Conclusions: The level of overall satisfaction of our patients with the epidural analgesia process was very high, corroborated by the high percentage of women who would recommend the technique in our hospital and who would use it again. Although we consider that information on epidural analgesia did not influence the overall satisfaction. The poor control of pain after the establishment of epidural analgesia was decisive in the low satisfaction.

#### 04AP10-10

# Bilateral subdural hematoma secondary to accidental dural puncture with epidural catheter during labor

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**Background**: Subdural hematoma (SDH) after labor epidural analgesia is a rare complication.

Case Report: A healthy 38-year-old woman was admitted to hospital due to labor pain. Combined spinal-epidural analgesia was performed. Two ml of levobupivacaine 0,125% and 10 ugr of fentanyl were administrated in the intrathecal space. Afterwards the catheter was introduced on epidural space and during aspiration cerebrospinal fluid was objectified. Another attempt was perform with the same complication. Subsequently the catheter was revised and changed. Preventive treatment for post-dural puncture headache (PDPH) was administrated.

Preventive treatment for post-dural puncture headache (PDPH) was administrated. Day 2 the patient developed PDPH and an epidural blood patch (EBP) was performed. Initially the patient reported improvement in headache but 24 hours after EBP she showed biparietal headache. Due to lack of clinical improvement a brain nuclear magnetic resonance (MRI) was performed, which showed bilateral intracranial subdural hematoma (SDH).

The patient is then transfer to a third level Hospital and non-surgical treatment was started. Control cranial CT showed improvement of lesions. She was discharged home with oral treatment

**Discussion**: PDPH is a frequent complication after neuroaxial anesthesia, is characterized by its postural character. The SDH is a rare but potentially fatal complication of dural puncture, the literature collects isolated cases and the estimated prevalence is up to 1/500000 (1,2) A recent case series study reports a higher incidence of SDH up to 1/3900 and even 1/87 if it is a recognized dural puncture (1) For that, we think that it is important to report all cases of SDH.

If there is a headache that does not respond to usual treatment for PDPH, which

loses its postural character, which worsens after the completion of an EBP an intracranial complication should be suspected and a neuroradiology study should be performed

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**Learning points**: SDH is a rare complication but potentially more common that historically estimated (1)

An early diagnosis may allow medical treatment and avoid surgical evacuation.

# 04AP11-1

# Parturients with more central sensitization may have increased risk of postnatal depression: a preliminary analysis

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Background and Goal of Study: Central sensitization (CS) refers to abnormal and intense enhancement of pain in response to both noxious and non-noxious stimuli by mechanisms in the central nervous system¹. CS has been associated with the development of depression in general population². However, their relationship in women experiencing labour remains unclear. Severe labour pain predisposed women to increased risk of postnatal depression (PND). CS disrupts both ascending and descending pain regulation pathways, and may contribute to PND by exacerbating labour pain. We therefore propose to examine if there was a correlation between CS and PND in the parturient population.

Materials and Methods: This pilot analysis is part of an ongoing clinical trial recruiting healthy, term, singleton parturients. The Central Sensitization Inventory (CSI) was administered upon recruitment till 5 days after delivery. The Edinburgh Postnatal Depression Scale (EPDS) was administered via phone or online survey at 6 to 10 weeks post-delivery. Data from the first 50 patients was analyzed using Spearman Correlational analysis. Linear regression analysis was also performed to predict postnatal EPDS total scores based on CSI total scores.

**Results and Discussion**: A moderate correlation was found between the total scores of CSI and EPDS (R=0.51). Linear regression analysis revealed that EPDS total score increased by 1.42 (95% CI: 0.737 – 2.103) for every increase in CSI total score of 1 (p<0.001).

Conclusion: Parturients with features of central sensitization may be at risk of developing postnatal depression. Larger studies are needed to examine the strength of this association after adjusting for other risk factors associated with postnatal depression. Clinical practice may be directed towards modulating central sensitization in high-risk individuals to curtail the incidence of postnatal depression if the strength of this association can be validated.

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# 04AP11-2

# Influence of anaesthetic agents on contractions of the pregnant rat myometrium in vivo

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Background and Goal of Study: Propofol is used after extraction of the fetus in pregnant women who have received combined spinal-epidural anaesthesia for caesarean section. In previous studies, it was shown that propofol has an inhibitory effect on uterine contraction like volatile anaesthesia1,2). On the other hand, it has been shown that dexmedetomidine is an  $\alpha 2$ -adrenergic agonist that induces uterine contraction via a pathway involving G protein 3. However, there are no data on a comparison of the effects of propofol, sevoflurane and dexmedetomidine on contractions of a pregnant rat myometrium *in vivo*. The aim of this study was to determine the effects of anaesthetic agents on contractions of the pregnant rat myometrium.

**Materials and Methods**: With institutional approval, pregnant rats were anaesthetized and fetuses were removed. A balloon was inserted into the uterus to measure contractions of the myometrium. Uterus muscular contractions of the pregnant rats that were sedated with propofol (30 mg/kg/hr, 150 mg/kg/hr), dexmedetomidine (6 mcg/kg/hr, 30 mcg/kg/hr) or sevoflurane (2%, 5%) were measured. Statistical analysis was performed using the unpaired t-test. P values < 0.05 were considered statistically significant.

**Results and Discussion**: Dexmedetomidine significantly augmented contractions of the pregnant rat myometrium. However, there were not significant difference in myomertium contractions in rats sedated with propofol or sevoflurane (figure).

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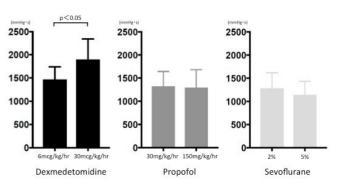


Figure. Influence of anaesthetic agents on contractions of pregnant rat myometrium.(n=8)

**Conclusion**: Dexmedetomidine may be preferable for maintaining uterine contractions in caesarean section.

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#### 04AP11-3

## Detection of atelectasis with lung ultrasonography in parturients having normal labour and cesarean section under spinal or general anesthesia

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**Background and Goal of Study**: Changes in respiratory system functions in pregnancy can increase the risk of atelectasis and type of anesthesia is of importance (1). In our study, we aimed to determine the development of atelectasis using transthoracic lung ultrasonography (US) in patients planned for cesarean section (CS) either under spinal or general anesthesia, comparing them with a normal delivery group.

Materials and Methods: Forty-eight 18-40 years old parturients with the ASA II-III group, who underwent informed written and verbal consent for elective CS at the Obstetrics and Gynecology Clinic, were included in the study. Our study had 3 groups: spinal anesthesia in Group S (n=23) and general anesthesia in Group G (n=25) patients had CS, and Group N patients preferred normal vaginal delivery without any labor analgesia. Standart ASA guided monitoring was applied to each patient. Hemodynamic parameters, block level, operative time, visual analog scale pain values were recorded at regular intervals. Transthoracic pulmonary US examination was performed pre- and postpartum. According to USG protocol, 4 images for each of the three thoracic walls' (anterior, sides and posterior) were recorded as totally 12 images per US examination. Images were evaluated by two physicians experienced in transthoracic lung US and the lung ultrasound (LUS) scored between 0 (no atelectasis) and 36 (total atelectasis) and recorded as LUS1 (preoperative) and LUS2 (postoperative) values (2).

Results and Discussion: There was no difference between groups in terms of demographic data except age and VAS values. It was observed that LUS2 score increased in general anesthesia group (3.7±3.5) while LUS2 score decreased in spinal anesthesia (1.9±2.2) and normal delivery (1.2±1.4) group (Figure 1). There was a difference between groups in terms of LUS2 caused by the difference between Group N and other groups (p=0.006).

Conclusion: General anesthesia increases the incidence of postoperative atelectasis in parturients having CS. Early detection of atelectasis may reduce the risk of developing postoperative pulmonary complications, especially in patients with high risk. Lung ultrasonography is a method that can be repeated when necessary and can be available faster than other radiological methods without causing any radiation while it can be easily applied at the bedside, as well.

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#### 04AP11-4

# Foetal accumulation of oxymorphone after oxycodone administration to the ewe

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Background and Goal of Study: Oxycodone is a highly effective mu-opioid agonist for managing moderate to severe visceral pain. Opioid use during pregnancy and labour is a concern because opioids pass freely through the placenta<sup>1</sup>, and may compromise newborn's adaptation. In this experimental pregnant sheep model, we have evaluated foetal exposure to oxycodone and its major metabolites.

Materials and Methods: Ten ewes in late pregnancy received oxycodone 0.5 mg·kg-¹ either intravenously (i.v., n=5) or epidurally (n=5). A laparotomy was performed to the ewes for placement of catheters into foetal superior vena cava and carotid artery. Two parallel maternal and foetal blood samples were taken for oxycodone and its metabolites assay.

**Results and Discussion**: Blood samples were obtained at 1-2.5 h after oxycodone bolus. No accumulation of oxycodone was noticed; after i.v. administration the median (minimum-maximum) foetal-to-maternal-ratio (*F/M*-ratio) was 1.01 (0.77-1.95) and that after epidural administration 0.64 (0.47-1.04), respectively. However, the foetal plasma oxymorphone concentrations were significant; *F/M*-ratios were between 1.3 and 3.5 in the i.v.-group, and between 0.86 and 3.0 in the epidural-group. The plasma concentrations of noroxycodone and noroxymorphone were low. **Conclusion**: Surprisingly, oxymorphone accumulation to the foetus was observed after a single bolus oxycodone administration to the ewe. Further studies are required to evaluate the foetal safety after maternal oxycodone administration in humans.

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# 04AP11-5

# Retrospective evaluation of trigger criteria of rapid response system in an obstetric ward

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Background and Goal of Study: A rapid response system (RRS) triggered by single parameter criteria has been introduced in our hospital since 2015 with the aim of early identification of patient deterioration. Although the criteria is designed for non-obstetric hospitalized patients, the RRS concept can be applied to inpatient obstetric care. We evaluated the usefulness of the trigger criteria in correlation with obstetric morbidity by measuring its sensitivity, specificity, and predictive values.

Materials and Methods: We reviewed medical records of women who admitted to maternal and fetal intensive care unit (MFICU) in Kitasato university hospital between January and December 2015. Based on recorded physiological parameters, we investigated all cases whether they met the trigger criteria of Kitasato rapid response system (KRRS). Obstetric morbidity was defined as below; severe hypertensive disorder in pregnancy (HDP), eclampsia, obstetric hemorrhage, sepsis, pulmonary edema, shock, diabetic ketoacidosis, intracranial hemorrhage, asthma, epilepsy. Sensitivity, specificity, positive predictive value, and negative predictive value of KRRS were calculated.

Results and Discussion: Out of 377 patients who admitted to MFICU over the study period, 69 (18%) met the criteria of obstetric morbidity. KRRT criteria for detecting obstetric morbidity was found to be 47% sensitive, 77% specific and had a positive and negative predictive value of 27% and 87% respectively. Out of 34 patients who had morbidity but did not trigger on KRRS criteria, 26 cases were diagnosed HDP. Sensitivity of the criteria was 47% which is lower than previously reported sensitivity of modified obstetric early warning system (1). The study showed the trigger criteria could not detect obstetric specific conditions, which presented a beneficial information for encouraging to trigger RRS. Obstetricians used to deal with obstetric conditions but not with systematic severe conditions, vice versa in intensivists. Since RRS has focused on early prediction of critical conditions of hospitalized patients, the result suggested that the criteria can promptly trigger RRS among obstetric patients.

Conclusion: This study showed that RRS trigger criteria designed for non-obstetric patients can be useful for obstetric patients.

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#### 04AP11-6

# Maternal anesthesia for open fetal surgery: a report of 16 cases and 10-year experience

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Background and Goal of Study: Fetal surgery is performed in the latter part of the second timester or early in the third trimester. Anesthetic management for open fetal procedures and ex utero intrapartum therapy (EXIT) is typically performed under general anesthesia. Uterine relaxation is essential, but it may cause hypotension, which may be detrimental to both mother and fetus. Many of these therapeutic tenets have not been supported by data.

Material and Methods: We present data focused on the anesthetic management and outcomes of 16 patients undergoing either EXIT procedures (14 cases) or open fetal repair of myelomeningocele (2 cases). Data were recorded between 2006 and 2016. Medical records were reviewed.

Results and Discussion: General anesthesia with inhalation agents (IA) at 2CAM was most commonly used. Invasive blood pressure monitoring was used in all cases, and since 2013, non-invasive cardiac output (CO) monitoring (NICOM system or CLEARSIGHT®) was included. These latter results are shown in table 1. Fetal perfussion was maintained via high maternal blood pressure and CO, ensuring adequate blood flow from the placenta to the fetus. Anesthesia was manitained with IA±TIVA. High levels of volatile anesthetics were used for uterine relaxation, together with NTG perfusion and tocolytic agents. In only one case supplementary use of uterotonic agents due to uterine atony was neede. Uterine artery pH levels remained between 7.02 and 7.22.

Diagnostic	Gestational age (weeks)	Anesthesia	Length of Surgery (min)	Vasoactive Drugs	Compli- cations	Blood loss	UA pH	
Cervical teratoma	34.8	IA at 2CAM + TIVA + epidural	16	NTG bolus	hypoten- sion	-	7.16	
Myelome- ningocele	23.6	IA at 2CAM	73	No	-	-	-	
Laryngeal atresia	34.2	IA at 2CAM + TIVA	30	NTG perfus- sion	-	-	7.22	
Giant neck mass	33.4	IA at 2CAM + TIVA	15	NTG perfus- sion	hypoten- sion	700cc	7.02	
Myelome- ningocele	25	IA	90	NTG perfus- sion	-	-	-	
Neck mass	38	IA at 1.5CAM	15	NTG perfus- sion	-	600cc	7.19	

**Conclusion**: Noninvasive CO monitoring provides valuable information on arterial and venous circulation parameters, allowing for accurate management during invasive fetal surgery. Hemodynamic stability is essential in this setting.

#### 04AP11-7

# Incidence and safety of general anaesthetics on a high-risk labour ward

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**Background**: There is overwhelming evidence that regional anaesthesia (RA) is safer than general anesthesia (GA) for a caesarean section (CS)¹ with the added advantage that the mother can be awake for the birth of her child. RA delivered either by a spinal or top-up epidural technique has significant failure rates leading to conversion to a GA before surgery or during the surgery. This audit attempts to determine the incidences of GA procedures performed on labour ward, particularly CS, and how safe they are for the mother.

Methods: All procedures requiring a GA on labour ward at Queen Charlotte's and Chelsea hospital (Du Crane Road, London, UK), a specialist high risk maternity hospital, were audited over a 2 year period (1st December 2015 to 1st December 2017) using a proforma completed by the anaesthetic staff retrospectively. Time/ date; grade of most senior obstetrician/anaesthetist present; indication for the procedure; whether RA had been attempted; whether it was a primary GA or a RA to GA conversion; reason for GA conversion; whether there were any critical incidences (CI) were collected for each GA procedure.

**Results:** 110 GA procedures were performed during this time frame. 86% (n=95) were CS, 41% (n=45) were category 1 CS. Mean rate of GA elective CS was 2% per month and 5% per month for all emergency CS (category 1/2). 54% (n=60) of procedures were performed out of hours (0800-1700). 40% (n=44) of cases had both consultant anaesthetist and obstetrician presence. 58% (n=64) were primary GA with the rest being

RA to GA conversions. Most common reason for conversion was intraoperative pain (57%, n=26). CI occurred in 21% (n=224) of cases, with majority occurring during category 1 CS. 71% (n=17) of these cases had consultant anaesthetist present. There were no maternal deaths. 90% (n = 26) of primary RA category 1 CS achieved <30 minutes DDI compared to 57% (n =8) for RA conversions.

Conclusion(s): Rates of RA to GA conversion as set by the Royal College of Anaesthetists (RCOA) were met and is reassuring of best practice carried out at QCH. CI during these GA procedures performed were far less common in elective CS performed at QCH and had at least one consultant anaesthetist present in the majority of cases. Intraoperative pain requiring GA conversion will need further investigating to highlight any areas of practice can improve on to lower the number. References:

The National Sentinel Caesarean Section report. RCOG, London. May 2001

#### 04AP11-8

# Body habitus as a predictive factor of difficult epidural block in parturients?

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Background and Goal of Study: Epidural anaesthesia is being increasingly used to provide anaesthesia for labor pain. We often presuppose that obesity will increase neuraxial technique difficulty. With the current prevalence of obesity in parturients in spanish maternity units, we performed a prospective, observational study to establish the effect of the body habitus as a predictive factor for difficult epidural block.

Materials and Methods: We present a prospective and observational study in term pregnant women. We collected the following patient data: age, body mass index (BMI; weight/height squared, kg/m2) and spinal anatomy (normal or deformed, subjectively from inspection and palpation). Patients were clasified into normal body habitus if BMI≤29.9 or obese if BMI≥30. The technique was done by anaesthesiology residents with prior experience of at least 120 epidural blocks. Difficult epidural block was considered if placement of the catheter requires more than a puncture in the skin or one puncture on the skin, but more than a change of direction of the needle in the interspinous space. The technique is considered adequate if after 20 minutes of the initial dose the patient reported visual analogic scale of pain ≤3 than before. We also recorded numbers of complications.

Results and Discussion: We collected data from 120 patients, ASA I-II. Ages ranged from 15 to 41 years old, BMI was medium  $32 \pm 3.44$ . Were obese 60% of patients (72 cases). Most epidural catheters were successfully placed at the first attemp being difficult to puncture under the criteria of the study in 36.67%, in this cases only 40% had BMI≥30. We found an incidence of 50% difficult puncture in patients with BMI ≥ 30. The incidence of epidural re-punction was 6 cases (5%), 4 of these were obese patients. Spinal anatomy had effect on the number of attempts, in deformed spinal anatomy the incidence of difficult punction was 33.3%.

Conclusion: Our data collection procedures in 120 obstetric patients in labor concluded that body habitus had no significant effect as a predictive factor for difficult epidural block in the obstetric patient. Some obese patients have surprisingly easy neuraxial block placements. The most reliable method to determine in advance the possibility of a technical difficulty for epidural block in the obstetric patient is an examination of the patient's back to identify the quality of anatomical landmarks and obvious deformity of the spine.

### 04AP11-9

# Epidural analgesia: a randomized clinical trial comparing loss of resistance to saline versus low volume of air

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Background and Goal of Study: Neuraxial analgesia depends on the correct placement of the needle. Optimal technique for localizing the epidural space has not been described, so anesthesiologists usually choose whether to use air or saline for loss of resistance based on personal experience. This study compares loss of resistance of the epidural space using air and saline  $\leq 3$  mL.

Materials and Methods: This randomized clinical trial included pregnant to term women between the ages of 18 and 40. Patients were assigned to the groups of loss of resistance with either air or saline in a 1:1 proportion. Items evaluated were the correct placement of the catheter, pain control, maternal satisfaction, block characteristics and adverse effects.

Results and Discussion: 208 patients were included. No statistically significant differences were found regarding successful identification of the epidural space (p=0.56). Pain control, maternal satisfaction, block characteristics and incidence of adverse effects were similar for both groups. Time to insertion of the epidural catheter was not taken into account, which may have affected the results; because

a long procedure may influence the quality of analgesia and patient satisfaction.

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**Table 1.** Analogue verbal scale (VAS) for maternal satisfaction at the time of the epidural and 1 hour after the block.

Group	Baseline VAS	VAS (	p value	
	-	< 8	≥ 8	_
Λ:-				0.83
Air (n=91)	< 8	1	0	
(11-91)	≥ 8	0	90	
Saline				0.75
(n=93)	< 8	2	0	
(11-95)	≥ 8	0	93	

**Conclusion**: No statistically significant differences were found regarding pain and obstetric outcomes. Neither technique showed an increased occurrence of complications.

### 04AP11-10

# Feasibility study: non-invasive hemodynamic monitoring during cesarean section and intraoperative fluidic management

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Background and Goal of Study: Maternal and neonatal outcome secondary to caesarean section surgery improved thanks to the evolution of surgical/anaesthetic techniques. Anaesthetic management aims to eliminate the algic stimulus and to reduce hemodynamic alterations linked to blood loss, caval compression and the vasodilatation(loco-regional anesthesia, ALR). The approaches to ALR-induced hypotension are defined as PRELOAD(fluid load carried out before anesthesia) and COLOAD(fluid load given during the execution of anesthesia), with no general standardization. This observational study aimed to evaluate the use of non-invasive hemodynamic monitoring in comparing the 2 approaches in patients undergoing a caesarean section under subarachnoid anesthesia.

Materials and Methods: Pregnant patients (18-40 years), single fetus, gestational age> 36 w, ASA I, ordinary hospitalization were included. Two groups were identified depending on the choice of the present anesthesiologist. PRELOAD: pre-intervention 1 L of balanced solution, followed by 500 mL during the surgery; COLOAD:500 mL of balanced solution started during ALR execution. Monitoring: usual + Clear-sight probe (EV1000-Edwards Lifescience). Precise waypoints were identified: baseline, fluid-load, ALR, incision, fetal extraction, afterbirth.

# Results and Discussion:

18 patients. The two groups showed no significant differences in height, weight, ASA, comorbidity, home therapy, gestational week and CS indication. The characteristics of ALR was found to be superimposable in the 2 groups.Blood losses were not significantly different, as were the outcome of newborns (APGAR at I and V minute, umbilical blood gas values, weight in I and III day). The haemodynamic variables showed considerable inter-individual variability over time, but were not significantly different between the 2 groups, in relation to the received fluid load.

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	Gruppo	То	Tı	T2	Т3	T4	Tş	T6	ANOVA Within group	ANOVA Among groups
HR,	COLOAD	88.4±11.6	88.4 ±11.6	89.8±13.0	99.5±14.5	95.7 ±16.6	98.6±27.5	100.9±26.3	p<0.05	NS
beats/min	PRELOAD	84-3 ±12.2	92.0 ±13.6	93.0±11.8	97.0±21.8	102.4 ±17.7	914±114	89.0±13.6	p<0.05	N3
co,	COLOAD	8.7±1.0	8.7±1.0	8.4±1.4	9.0±0.7	8.2±1.1	10.0±3.2	10.5±2.7	p < 0.05	N5
L/min	PRELOAD	7.6±1.8	8.7±2.5	8.7±1.7	8.1±2.6	7.5±2.6	8.6±2.6	8.8±2.5	p < 0.05	
CI, L/min.m²	COLOAD	4.7 ± 0.6	4.7±0.6	4-5±0.7	4.8±0.5	4.4±0.6	5.3±1.7	5.6±1.4	p < 0.05	NS
	PRELOAD	4.3±1.2	4.9±1.4	4.9±0.9	4.6±1.7	4.2±1.7	4.8±1.4	5.0±1.5	p < 0.05	
SV, mL/beat	COLOAD	98.2±6.0	98.2±6.0	93.7±10.5	91.7±6.6	88.4±18.3	100.1±16.0	105.3±12.9	p<0.05	NS
	PRELOAD	94±14.4	97 ±14.2	95.1±9.5	88.5±22.0	74.6±15.0	89.7±19.1	99.1±18.9	p<0.05	
SVI.	COLOAD	52.5±1.8	52.5±1.8	50.2±5.8	49-3±5-4	47.2 ±9.5	53.6±8.9	56.3±6.0	p < 0.05	
mL/beat/m²	PRELOAD	52.5±9.1	54.1±8.2	53.1±5.9	50.1±15.0	42.0±10.2	50.5±13.0	55.5±12.1	p<0.05	NS
SVV,	COLOAD	13.3±3.5	13.3±3.5	13.3±3.8	12.1±3.1	13.2±7.0	12.7±5.1	11.1±4.6	N5	NS
56	PRELOAD	14.5±5.1	11.4±4.3	14.0±6.0	12.9±6.6	12.1±5.5	11.0±2.8	9.1±3.2	NS	CN
SAP, mmHg	COLOAD	134-5±21-3	134-5±21-3	141.0±27.4	130.5±25.1	120.2 ±26.6	133.5±24.5	124.4±23.1	p < 0.05	NS
SAP, mmng	PRELOAD	122.5±12.3	127.5±13.5	132.7±12.3	114.4±29.4	104.7±23.1	117.1±28.2	120.± 22.7	p<0.05	NO.
242	COLOAD	79.3±12.1	79.3±12.1	84.7±12.9	79.5±11.6	71.8±12.0	79.3±11.3	72.0±12.2	p < 0.05	N.
DAP, mmHg	PRELOAD	74.2±11.8	75.5±5.9	80.2±8.9	66.5±18.4	63.2±15.1	68.9±18.0	68.2±14.4	p < 0.05	NS
MAP, mmHg	COLOAD	101.5±16.1	101.5±16.1	106.6±18.9	98.4±17.2	89.5±18.9	102.0±18.2	93.7±17.1	p<0.05	NS
	PRELOAD	93.6±13.0	96.1±9.5	101.6±10.8	83.0±32.1	76.4±18.9	87.4±22.7	87.7±18.8	p < 0.05	

**Conclusion**: The use of a completely non-invasive hemodynamic monitoring was proven feasible, reliable and well tolerated. Different fluid regimens do not significantly modify pregnant woman's haemodynamics, nor the newborn's conditions. The volume given before ALR may result ineffective (redistribution).

# Paediatric Anaesthesiology

#### 05AP01-1

# Can it be better? EMLA before peripheral venous cannulation of children

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Background and Goal of Study: The introduction of i.v. cannula is one of most stressful situations during hospitalization of children. Generally, local anesthetic EMLA is used to minimize this fear. The aim of this study was to evaluate the reaction of introduction of venous access with FLACC scale and to determine the optimum time of application of local anesthetic EMLA prior to intravenous cannula insertion

Methods: This study was approved by the institute ethics committee of our hospital (University Hospital Split) and informed consent was obtained from parents before surgery. 120 children were included in total (aged 0-10, ASA I-II) and they were divided into two equally large groups: younger (0 to 4.99) and older (5 to 9.99) years. Each group had three subgroups of subjects who had the EMLA applied on the site of planned i.v. cannula insertion. In the first group, EMLA was applied 15 minutes before setting up i.v. cannula, and in the second and third group, 30 and 45 minutes before, respectively. Children who had a history of allergy to local anesthetics or any components of the EMLA cream, uncertain drug sensitivities, open wound at the application site or severe systemic disease, were excluded. The cream was applied over a prominent vein on the dorsum of the hand in a thick layer and covered with occlusive dressing.

**Results and Discussion:** No significant differences were found in either age group regarding pain relief in terms of duration of EMLA before the introduction of i.v. cannula. The heart rate was statistically significantly higher in girls compared to boys before and during i.v. cannulation (t = 2.541; df = 118; p = 0.012). There was also a statistically significant difference in age (t = 5.292; df = 118; p <0.001). Heart beats were higher in the younger age group. The oxygen saturation was also statistically significantly lower with girls before (t = 2,541; df = 118; p = 0,012) and during (t = 5,292; df = 118; p <0,001) induction of iv route. Researching specific parameters of the Flacc scale according to gender, there were no statistically significant differences. However, it can be noted that boys have a worse reaction to pain.

Conclusion: We should avoid longer application of EMLA because longer exposure to EMLA has no statistically significant effect on pain relief. Shorter application reduces the risk of possible side effects and reduces the time and preparation for surgery.

## 05AP01-2

# The comparison of two different concentrations of ketofol for pediatric procedural sedation in circumcision surgeries

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Objectives: Ketofol is used to refer to the name of combination of Ketamine and Propofol. Usage of combination of ketamine, dissociative anesthetic, and propfol, an intravenous anaesthetic, in procedural sedation and analgesia has been recently mentioned in several studies as a safer alternative than using only propofol. However, optimal combination and infusion rate of ketofol is still not determined. In this study, we aimed to determine an optimal combination of ketofol for patients who are going to have circumcision surgery by comparing sedation quality and side effects of two different concentrations of ketofol.

Methods: Retrospective analyses of sedation level during circumcision surgeries were performed using data from administration of 2 different concentrations of ketofol to patients. We looked at 100 patients who underwent circumcision surgery. The patients' ages ranged from 1 to 10. In Group I, patients received a combination of ketamine - propofol (1:2). In Group II, patients received a combination of ketamine - propofol (1:3). We used Richmond Agitation and Sedation Scale (RASS) to determine sedation levels. We recorded surgery duration time, recovery time, systolic blood pressure, diastolic blood pressure, heart rate, O2sat, and any side effects such as, vomiting, coughing, hallucination and apnoea. In addition, RASS levels and the need for re-application of ketofol injection have also been recorded.

Conclusion and clinical relevance: In both groups, the demographic characteristics, such as age and weight, were similar. We didn't find any significant change in hemodynamic parameters in both groups. However, there was a decrease in the number of hallucinations observed in the group that received a higher concentration of ketofol (ketamine/propofol of 1:3). In Group I (1:2), we found

that the number of anesthetic dose repetition was higher. In conclusion, since the number of hallucinations and the need for anesthetic dose repetition were lower in Group II patients, we believe that the concentration of ketofol (1:3) is more appropriate for procedural sedation and analgesia in circumcision surgeries.

# 05AP01-3

# Parental presence during induction reduced the time from patient entering operating room to the start of anesthetic induction

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Introduction: Hospital admissions and operations are stressful life events for patients. Furthermore, in pediatric patients, these events may have a major impact on their emotional response. It is natural for parents or quardians to feel anxiety and fear about anesthetizing and operating on their children. In order to assuage these anxieties and ease the emotions of children and their parents, our hospital started Parental Presence during Induction (PPI) for pediatric surgery in 2012. We evaluated the influence of PPI on the time from patient entering OR to the start of anesthetic induction Procedure of PPI: From the ward to the entrance of the operating room (OR) area, the ward nurse and the child life specialist (CLS) move along with the patient plus his or her parents or quardians. From there, OR nurse joins in so they can all go together to the each OR. After entering the OR, the patient waits at the operation bedside. The surgeon and the anesthesiologist along with the OR nurse do the sign-in process with the presence of parents or guardians. After that, the patient monitoring devices are in place, taking off any clothes as necessary. Induction begins as the patient lies down or sits on the bed with the comfort of his or her parents or quardians. When the patient sleeps, the parents or quardians leave the OR along with the ward nurse or the CLS. Subject: From 2014 to 2016, A total of 342 pediatric patients (0-17 years old, ASA-PS1) undergoing inguinal hernia repair with general anesthesia. Method: The time from patient entering OR to the start of anesthetic induction was retrospectively compared between in PPI group and non-PPI group.

**Result:** The PPI group's time  $(6.43\pm3.53\,\text{min})$  for 301 cases showed a significant difference compared to the non-PPI group's time  $(7.61\pm3.34\,\text{min})$  for 41 cases (P=0.046). Furthermore, as for children over 7 years old, the PPI group's time  $(6.73\pm2.75\,\text{min})$  for 49 cases showed a significant difference compared to the non-PPI group's time  $(8.71\pm3.30\,\text{min})$  for 14 cases (P=0.030).

Conclusion:PPI can reduce anxiety and fear for young patients undergoing anesthesia and operation. As a result, the time from patient entering OR to the start of anesthetic induction was shortened and smoother, especially for children over 7 years old. Additionally, it has been suggested that PPI is beneficial not only for the burden of time, but also for the experience of both the patients and the medical staff.

# 05AP01-4

Postoperative pain scores at home after adenotonsillectomy in children between 6 and 12 of age are associated with pre-existing emotional/behavioral problems

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Background and Goal of the Study: Pain at home after adenotonsillectomy is a major issue and specific child factors like pre-existing emotional/behavioral problems might be associated with higher pain scores [1]. Aims: 1. to assess the prevalence of postoperative pain at home during the first three days and at day 10; 2. to test the influence of emotional/behavioral problems on postoperative pain

corrected for the child's age and parental state anxiety.

Materials and Methods: After IRB approval a prospective cohort study was carried out. Inclusion: eligible were all consecutive children between 6 and 12 years old, ASA 1&2, good Dutch comprehension of the parent, undergoing adenotonsillectomy in a day-care setting. Exclusion: known mental retardation.

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Procedure: a standardized anesthesia procedure was performed including: 1. inhalation with sevoflurane; 2. pain management (including Non-Steroidal Anti-Inflammatory Drugs [NSAIDs] and paracetamol). Outcome parameter: postoperative pain at home was assessed using the Parents' Postoperative Pain Measure (PPPM) during the first 3 days and at day 10.

Psychological assessment tools: 1. child: emotional/behavior problems of the child during the past 6 months were assessed using the Child Behavior Checklist (CBCL) and rated by the accompanying parent. A CBCL total problem score was obtained; 2. parent: parental state anxiety was measured by Spielberger's State-Trait Inventory (STAI). Statistics: multivariable regression analysis was carried out, using the sum of the PPPM scores at the first 3 days at home (PPPM1-3days) as the dependent variable.

Results and Discussion: A total of 57 children (mean age in months: 108.8 SD ± 25.7) entered this study and 46 (80%) complete cases were obtained at day 3 postoperative. During the first 3 days at home, 43.5% of children had scores ≥ 6 on PPPM1-3days and at day 10 still 2.7% (37 complete cases). Pre-existing CBCL total problem scores were associated with higher PPPM1-3days scores (standardized regression coefficient: .373; 95%CI [.10-.86]; P=.015), independent of the child's age and parental state anxiety. Overall the model explained 17.9 % of variance (adjusted R2= .119; P=.042).

**Conclusion(s)**: Pre-existing CBCL emotional/behavioral problems might contribute to higher postoperative pain scores after adenotonsillectomy at home and could be helpful in identifying vulnerable children.

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#### 05AP01-5

# Awake Craniotomy in the Pediatric Population: A single centre retrospective cohort study

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**Background**: Awake craniotomy (AC) with intraoperative observation of cortical function and direct stimulation of the brain cortex is the gold standard for resection of lesions near eloquent brain areas. In contrast to the adult population, only small series of AC have been reported in children. We aim to determine the feasibility, complications and anesthetic management of AC in the pediatric population.

**Methods**: Retrospective single centre cohort study of children undergoing supratentorial AC between January 2009-December 2017. Primary outcome was feasibility of AC, defined as the ability to perform an AC without converting to general Anesthesia, or other anesthetic complication.

Results: 27 patients included, 12 female, 15 male. Median age 13 years (Range 7-17). Primary diagnosis: Epilepsy (4/27) and tumour (23/27). Preoperative neuropsychological evaluation was performed in 81.5% cases. The anesthetic technique was Asleep-Awake-Asleep (AAA) in 26 patients and conscious sedation (CS) in 1 patient, all cases supplemented by scalp block and pin-site infiltration. Premedication with benzodiacepines was avoided in all patients. For cases under AAA, airway was secured with a laryngeal mask, and the main anesthetic drugs where propofol + remifentanil infusions for the asleep phases, and low-dose remifentanil infusion for the awake phase. For CS, dexmedetomidine + propofol + remifentanil infusions were used. All patients received antiemetic prophylaxis. Conversion to general anesthesia was required in 1 case due to agitation. Speech and/or motor mapping was performed in 26 patients, and completed in 96.2% cases. Intraoperative complications: pain (6/27), hypertension (4/27), agitation (2/27), respiratory depression (1/27), seizures (1/27) and increased intracranial pressure (1/27). No patient experienced intraoperative nausea or vomiting. For tumoral surgery, gross total resection was achieved in 65.2% cases and subtotal in 34.8%. Postoperative complications: neurological deficit (moderate 1/27, mild 5/27; all transient), wound dehiscence (1/27) and extradural collection (1/27). Median lenght of hospital stay was 3 days (Range 2-17).

**Conclusion:** AC with intraoperative brain mapping can be successfully performed in children. Adequate patient selection and close cooperation between neurosurgeons, anesthesiologists, neuropsychologists and neurophysiologists is paramount. Further studies are needed to determine the best anesthetic technique in the pediatric population.

#### 05AP01-6

# Postoperative observational FLACC scores by nurses do not reliably reflect children's and parental Colored Analogue Scale ratings of children's pain

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Background and Goal of Study: The Face, Leg, Activity, Cry, Consolability scale (FLACC) and the Colored Analogue Scale (CAS) are both recommended tools in pediatric postoperative pain assessment. Nurses often report lower pain intensity scores compared to children and parents (1). This might impair good pain management. Aim: to further investigate differences in-hospital pain assessment between nurses, children and parents after adenotonsillectomy.

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 children between 6 and 12 years old, ASA 1&2. Exclusion: known mental retardation.

Instruments: a. the FLACC-scale scored by 2 independently nurses (1 permanent research nurse) at 2h and 4h postoperative; b. a CAS consists of two extremes, 'no pain' (white color) and 'most pain' (red color), on which both the child and parent slide a marker on a vertical line to indicate the child's pain at 2h and 4h postoperative (0 indicating no pain and 10 very much pain). Statistics: 1. agreement between nurses FLACC scores using intraclass correlation coefficient (ICC); 2. ICC between child/parental CAS scores; 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 ≥3 on the child/parental CAS ratings.

Results and Discussion: This study included 57 children (64 % girls) with mean age of 108 (months), SD±25.7. ICC between FLACC scores at 2h were: r =.72; P=.000 and at 4h: r = .33; P =.07). ICC between child/parental CAS at 2h: r=.72; P=.000 and at 4h r=.63; P=.001. After dichotomizing scores at 2h [FLACC2h: n=2 had moderate to severe pain vs. CASchild2h: n=32; P<.0001] and at 4h [FLACC4h: n=3 had moderate to severe pain vs. CASChild4h: n=32; P<.0001]. FLACC scores compared to parental CAS at 2h [CASparent2h: n=46 had moderate to severe pain; P<.0001] and at 4h [CASparent4h: n=34 had moderate to severe pain; P<.0001]. Conclusions: Nurses pain intensity scores are systematically lower compared to child and parental assessment. No differences were found between nurses FLACC ratings. Furthermore there were no differences between child and parental CAS ratings.

## References

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### 05AP01-7

# Spinal anaesthesia in neonates with hypertrophic pyloric stenosis undergoing extramucosal pyloromyotomy. Our experience at the University Hospital of Salamanca

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Background and Goal of Study: The role of spinal anaesthesia (SA) as a first choice in children is still controversial and limited to specialized centers. The objective of our study is to prove that SA in neonates with hypertrophic pyloric stenosis (HPS) undergoing extramucosal pyloromyotomy(EP) is a safe alternative to general anesthesia(GA) and reduces the morbidity and mortality.

**Materials and Methods**: We carried out a retrospective observational study through the review of the medical history of 71 patients who underwent surgery for HPS from between 2004 and 2017. The study assessed the incidence of apnea, difficult intubation in patients with GA, difficult spinal puncture in patients with SA, total operating room (OR) time, operation time, Reanimation Unit stay time and total length of hospital stay. The hemodynamic indicators included were systolic blood pressure (SBP), oxygen saturation(O2sat) and heart rate (HR) at pre-induction,

post-induction, 15 and 30 minutes after induction, pre-eduction and post-eduction times

Results and Discussion: There were 5 patients in the GA group (25% of all patients with GA) who presented apnea with hypoxemia in postoperative period and none in SA group (p=0.00). The prevalence of instrumental difficulties was 7% higher in the GA group than in the SA group. It was not necessary to switch from SA to GA in any case. A statistically significant difference was observed (p=0.027) in the average induction times, which were 11.31 minutes in the SA group and 13.37 minutes in the GA group. There were also statistically significant differences (p=0.048) in the average total OR time, which was lower in the SA group (45.98 minutes) than in the GA group (51.97 minutes). The average SBP values were higher in the SA group than in the GA group in most measuring times. These differences were only statistically significant when the values were measured 30 minutes after induction (p=0.022). The average values of O2sat were slightly higher in the SA group than in the GA group. HR values were lower in the SA group than in the GA group at all the measured times with statistically significant differences.

Conclusion(s): SA is a safe and effective technique for EP. There was no incidence of apnea episodes, hemodynamic stability was maintained and the total OR time was lower in the patients who received SA. The highest technical limitation is the duration of its effects. In our opinion, SA in neonates should be performed by pediatric anesthesiologists.

# 05AP01-8

# An investigation into today's parental perceptions of presence during paediatric induction of anaesthesia

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Introduction: In many institutions parents are allowed to accompany their child during induction of anaesthesia. Previous research suggests that parental presence during anesthesia induction (PPIA) can benefit the child, but can result in anxiety and upset in the parent. There is a perception that modern parents may be more anxious and use 'helicopter parenting' styles that may influence how they are affected by PPIA.

**Aim:** This study aims to explore current parents' preferences with regard to PPIA and investigate the level of anxiety experienced by them, both prior to and after induction of anaesthesia.

**Methods:** Parents of children receiving general anaesthesia for surgical procedures at our institution were asked to complete pre and post operative questionnaires investigating their feelings towards being present during the induction of their child's anaesthesia. Using computer software (SPSS), descriptive frequencies were calculated and chi-squared tests were performed where appropriate.

**Results:** Of the 112 parents approached, 90 parents met inclusion criteria and 85 completed the questionnaire package. Pre-operatively, 88.2% of parents agreed or strongly agreed that they would like to be present during induction. 46.4% of parents reported that they felt anxious prior to accompanying their child's induction of anaesthesia; whereas post-induction only 26.4% reported that they felt some anxiety. There was no significant correlation to parents' stated anxiety if the parent had been present previously for a child's induction of anaesthesia ( $x^2$ =10.8, p=0.096); if the child had experienced anaesthesia previously ( $x^2$ =5.7, p=0.459); if the child had attended a pre-assessment clinic ( $x^2$ =5.4, p=0.943); or if the parent was given information prior to the surgery regarding their options to be present or absent ( $x^2$ =10.4, p=0.581).

Conclusion(s): Our findings indicate that, similarly to older studies, the majority of modern parents would like to be present during their child's induction of anaesthesia, despite nearly 50% experiencing increased anxiety. Notably, this anxiety rate fell to 26.4% when questioned postoperatively, indicating that pre and post event questionnaires are not comparable. 12% of parents would have liked more information regarding their child's anaesthetic and options to be present or absent, thus hospitals should provide adequate information and indicate that parents can choose whether to accompany their child or not during their child's induction.

#### 05AP01-11

# Comparison of pudendal block with penile block during pediatric prepuce surgery

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Background and Goal of Study: The objective is to compare the penile block with the pudendal block in terms of feasibility and effectiveness, during pediatric

Materials and Methods: After approval of the hospital's ethics committee and parental consent, we conducted a randomized prospective study, including 60 patients aged 2 to 5 years, classified as ASA 1 and admitted for foreskin surgery. We excluded patients who experienced block failure, defined as an increase in mean arterial pressure greater than 25% from baseline, or an anesthetic or surgical complication. The children were randomized into 2 equal groups of 30 patients each GR (penile block by the loss of resistance technique) and GN (pudendal block under neurostimulation). All patients received a 0.2ml / kg dose of 0.25% Bupivacaine

Anesthetic Mix and 1% Nonadrenaline Xylocaine on each side. Nalbuphine was administered intranasally if pain persisted (CHEOPS> 7). Parents were contacted by phone the following day for evaluation of the quality of analgesia. We collected the anthropometric parameters of the patients, the duration of the block procedure and the quality of the analgesia (CHEOPS from 4 to 13) as well as the satisfaction of the surgeons and the parents. Statistical analysis was performed by SPSS 22 (p <0.05)

#### Results and Discussion:

	GR	GN	p
Age (year)	3.7±1.2	3.9±1.5	>0.5
Weight(Kg)	15.1±4.3	16.6±5.7	>0.5
Procedure time(min)	4.5±1.1	4.9±1.3	>0.5
CHEOPS (4 à 13)	6.7±1.9	5.9±1.3	0.029
Antalgic remedies	7/30	3/30	0.031
1st analgesic dose (min)	230±63	290±41	0.037
dysuria	1/30	4/30	0.041
surgeons satisfaction	24/30	30/30	0.01
parents satisfaction	29/30	25/30	0.027

**Conclusion**: Pudendal block provides better analgesia and surgeon satisfaction by decreasing the risk of erection compared to the penile block, but it causes a higher risk of dysuria which, even if it is statistically insignificant, would be the cause less satisfying parents.

#### 05AP02-1

# Epidural blood patch for the treatment of post intrathecal chemotherapy liquor hypotension in a 10-year-old

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Background: Epidural blood patch (EBP) is a procedure used to treat post-dural puncture headache and liquor hypotension headache¹. It consists in the administration of autologous blood in the epidural space which, through a still not fully explained mechanism, works as a patch of cerebrospinal fluid (CSF) leak, raising epidural space pressure and causing an inflammatory response that will seal the leaking spot. There are few reported cases of this procedure in children, under general anesthesia (blind blood patch)². Intrathecal (IT) chemotherapy has been used in the treatment of some forms of cancer and involves repeated lumbar puncture (LP), that may form CSF fistula, leading to liquor hypotension and related symptoms.

Case Report: Ten-year-old female, diagnosed with Acute Lymphoblastic Leukemia – group AR2, treated with IT chemotherapy. After various unsuccessful LP, without CSF exit, she developed symptomatic focal seizures. CT scan revealed venous thrombosis of the posterior sagittal sinus, without hydrocephalus signs. After introducing an intracranial pressure catheter, the patient repeated the CT scan revealing a marked shift of the midline structures and underwent an urgent decompressive craniectomy. There was no improvement in the clinical status after surgery. Dorsal spine MR myelography revealed a CSF collection in the epidural space from T4 to the lumbar area with an increase of CSF in the lumbar cistern. A multidisciplinary team decided to perform a blood patch. The procedure was performed by a trained anesthesiologist: under proper aseptic conditions, a Tuohy 20G needle was used to find the epidural space at L4-L5 level and injected 8mL of autologous venous blood, collected from the saphenous vein of the left leg, with no complications. The patient had a favorable clinical and imagiological evolution in the 24h after the procedure.

**Discussion**: There are no case reports to our knowledge regarding epidural blood patch use in children with LCR hypotension with clinical instability. This case suggests that blind blood patch may be a possibility in similar cases.

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**Learning points:** Recognize intracranial hypotension and clinical features. Describe EBP procedure.

#### 05AP02-2

# Accuracy of different ultrasound techniques for confirmation of laryngeal mask airway placement

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Background and Goal of Study: Laryngeal mask airway (LMA) is frequently misplaced because of anatomical differences in chilren's airway. Our aim was to assess the feasibility of different ultrasound (US) techniques for confirmation of correct placement of LMA and their correlation with fiberoptic laryngoscopy (FOL). Materials and Methods: After local ethic committe approval and written informed consent was obtained, 50 consecutive children (1-12 ages) were included in this prospective, observational study.

After anesthetic induction, the position of the LMA was assessed by US in 4 transverse planes (at the level of just above the hyoid bone, the pharynx, the larynx, and upper end of the esophagus) and confirmed with leakage test at 20 cm H2O and fiberoptic laryngoscopy (FOL). LMA rotation grade was performed by FOL. The symmetry of the arytenoid cartilages and cuff shadows at the tongue base level and pharynx according to the midline was graded as 0 to 3 by US. Also, whether the LMA cuff tip is in the esophagus were evaluated. We tested relationship between FOL LMA rotation grade and sonographic parameters by Spearman's correlation coefficient. P < 0.05 was considered statistically significant

Results and Discussion: On FOL, the incidence of LMA rotation was 62% and the LMA reinsertion was %6. There was a high correlation between FOL-LMA rotation grade with US examination of arytenoid cartilages (R=0,791, p<0,05) and the asymmetrical cuff shadows (R=0,67, p<0,05). Detecting LMA cuff tip in the oesophagus did not correlate with FOL- LMA grade (R=0,123, p>0,05).

**Conclusion(s)**: US examination is noninvasive and as effective as a fiberoptic examination in detecting a rotated LMA even if it is positioned at proper depth. Further detailed studies are required to compare the different US techniques for confirmation of correct placement of LMA.

### 05AP02-3

# Anesthesia in an infant with an unknown type of dwarfism. About a case

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Background: We present the anesthetic approach in the case of a baby with several malformations in face, airway and lungs (CT diagnosed), included in a syndrome confirmed after surgery: Lenz-Majewsky Hyperostotic Dwarfism (LMHD). Case Report: 40 days old infant requires urgent extramucosal pylorotomy Arriving to operating room, some features draw our attention: low weight (2.1 kg), exophthalmos and ocular hypertelorism, sharpy upper lip, ogival palate and retrognatia. The anesthetic approach was addressed as a case of difficult airway. We performed anesthetic induction with sevoflurane and orotracheal intubation with straight shovel no 0 (Cormack II) using ETT no 2.5, without incidences. Maintenance was made with sevoflurane, high O2 rate and fentanyl, without neuromuscular relaxant. Ventilation was based on volume-controlled mode (respiratory rate from 35 to 30 breaths/min and tidal volume 4-6 ml/kg depending on CO2 levels). Just after intubation there was a drop in the end tidal values of CO2, ranging from 24-26 mmHg in manual ventilation to 0 in controlled ventilation probably due to pulmonary malformations. During surgery, SaO2 ranged between 94-99%; we decided not to use PEEP but we performed some slight manual recruitment maneuvers. Awakening developed without incidences and the baby was transferred to pediatric ICU safely. Later, pediatricians requested a genetic study that confirmed LMHD.

**Discussion**: Clinicians should be prepared to deal with non-diagnosed syndromic patients, observing them and getting prepared for difficulties that could be found depending on suspicion. For anesthesiologists, airway, cranial and hemodynamic features are very relevant<sup>1</sup>. LMHD is a very rare syndrome caused by a *de novo* heterozygous mutation in phosphatidylserine synthase 1 gene with autosomal dominant pattern<sup>1</sup>; not usually diagnosed just after birth so therapeutic treatments can be necessary before diagnosis<sup>2</sup>.

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**Learning points**: 1-Carefully evaluate airway and plan for potential difficult management? 2-Inhalation induction could be the safest approach in these cases. 3-Assessment of malformations is crucial for the best anesthetic management. 4-Care with the position of the patient especially if muscle-skeletal disorders are diagnosed or suspected?.

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#### 05AP02-4

# Accuracy of Identifying the Cricothyroid Membrane in Children Using Palpation: An Observational Study

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Background and Goal of Study: Accurate identification of cricothyroid membrane has a paramount importance in case of "cannot intubate, cannot oxygenate" scenario. However, under developed thyroid cartilage, more prominent hyoid bone, smaller dimensions of cricothyroid membrane in children may make this difficult. We sought to determine the ability of anesthesiologists to correctly identify cricothyroid membrane in children

Materials and Methods: As participants, anesthesiologists were asked to mark the entry point of the cricothyroidotomy device with an ultraviolet invisible pen on obese and non-obese children at the ages of 7-12. Ultrasonography was used to mark the midpoint of cricothyroid membrane and the distance between two marks measured. A correct estimation was defined as the mark made between the upper and lower borders of cricothyroid membrane and within the 3-mm midline Participants were also asked to define the ease of palpation as easy, moderate, difficult and impossible

Results and Discussion: Twenty participants palpated 30 obese and 50 non-obese children. Cricothyroid membrane located by palpation was defined in agreement with ultrasonography in 56.67% (95% confidence interval (CI) 39% to 74%) of obese compared with 54% (95% CI 40% to 68%) non-obese patients. Participating anesthesiologist found palpation of cricothyroid membrane subjectively more difficult in the obese than non-obese children. Accuracy was not correlated with any demographic or morphometric features of the children

Conclusion: A poor agreement was determined between palpation and identification of cricothyroid membrane through ultrasonography. Pre-procedural ultrasonography may help to identify the landmarks for cricothyroidotomy

#### 05AP02-5

### Anesthesiologic dilemmas in Oncopediatrics

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Background and Goal of Study: Procedural analgosedation in oncopediatry is necessary when performing painful invasive manipulations such as bone marrow aspiration, trepanobiopsy and lumbar puncture. Different pharmacology agents are used for this purpose. The goal of this study is to determinate the safety and efficacy of combination of anesthetics for optimal analgosedation in oncopediatry.

Materials and Methods: Prospective study (2016-2017), performed at University Hospital "Tsaritsa Yoanna-ISUL", with 90 participants between 2-17 years of age, randomized in 3 groups, according to the anesthetics applied: Group 1 (n=30): Propofol/Ketamine; Group 2 (n=30): Midazolam/Ketamine; Group 3 (n=30) Propofol/Fentanyl. The hemodynamic and respiratory parameters are measured on the 5-th. 15-th and 30-th min (systolic/diastolic blood presure; respiratory rate; SpO2, the recovery time is reported according to the Aldrette scale and the adverse reactions rate: respiratory suppress, laryngospasm, nausea. The results are statistically analyzed

Results and Discussion: Statistic difference in the demographic parameters between the groups has not been found. The respiratory depression was found in 10 patients from the Propofol/Ketamine group -Spo2 up to 90% and desaturation under 60 sec. The change of hemodynamics was visible in the Ketamine/Midazolam group with 30 -sys BP 106.23; dys BP 62.06; Pulse 111.6The Ketamine/Midazolam group is characterized by a longer recovery period from general anesthesia and max score on 13.13 min. The respiratory depression in the Fentanyl/Propofol group was found in 14 patients and the recovery period was 10.11 min.

Conclusion: Each of the applied combinations of anesthetics is effective to achieve deep analgosedation in oncopediatry: the respiratory depression could be easily overcomed with the use of ventilation and respirator

#### 05AP02-6

The use of dexmedetomidine for the treatment of arrhythmias after pediatric cardiac surgery

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Background and Goal of Study: Arrhythmias after cardiac surgery can be a therapeutic challenge, since antiarrhythmics may be ineffective and associated with adverse effects. This study evaluates dexmedetomidine as a first line therapy for management of postoperative arrhythmias in pediatric cardiac patients.

Materials and Methods: Retrospective study evaluated 65 patients who received dexmedetomidine as a primary drug for postoperative arrhythmias. The restoration of sinus rhythm or slowing of tachycardia to rate that allowed atrial or atrioventricular sequential pacing was considered as efficacy of therapy

Results and Discussion: Sixty-five patients with median age of 2.0 months (1 day - 16 years) received dexmedetomidine for junctional ectopic tachycardia n=40), supraventricular reentry tachycardia (n=6), supraventricular premature beats (n=6), and other types of arrhythmia. Fifteen (23%) patients received an initial loading dose of 1 (0.8-1.2) mcg/kg. A continuous infusion with a maximum dose of 1 (0.3-2) mcg/kg/h was administered in all patients. Dexmedetomidine alone was successful in 37 (57%) patients. Risk factors for failure of dexmedetomidine as a single antiarrhythmic therapy was lower patient weight (p=0.02, AUC=0.62) and age (p=0.031, AUC 0.62), and higher maximum heart rate (p=0.004, AUC 0.69). Fransient hypotension related to dexmedetomidine was seen in 4 patients. In 23 (35%) patients adding amiodarone to dexmedetomidine resulted in arrhythmia termination. Amiodarone was used as a loading dose of 4.5 (1 - 10) mg/kg and/ or continuous infusion of 15 (10 - 20) mcg/kg/min. The escalation therapy to other antiarrhythmics or extracorporeal membrane oxygenation was required in 6 (8%)

Conclusion: The study suggests that dexmedetomidine as a first line antiarrhythmic drug has a therapeutic role in the treatment of postoperative arrhythmias after pediatric cardiac surgery.

#### 05AP02-7

Palliative neurosurgeries for recurrent seizures in a child with single ventricle physiology at different stages of cardiac palliation: an anaesthetic and neurosurgical challenge

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Background: Anaesthetic management of paediatric patients with single ventricle (SV) physiology is challenging. We report 2 epileptic neurosurgical procedures in a boy with SV physiology at two different stages of cardiac palliation.

Case Report: A 18-months-old boy with SV physiology suffering from stroke post bidirectional superior cavopulmonary connection (CPC) necessitated a callosotomy (palliative neurosurgery) for refractory seizures. A multidisciplinary discussion was planned to cope with his particular cardiac physiology (high superior caval venous pressures and the existence of intracardiac shunts) and the specific neurosurgical requirements being the necessity to improve cerebral relaxation. Blood pressure was measured invasively. A central venous catheter (CVC) was placed in the right internal jugular vein to measure the pulmonary pressures. Another CVC placed in the femoral vein measured the single atrium pressure. Cerebral NIRS was used. Intraoperatively, mannitol was avoided (to reduce the risk of paradoxal air embolism), normocapnia was maintained and an intraventricular catheter (IC) was placed to reduce intracranial volume. The surgery and postoperative course were uneventful. The child was schedulded 4 years later for a hemispherotomy because recurrent untractable seizures1. Meanwhile, he had undergone total CPC (Fontan) with an extracardiac conduit and a fenestration which had been closed percutaneously before his neurosurgery. Intraoperatively there were no episodes of hypovolaemia, hypotension or hypoxemia. The CVC was inserted in the femoral vein which presented the pulmonary artery pressure. Mannitol was avoided to reduce the risk of relative hypovolaemia. An IC was also placed to optimize surgical conditions. The surgery and postoperative course were uneventful.

Discussion: Anaesthetic management of children with SV physiology presenting for neurosurgery is challenging but totally different at the different stages of cardiac palliation2.

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surgery. Neurosurgery remains challenging in these sick children because of specific surgical conditions. Multidisciplinary discussion and understanding of cardiac physiology at different stages is mandatory.

### 05AP02-8

Postnatal neurocognitive and histopathological effects of the repeated ketamine exposure during fetal synaptogenesis phase in rat

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Background and Goal of Study: Ketamine which acts by attenuating excitatory activity through NMDA glutamate receptors is commonly used for anesthesia and as a recreational drug. NMDA receptors are closely related to learning, memory and other cognitive process. Animal experiments suggest that anesthetic exposure during fetal period cause neurodegenerative changes and learning abnormalities In recent experimental research we aim to evaluate effects on neurocognitive performance and brain histopathology in rat with exposure repeated ketamine anesthesia during fetal synaptogenesis

Materials and Methods: Pregnant rats (n=8) on gestational day 13-19 (synaptogenesis phase) were given to IV ketamine or %0.9 NaCl solution [Group Control (C): %0.9 NaCl solution (n=2), Group Single Ketamine (SK): Single day, 50 mg.kg-1 ketamine (n=3), Group multiday ketamine (MK): 3 days 50 mg.kg-1 ketamine (n=3)] 3 times in a day for 2h intervals. Cognitive performance of the 18 offspring's which 6 pups in each group were evaluate with Radial Arm Maze Test (RAMT) at postnatal day 21 (P21). After that, histopathological examination of the thalamus, basal ganglia, hippocampus, and cornu ammonis was performed for gliosis, ischemia, cytoplasmic vacuolation, edema, chromatolysis, dysplasticity

Results and Discussion: Three weeks after birth in the measurement of the third day, the third hour, (according to RAMT) the number of the inputs-outputs in the Group SK was observed to be significantly higher than the Group C (p=0.011). On the second day the second hour measurement, the inputs-outputs, which were below 15 seconds, were found to be significantly higher in the Group SK as compared to the Group C (p=0.03). On the third day, the third hour measurement, shorter than 15 seconds inputs-outputs, were found to be significantly higher in the Group SK as compared to the Group C (p=0.007). But no neuronal damage (gliosis, ischemia, cytoplasmic vacuolation, edema, chromatolysis, dysplasticity) and cell apontosis (TUNNEL method) in fetal brain tissue histopatology

Conclusion: Intrauterine ketamine exposure during fetal synaptogenesis phase may be associated with activity increase in offspring's even if there is no structural changes at cerebral histopathology. Long term cognitive effects of the recurrent anesthesia during fetal synaptogenesis phase must be evaluate another experimental research.

# 05AP02-9

Influence of the limitation of intraoperative fluids volume on haemodynamics and stress response in children undergoing orthopaedic surgery

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Background and Goal of Study: Avoiding of perioperative fluid overload is a part of fast-track surgery and is well studied in adults [1]. However, the limitation of intraoperative fluid therapy remains unexplored in children. The need for fluids in children differs depending on the age, and exceeds those in adults. The aim of our study is to estimate influence of the restrictive fluid regimen on haemodynamics and stress response in children undergoing orthopaedic surgery.

Materials and Methods: After receiving the ethic committee approval and parent's consent we conducted prospective study, which included 60 patients, aged 2-16 y.o. Patients had ASA status I and II and underwent 1-3 hours orthopaedic surgery. Children received oral carbohydrate drink (25% maltodextrin) 2 hours prior the surgery in accordance with the principles of the ERAS program. Group 1 (n=30) received the standard regimen of fluid therapy. Group 2 (n=30) was limited in fluids. We evaluated intraoperatively changes of haemodynamic parameters, Hb and Ht, urine output, blood glucose, insulin and the insulin resistance index HOMA-IR (homeostatic model assessment). Mean data were compared with Mann-Whitney

Results and Discussion: The volume of intravenous fluids was 10,7 ± 3,03 ml/ kg/h in group 1 and 5,07  $\pm$  1,15 ml/kg/h in group 2. The results of the study did not reveal significant changes in haemodynamic parameters such as blood pressure, heart rate, systolic output, except for a decrease in urine output in the restrictive volume group (1 16 + 0.89 vs 0.43 + 0.59 ml/kg/h, P=0.009). Changes in Hb and Ht were comparable in both groups. With a slight increase of glucose in both group, we found the level of insulin and HOMA-IR were significantly higher in group 2 (insulin  $5,39 \pm 3,93 \text{ vs } 8,94 \pm 6,15 \text{ mU/L}, P=0,006; HOMA-IR 1,30 \pm 1,05 \text{ vs } 2,39 \pm 2,14,$ P=0,004). This demonstrates the tendency to insulin resistance of tissues and can be a sign of a surgical stress response.

Conclusion: Results of the study suggest that the limitation of intraoperative fluids does not affect haemodynamics but seems to increase the surgical stress response in children. Further research is necessary to determine which minimum volume is acceptable

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### 05AP02-10

Cerebrospinal fluid volume change in neonates, infants, children, and adolescence - a magnetic resonance imaging

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Background and Goal of Study: The cerebrospinal fluid (CSF) volume may be the most important factor determining spinal anesthetic level. However, the reference values of pediatric CSF volume have not been clearly determined. No study has described the spinal CSF volume across all pediatric age groups; from neonates to adolescent. We reviewed magnetic resonance image (MRI) of pediatric patients from infatns to adolescents to provide reference range of CSF volume according to age, height and weight.

Materials and Methods: The thoracolumbosacral (TLS)-CSF volume (n=248) and lumbosacral (LS)-CSF volume (n=418) were measured from MRI scan of pediatric patients aged from 1 month to 18 years. The correlations between TLS- and LS-CSF volumes and age, height, weight were analyzed using linear and non-linear regression analysis.

Results and Discussion: The TLS- and LS-CSF volume show a linear correlation with height (R2=0.661 and R2=0.730, respectively), but a curvilinear correlation with age (R2=0.717 and R2=0.752, respectively) and weight(R2=0.734 and R2=0.734, respectively). The TLS- and LS-CSF volume per weight decreased with age and weight. The TLS-CSF volume can be estimated as 1.9mL/kg in 0-15kg, 1.6mL/kg in 15-30kg, and 1.0mL/kg in more than 30kg and 1.9mL/kg in 0-4 year, 1.6mL/kg in 4-8 year, and 1.2mL/kg in more than 8 year. The LS-CSF volume can be estimated as the half of TLS-CSF volume.

Conclusion: In this retrospective MRI study, the authors found that TLS-CSF volume and LS-CSF volume show a linear correlation with height and whereas they show a curvilinear relationship was found with age and weight. Also, the TLS-CSF volume/weight and LS-CSF volume/weight decreased with weight and age, and there were differences according to each weight group and age group. When Intrathecal dosage is determined in pediatric patients, the CSF volume, which varies with weight, age, and height, should be considered.

# 05AP02-11

How do neonates and small infants respond to pneumoperitoneum?

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Background and Goal of Study: To assess the physiological response to pneumoperitoneum of paediatric patients under 6 months of age undergoing the same procedure, elective laparoscopic ureteropyeloplasty Materials and Methods: We conducted a prospective observational study in our center from January 2012 to June 2017. The variables analyzed were: mean arterial pressure (MAP), heart rate (HR), SatO2, ETCO2, lung compliance, pressure airway, number of lung recruitment maneuvers, temperature and warming measures applied. We collected data before insufflation, every 15 minutes during surgery and after

Results and Discussion: We analyzed 28 patients ASA I-II, median age 3 (0-6) months, median weight 6 (4-10) Kg. Surgical position was lateral decubitus 45° in all patients. Median pneumoperitoneum pressure was 10 (10-13) mmHg. Median operating room time was 150min.

Volùme Controlled Ventilation was set in 85.7% of patients and Pressure Controlled Ventilation in 14.3%. The median compliance during pneumoperitoneum decreased in 62.5% of patients. Respiratory pressures increased in all patients. Median peak inspiratory pressure was 25 (22-26) mmHg and median platteau pressure 24 (22-26) mmHg. Median PEEP was 4 (0-6). ETCO2 increased in all patients. Median ETCO2 during pneumoperitoneum was 48.5mmHg. In 12.5% of patients there were moments of severe hypercarbia (>60mmHg). Median SatO2 was 99 (92-100) %. In one patient the median SatO2 was 92 (90-93) %, he was one month of age and his basal SatO2 was 95%. All patients required changes in ventilator settings. Recruitment maneuvers were performed in all patients.

In 57% of patients the MAP increased a median of 4.25mmHg. In 14% it decreased a median of 5mmHg. Median MAP was 50mmHg. Median HR was 131bpm. It decreased in 75% of patients a median of 13bpm.

Active warming measures were applied in all patients. The median Ta was 34.9 (34.1-36) °C. It increased in 85% of patients a median of 0.4°C. All patients were extubated successfully in the OR. There were no surgical complications and postoperative critical care was not required

1.Cerebral hemispherectomy in infants and young children. S.Flack and al.

Learning points: Children with SV physiology nowadays undergo non-cardiac

#### in any case.

Conclusion: In our study, changes in hemodynamic and temperature parameters were not relevant. The effect in the respiratory parameters was the expected, except for the cases of severe hypercarbia. These values returned to physiological levels with changes in the ventilatory settings and after the exufflation.

### 05AP03-1

Comparison of the clinical performance of disposable supraglottic airway devices, AuraGain™ with i-gel™ in children: A randomised clinical trial

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Background and Goal of Study: AuraGain<sup>™</sup>, a newly developed disposable supraglottic airway device (SGA), has an inflatable cuff and a gastric port. Paediatric AuraGain has recently become available in Japan. No studies have compared the clinical performance of AuraGain with the existing widely used SGAs, such as LMA Proseal<sup>™</sup> or i-gel<sup>™</sup>. Therefore, we conducted a randomised clinical trial to compare the clinical performance of AuraGain with i-gel in children.

Materials and Methods: A total of 100 paediatric patients scheduled for surgery under general anaesthesia were randomly assigned to the AuraGain and i-gel groups. The primary study outcome was oropharyngeal leak pressure (OLP) immediately after SGA insertion. To determine the OLP, the adjustable pressure-limiting (APL) valve was closed with a fresh gas flow of 3 L/min until equilibrium was reached. The secondary outcomes were time to insertion, insertion success rate at first attempt, and blood staining on the device. The sample size was calculated to detect a minimum clinically significant difference of OLP, which was defined as 3 cm H2O, with 80% power and 5% type 1 error. Continuous and categorical data were compared using Mann–Whitney U test and Fisher's exact test, respectively. We calculated the 95% confidence interval (CI) of the median value using the bootstrap method.

**Results and Discussion:** The OLP of the AuraGain group was significantly lower than that of the i-gel group (p < 0.001, Figure 1). Moreover, the upper limit of the 95% CI of the difference (-3.5~cmH2O) exceeded the pre-defined clinically significant difference (-3~cm H2O). Moreover, the time to insertion and incidence of blood staining on the device were higher in the AuraGain group than in the i-gel group. The insertion success rate at first attempt was not different between the two groups.

**Conclusions:** The OLP of AuraGain was inferior to that of i-gel. The secondary outcomes of AuraGain were also inferior or equal to those of i-gel. Therefore, we conclude that the clinical performance of AuraGain was inferior to that of i-gel in paediatric patients.

	AuraGain (n = 48)	i-gel (n = 50)	Median difference or risk ratio (95% CI)	P value
Oropharyngeal leak pressure (cmH2O)	17 (15–20)	21.5 (18.0–27.5)	-5.5 (-8.8 to -3.5)	<0.001
Blood staining (%)	6 (12.5)	0 (0)	NA	0.012
Insertion success at first attempt (%)	46 (95.8)	45 (90.0)	1.07 (0.95–1.19)	0.44
Time to insertion (seconds)	20 (17–24)	17 (14–20)	3.7 (1.0–5.4)	0.001

#### 05AP03-2

Laryngeal mask Unique® position in paediatric patients undergoing magnetic resonance imaging (MRI): prospective observational trial

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<sup>1</sup>Department of Paediatric Anesthesia and Intensive Care, University hospital and Faculty of Medicine, Masaryk University - Brno (Czech Republic), <sup>2</sup>Department of Paediatric Radiology, University hospital and Faculty of Medicine, Masaryk University - Brno (Czech Republic)

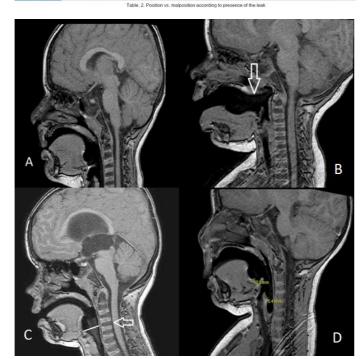
Background and Goal of Study: Laryngeal mask (LM) is nowadays well established supraglottic airway device. The primary aim of the study was to evaluate the incidence of the radiologic malposition of the LM under magnetic resonance imaging (MRI) according to the size of the mask. The secondary outcome was the clinical performance of the LM (1st attempt success rate, audible leak, peak leak pressure) in LMs in malposition compared to LMs located in the radiologically correct position.

Materials and Methods: Prospective observational study was approved by local ethics comittee and registered at Clinicaltrials.gov (NCT02940652). Ir the study period, paediatric patients undergoing elective MRI of the brain were enrolled. Malposition outside the hypopharynx was defined as Malposition A (Fig.1 B). Malposition of the proximal cuff outside C1-C2 as Malposition B (Fig.1 C). Malposition C - as the distance A ≥ distance B (distance A = proximal cuff end to aditus laryngis, distance B = distal cuff end to aditus laryngis) (Fig. 1 D). The statistical significance of LM malposition was assessed using the exact Fisher test. Results and Discussion: 220 patiets were enrolled and 202 were eligible for analysis. Laryngeal mask was properly inserted on the 1st attempt in 91.1% (n= 184) cases. The overal radiological malposition (A+B+C) was detected in 26.2% (n=53) patients (Table 1). Audible leak was detected in 5.6 % (n=3) patients with LM in malposition and in 2.7% (n=4) patients with LM in correct position (Table 2.). There were no single case of LM failure with the need for alternative airway management. The rate of associated complications was 1.5% (n=3): laryngospasm, desaturation, cough. In 4.0% (n=8) the LM was soiled from blood.

Conclusion: Radiological malposition was not associated with impaired clinical performance of the LM or the need for alternative airway management.

LM size*	Malpositi	on (A+B+C)	Radiologically	correct position	
	n	%	n	%	p-value
LM 1.0	1	14.3%	6	85.7%	<0.001
LM 1.5	10	50.0%	10	50.0%	
LM 2.0	20	18.0%	91	82.0%	
LM 2.5	14	28.0%	36	72.0%	
LM 3.0	3	37.5%	5	62.5%	
LM 4.0	4	100.0%	0	0.0%	

	Table. 1. Radiological malposition according to the size of Life			
	Malposition overall (A+B+C) (n=53)	Radiologically correct position (n=149)	p value	
Leak	5.6% (n=3)	2.7% (n=4)	p=0.309	



# 05AP03-3

Ideal depth of central venous catheters using a real-time ultrasound-guided technique in pediatric patients with congenital heart diseases

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Background and Goal of Study: We introduced a real-time ultrasound-guided supraclavicular approach as a practical alternative for access to central veins<sup>1,2</sup>. The position of the central venous catheter (CVC) tip is important to avoid life-threatening complications. Numerous reports have established the formulae to calculate the ideal CVC depth compared to patients' characteristics or introduced landmark measurement methods. However, the calculation formulae or the landmark measurement procedure is complex to be practical. The purpose of this study was to develop a simple and practical formula for the ideal depth of CVCs inserted using the real-time ultrasound-guided technique.

Materials and Methods: Pediatric patients with congenital heart disease who underwent cardiovascular surgery were enrolled. A two-stage study was conducted. In the first stage, ideal CVC depth was calculated by measuring the distance between the level of the carina tracheae and the CVC tip on the first postoperative chest radiograph. The relationship between the ideal CVC depth and body height, body weight, and age (months) of patients was investigated in the right internal jugular vein approach and the left supraclavicular approach (July 2015–December 2016). The second stage was a prospective validation study to prove the results of the first-stage study. The CVCs were placed according to the first stage study and the position of the CVC tip was confirmed on the first postoperative chest radiograph (January–June 2017). The ideal CVC depth in the right supraclavicular approach was also investigated (July–December 2017).

Results and Discussion: Results confirm that body height predicts best the ideal CVC depth as revealed by sorting of patients into groups for every 10 cm in height. Conclusions: This study provides the ideal CVC depth for every 10 cm in height, inserted using the real-time ultrasound-guided technique in the internal jugular vein approach and the supraclavicular approach, easily simply without complex calculation formulae.

#### References:

- 1. Yamamoto T, Schindler E: Is the supraclavicular approach to the central vein still risky and taboo? Paediatr Anaesth 2015; 25: 1176-8
- Yamamoto T, Schindler E: Real-Time Ultrasound-Guided Right Supraclavicular Approach to the Central Vein: An Alternative Option. Anesth Analg 2017; 125: 359

### 05AP03-4

# An easy method to introduce a bronchial blocker to the intended bronchus in pediatric patients

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**Background**: It is rather technically difficult to introduce a bronchial blocker (BB) to the intended bronchus in pediatric patients, because the diameter of the trachea isn't enough wide to manipulate a fiber optic bronchoscopy (FOB) and a BB simultaneously. Here we introduced our easy method to achieve this. Our method is as follows.

At first, we intubated a proper size of tracheal tube and advanced it into the intended bronchus with the aid of FOB. Then we introduced an Arndt® bronchial blocker to the intended bronchus through the tracheal tube. After that we once extubated the tracheal tube remaining the bronchial blocker in the bronchus. Finally, we intubated another tracheal tube, and adjust the position of a BB after fixed the patients position. This report is a case series.

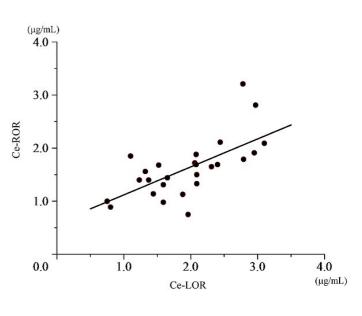
Case Report: We tried to apply our method to 9 pediatric cases (4 months to 3 years). 5 cases were congenital cystic adenomatoid malformation (CCAM), 2 cases were bronchial atresia, one case was pulmonary sequestration, and one case was mediastinal tumor. 4 cases were left side and 5 cases were right side. Tracheal tube size was 3.5 mm to 4.5 mm (i.d.).

In all cases, intubation to intended bronchus was easy (within 20 seconds), and BB could be advanced into the bronchus. After patients were placed in the lateral decubitus position, the position of BB was adjusted under FOB.

**Discussion**: An Arndt® bronchial blocker has a guide loop that enabled us to introduce the BB to the intended bronchus by FOB. However, manipulation of both BB and FOB is quite difficult or impossible in infant or small children because the diameter of a tracheal tube is not enough wide. With our method, introducing a BB to the intended bronchus is quite easy, and BB can be placed outside a tracheal tube, which made easier to handle FOB.

**Conclusion**: Our method presented here was quite effective to place a BB into the intended bronchus.

**Learning points**: We recommend that we once intubate a tracheal tube into the intended bronchus and intorducea BB, and extubate a tube then re-intubate another tracheal tube in peadiatric cases.



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05AP03-5 Anesthetic management of the Klippel-Trenaunay Weber syndrome

Sanchez Royo M. E.<sup>1</sup>, Gispets D.<sup>1</sup>, Sanchez-Migallon V.<sup>1</sup>, Boliart Y.<sup>1</sup>, Borras R. M.<sup>1</sup>, Miranda A.<sup>1</sup>

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**Background**: Klippel-Trenaunay-Weber syndrome (KWTS) is a rare congenital neuroectodermal disorder characterized by the triad of varicose veins, cutaneous capillary abnormalities and soft tissue hypertrophy. Frequently, it is associated with arteriovenous malformations (AVM) <sup>1</sup>. It has been linked to genetic mutations in angiogenic factors that are not yet well defined.

Case Report: A 12-year-old patient diagnosed with Klippel-Trenaunay-Weber syndrome admitted for scheduled surgery of proximal and distal epiphysiodesis of the left tibia and fibula. A general anesthesia is planned, discarding the neuraxial technique due to the existence of alterations in the lumbar blood vessels.

Once in the operating room, pneumatic stockings are placed on the patient as thromboembolic prophylaxis. Surgery is performed under balanced general anesthesia. Induction is performed with Fentanyl 100mcg, Propofol 100mg and Rocuronium 30mg. A first direct laryngoscopy is performed in which no lesion is observed at the level of the oral cavity and an orotracheal intubation is performed without evidence of bleeding.

For the anesthetic maintenance, Sevoflurane was used at fCAM 1%, remaining hemodynamically stable during surgery, without needing vasoactive drugs. The surgery proceeds without any incident and the patient is extubated in the operating room.

**Discussion**: The KTWS is an anesthestic challenge due to the high incidence of bleeding associated with regional anesthesia, which usually eliminates this option due to safety reasons <sup>3</sup>. The handling is also complicated in general anesthesia due to the possibility of a poor response to hemodynamic changes secondary to laryngoscopy, which could lead to a rupture of an intracranial AVM or severe bleeding of the oral cavity if there is a vascular malformation <sup>2</sup>.

- 1. Renard D, Campello C, Taieb G, et al. Neurologic and vascular abnormalities in Klippel- Trenaunay-Weber syndrome. JAMA neurology. Jan 2013;70(1):127-128. 2. Barbara DW et al. Anesthesia for surgery related to Klippel-Trenaunay syndrome:
- a review of 136 anesthetic. Anesthesia and analgesia. Jul 2011;113(1):98-102. 3. Abd-Elsayed AA et al. Anesthetic considerations in a parturint with Klippel-
- Trenaunay-Weber Syndrome Society of obstetrics anesthesia. 2011 **Learning points**: The development of an adequate and exhaustive anesthetic

**Learning points**: The development of an adequate and exhaustive anesthetic plan, familiarizing itself with the affected body regions (lumbar spine, oral cavity and airway), minimizes the risk in patients with KTWS.

#### 05AP03-5

# Anesthetic management of the Klippel-Trenaunay Weber syndrome

Sanchez Royo M. E.<sup>1</sup>, Gispets D.<sup>1</sup>, Sanchez-Migallon V.<sup>1</sup>, Boliart Y.<sup>1</sup>, Borras R. M.<sup>1</sup>. Miranda A.<sup>1</sup>

<sup>1</sup>Hospital Univeristario Dexeus - Barcelona (Spain)

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1.Renard D, Campello C, Taieb G, et al. Neurologic and vascular abnormalities in Klippel- Trenaunay-Weber syndrome. JAMA neurology. Jan 2013;70(1):127-128. 2. Barbara DW et al. Anesthesia for surgery related to Klippel-Trenaunay syndrome: a review of 136 anesthetic. Anesthesia and analgesia. Jul 2011;113(1):98-102. 3.Abd-Elsayed AA et al. Anesthetic considerations in a parturint with Klippel-

Trenaunay-Weber Syndrome Society of obstetrics anesthesia. 2011

**Learning points**: The development of an adequate and exhaustive anesthetic plan, familiarizing itself with the affected body regions (lumbar spine, oral cavity and airway), minimizes the risk in patients with KTWS.

# 05AP03-6

# Anesthetic management of the infant with cleft lip in a rural hospital in Sierra Leone. A purpose of two cases

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**Background**: The practice of anaesthesia in developing countries is a challenge for any anaesthesiologist due to the scarcity of human and material resources and the associated diseases suffered by patients. Paediatric anaesthesia is a major problem because apart from all the above, the characteristics of children's age and the typical diseases of these countries are added.<sup>1,3</sup>

Case Report: Two infants were scheduled for repair of unilateral labial cleft using Millard's rotation-advance technique. Both procedures were performed under general intravenous anaesthesia, orotracheal intubation with flexometal tube and maintenance of ventilation with Mapleson C circuit connected to an oxygen concentrator. One of the babies presented a bronchospasm in the anesthetic induction that resolved with conventional treatment and the other patient had a extended awakening attributed to prolonged relaxation that required neuromuscular reversal treatment. Without significant incidents during both surgeries, the two girls were extubated in the operating room and went to the hospital ward. There were no complications during their hospital stay.

**Discussion:** Paediatric anaesthetic management in developing countries is an additional difficulty for anaesthesia technicians working in this environment. The lack of adequate materials (it is very difficult to find paediatric sizes of masks, laryngoscope blades or pulse oximetry, for example) and the lack of proper training on the part of the anaesthesia staff (in the best case, many of them have education in anaesthesia for adults but little or no learning for the children), cause the perioperative morbidity and mortality rates to be much higher than ours <sup>2</sup>

#### References:

1. Paediatric anaesthesia in developing countries. SC Hodges, I Walker et al Anaesthesia 2007. 62 (Supl 1):26-31.

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3.Challenges of anaesthesia in the management of the surgical neonates in Africa G Amponsah. Afr J Paediatr Surg 2010, 7(3): 134-139.

Learning points: We need suitable material for children, we need more accesible training and education to our partners in these countries, we need the commitment of governements and institutions to promote training in neonatal and paediatric surgery and anaesthesia. With all this and many projects that are already underway, it will be possible to reduce perioperative mortality in children.

# 05AP03-8

# The most important cause of stridor in infants: A case of Laryngomalacia

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Background: Laryngomalacia is the most common congenital malformation of the larynx which causes stridor in infants. The stridor is inspiratory, musical, vibrating and usually develops first 10 days of life. Dyspnea with permanent and severe intercostal or xyphoid retraction, poor weight gain are the other symptoms (1). The aryepiglottoplasty or epiglottoplasty are the surgery methods in severe cases. General or intravenous anesthesia with spontaneous ventilation is selected in short term surgeries while the controlled ventilation is performed for longtime operations. In this report we aimed to discuss our anesthesia management of 2months old baby with laryngomalacia.

Case Report: The patient was 3.5kg,2months old,male, ASA-II. He had stridor, poor weight gain and feeding difficulties in his history. After parental consent he was taken to the operation room for diagnosis with flexible laringoscopy and aryepiglottoplasty surgery. Since the long operation was planned by the surgeon, general anesthesia with controlled ventilation was chosen for anesthesia method. In the operating room, the haemorespiratuar parameters were normal. After intravenous induction of anesthesia, during the laryngoscopy the epiglottis was observed long and aryepiglottic folds were seen short with flaccid mucosa. Vocal cords could not viewed easily. Intubation was performed after third attempt with a size of 2.5cuffed tube. General anaesthesia was started with sevoflurane 1,5% concentration in Air/O2 (50%/50%) mixture. Anesthesia was performed with low tidal volume and high frequency with manually. Aryepiglottoplasty was performed as an excision of offending part of aryepiglottic folds with microlaryngeal scissors. At the end of operation the patient extubated succesfully and taken to the postoperative care unit. No complications were observed, the patient sent to the ward

**Discussion:** Most forms of laryngomalacia are minor (70%) causing isolated stridor with no changes of crying or coughing, no dyspnoea. However 10 to 20% of the cases present signs of upper airway obstruction and require surgical therapy under anesthesia. The important part of anesthetic management for this cases include good communication and harmony with surgeon, suitable anesthesia depth, careful intraoperative monitoring and prepared for postoperative complications

#### References

1. European Annals of Otorhinolaryngology, Head and Neck disease (2013);130:15-21

**Learning points:** Working in a harmony with surgeon is a key point in a laryngomalacia surgery.

# 05AP03-9

# Anesthetic management for a difficult airway in a case of temple baraitser syndrome

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**Background:** Anaesthesiologists are trained to solve complicated situations amongst which are the intubation of patients with difficult airways. In paediatric patients these situations can also occur. Temple Baraitser syndrome is a rare syndrome with a prevalence less than 1/1000000.

Case Report: A four-year-old infant (20kg) with Temple Baraitser and Lennox syndrome, with chronic respiratory failure that requires nightly BIPAP, presented a huge superior and inferior gingival hyperplasia that was obstructing breathing. Palliative surgery to reduce lower gingival hyperplasia is performed.

Preoperative assessment was carried out thoroughly with routine investigations. Mallampati classification was not possible. In the oral cavity, gingival hyperplasia, haphazardly arranged teeth, reduced tongue mobility and an open mouth at rest were seen. High difficulty is anticipated when ventilating and intubating.

A slow inhalational induction, with gradually increasing sevofluorane (2 to 6%) was performed and 100% oxygen, while maintaining spontaneous breathing. There was good ventilation and intravenous access was established.

Intravenous fentanyl (1microg/kg) and propofol (1mg/kg) were administered. Intubation was tried two times with direct laringoscopy, The view was Cormack and Lehane grade IV. A second experienced anaesthetist was called. We finally performed a fibre-optic orotracheal intubation and a size 6.0 endotraqueal tube was inserted.

Surgery went on without complication and the patient was extubated uneventfully when spontaneous ventilation was recovered. After surgery upper airway obstruction improved significantly. However, high-flow nasal cannula (HFNC) was need during three days to maintain oxygen saturations above 90%.

**Discussion:** Paediatric airway deserves a special section among the difficult airway algorithms, the most recent guidelines already have a separate section on this issue. Fibre-optic intubation remains the "gold standard" for accomplishing tracheal

intubation in a difficult paediatric airway. Not only intubation, but also extubation is a dangerous moment, as a laryngospasm on a paediatric patient with a difficult airway might be a risky situation

**Learning points:** It is important for the anaesthesiologist to know the management of a difficult airway in paediatric and adult patients and the differences between both cases.

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1. https://www.das.uk.com/guidelines/paediatric-difficult-airway-guidelines

#### 05AP03-10

# Just keep breathing: spinal anesthesia in the extremely premature infant

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**Background:** Post-operative apnea in the neonate is a major concern after surgery. Spinal anesthesia has many advantages, such as minimal cardiorespiratory disturbances<sup>1</sup>. We describe a successful use of spinal anesthesia in a neonate undergoing inguinal hernia repair.

Case Report: A 33 weeks post-conceptional age premature (born with 26 weeks 5 days) boy, 1800g, with pulmonary hypertension and bronchopulmonary dysplasia, ASA III, was scheduled for a left inguinal hernia repair. The anesthetic procedure was explained and parental informed consent obtained. After arrival to the operating room, he was monitored according to ASA standard and sedation with sevoflurane 2% was initiated. The patient was then positioned in left lateral decubitus and an ultrasound-guided spinal anesthesia lumbar approach technique was performed with a 29G 35mm Quincke spinal needle and 0.55mg/kg bupivacaine 0.5% administered into the subarachnoid space. The patient was positioned in dorsal decubitus and surgery started while spontaneously breathing (FiO2 0.5). Hemodynamic and respiratory stability were maintained throughout the surgery that lasted 50 minutes. At the end of the procedure, under ultrasound guidance, an ilioinguinal and iliohypogastric nerve block was performed and 0.2ml/kg of ropivacaine 0.05% administered. The patient was safely transferred to the neonatal care unit.

**Discussion**: Spinal anaesthesia is a well-accepted anaesthetic technique for expremature infants undergoing infraumbilical surgery. One of its major advantages over general anaesthesia is to minimize the risk for postoperative apnoea and the need for ventilatory support. Furthermore, a major concern related to neuraxial techniques in small babies is the risk of potential spinal cord injury during the technique<sup>2</sup>. This is minimized with the use of direct-vision ultrasound guidance. The ilioinguinal and iliohypogastric nerve block provides post-operative pain relief after inguinal incisions and avoids the use of systemic opioids.

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- Gupta A., Saha U., Spinal anesthesia in children: A review, Journal Anaesth Clinic Pharm; Jan-March 2014
- 2. Goeller JK,Bhalla T, Tobias JD, Combined use of neuraxial and general anesthesia during major abdominal procedures in neonates and infants, Pediatric Anesthesia, 2014

**Learning points:** Combining ultrasound guided spinal anesthesia with ilioinguinal and iliohypogastric nerve block is a good anesthetic option for inguinal hernia repair in the neonate/infant.

# 05AP04-1

# Usefulness of diaphragmatic ultrasound in guiding tracheal extubation in pediatric surgery

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Background and Goal of Study: The optimal timing for tracheal extubation is important, especially in children, to prevent perioperative respiratory adverse events, such as laryngospasm, bronchospasm, persistent coughing, airway obstruction, and desaturation. The recovery of diaphragmatic function could be postulated as like as one of the main factor for successful extubation from mechanical ventilation while the sonographic evaluation has been conducted mostly in intensive care units. In this study we evaluate if the assessment of diaphragmatic mobility can be useful in identifying the timing of extubation in operating room.

Materials and Methods: A total of 40 patients aged between 3 and 6 years with no comorbidities, undergoing minor abdominal surgery, were studied and divided into two homogeneous groups. General anesthesia was conducted with sevoflurane, oxygen/air mixture and i.v. fentanyl in refracted bolus, without use of myorelaxants. In first group we proceeded to extubation following standard clinical evaluation and in the second one we evaluated also diaphragm function. B and M-mode sonography was used to measure the diaphragmatic excursion (DE) and diaphragmatic thickness (DT), expressed as diaphragmatic thickneing fraction (DTF), of the right hemidiaphragm (using the liver as acoustic window). We used a 7-10 MHz ultrasound transducer. Our target values were DE > 4 mm at the end of surgery in spontaneous ventilation and ΔDTF >30%. We recorded as ventilatory

parameters, at the end of surgery and at the resumption of spontaneous breathing, the end tidal sevoflurane, volume tidal, end tidal CO2, respiratory rate and oxygen saturation

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Results and Discussion: In the second group the extubation was performed only after the achievement of target values of DE and DFT and in 60% of cases it occurred after the normalization of ventilatory parameters. We recorded a reduced incidence of early post-extubation complications in group 2 (0% vs 5% in group 1 that consisted in episodes of desaturation resolved with oxygen administration via non-invasive ventilation for few minutes).

**Conclusion**: Our study has demonstrated the validity of the use of the ultrasonographic evaluation of the diaphragmatic activity as a valid support for the identification of the exact extubation timing at the end of anaesthesia even in the paediatric population.

# 05AP04-2

# TIVA safety in pediatric patients with cystic fybrosis and Kartagener syndrome undergoing FESS

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**Background and Goal of Study**: The aim of this retrospective study is to assess the safety of Total IntraVenous Anesthesia (TIVA) for patients with cystic fybrosis (CF) or Kartagener syndrome (KS) that underwent Functional endoscopic sinus surgery (FESS) procedures in the years between 2014 - 2017.

TIVA has been pointed as the first choice for the restraint of bleeding compared to inhaled agents in this kind of procedures. In this particular cluster of patients, the choice of anesthesia is even more critical due to higher risks of respiratory depression or postoperative pulmonary function decline. There is scant literature about this matter, but TIVA seems to ensure the most rapid awakening and tracheal extubation times with the lowest risk of respiratory depression.

**Materials and Methods**: We reviewed anesthesia charts and hospitalization records of 31 patients (17 females, 14 males; age 4 to 25 yrs), that underwent FESS (18) or FESS revision (13) between 2014-2017; 29 were affected by CF and 2 by KS.

Written consent for surgical and anesthetic procedures was obtained for all patients. A preoperative spirometry was performed.

All the procedures were conducted with TIVA (Propofol and Remifentanil) Younger children were induced with inhaled agents (N2O, Sevoflurane) and maintained with TIVA. Oral intubation was performed in all cases. We evaluated the time between end of the procedure and oral extubation, the occurrence of perioperative or post-operative complications, time of discharge from hospital.

Results and Discussion: All 31 patients have been discharged 24 hours after the surgery. Propofol administration was stopped immediately before the placement of nasal swabs, remifentanil was gradually reduced and completely stopped at the removal of sterile field. All patients resumed consciousness in times between 3 to 8 minutes after remifentanil suspension and were extubated 1 to 4 minutes after. Perioperative complications occured in 5 cases: 3 hypotension events after induction that required administration of ephedrine, 2 mild desaturations (Spo2 92%) that required deepening anesthesia and spontaneously resolved.

**Conclusion(s)**: These data suggest that TIVA is a safe anesthesia technique for patients with CF or KS in this particular surgical field. Anesthesia for CF patients should be object of further studies.

# 05AP04-3

# Mucopolysaccharidosis cases: ten years of experience in airway management

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**Background and Goal of Study**: Mucopolysaccharidosis (MPS) represents a group of rare lysosomal storage disorders associated with a progressive organ dysfunction <sup>(1)</sup>. Typical anaesthetic problems include difficult airway management, cardiovascular and cervical spine issues <sup>(1)</sup>. Objective: To review one hundred twenty-six (N126) anaesthetic charts following twenty children over a 10-year period with emphasis on airway problems.

Materials and Methods: A descriptive retrospective audit chart review of 20 patients with MPS who had received anaesthetics at the Niño Jesús Children's Hospital during the time frame January 2010–March 2017. We evaluated the type of anaesthesia, the airway devices used and the and frequency perioperative complications. Data are presented as mean and standard deviation, percentage.

Results: 100% of the procedures were performed with general anaesthesia. Primary airway management for the 126 procedures included 76 laryngeal masks (60.31%). Of 38 endotracheal tube (30,15%), 22 were managed by fiberoptic bronchoscopy (17.46%) and 12 with facial masks (9,52%). The most frequent complication was laryngospasm (4,69%) and the worst complication was a can't oxygenate can't intubate scenario which was resolved with an urgent tracheostomy. Discussion: The most important aspect MPS patients' anaesthetic considerations

is airway management. The anticipation of difficulties and preparation are of paramount importance. Even if not chosen as the first option, we highly recommend having a fiberoptic bronchoscope readily available in case other methods fail. Further, the use of LM to rescue the airway is recommended due to consistently good results. Nowadays, newly developed airway devices have greatly increased the safety of MPS

**Conclusion**: In our experience, a laryngeal mask is a very good option for minor surgery with children with MPS. Adverse events are less frequent using fiberoptic bronchoscopy intubation as the first option.

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#### 05AP04-4

# The changes of depth of tracheal cube by head and neck movement during dental surgery under general anesthesia for children

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Background and Goal of Study: The tracheal tube is often intubated through the nasal cavity for dental surgery. The position of the tip of the tube is important, as the head position is occasionally changed during dental surgery. It has been reported that forward bending of the neck may cause advance of the tip of the tube in the trachea, while the extension of the neck might result in the back of the tip. These situations may depend on the changes in the length of the trachea (t-length) and/or on the changes of the distance between the nare and the vocal code (n-v-distance). These changes might lead to bronchial intubation or unexpected extubation, especially in children as the trachea is shorter. Therefore, we investigated the changes of the t-length and/or the n-v-distance in children intubated nasotracheally Materials and Methods: Patients (2-15 yrs) undergoing dental surgery were enrolled. After pasotracheal intubation with uncuffed pasotracheal tube (4.5-6.0) mm), the tube was fixed to patient's nares. At the angle between the Frankfort plane and horizontal plane was 110°, the distance of between the tube tip and the 1st carina by using broncho-fiberscope. Subsequently, the location on the tube at the vocal code was checked also by using fiberscope. These measurements were repeated at the angle 80° (forward bending) and 130° (extension). The distances between the tracheal tube tip and carina were measured by fiberscope. The positions on the tube at the vocal code were also checked. The t-length and the n-v-distance were calculated with these measurements

**Results and Discussion:** In the case of forward bending of the neck, the t-length changed significantly from  $84.5 \pm 10.8$  mm to  $80.0 \pm 10.8$  mm (p=0.004). The n-v-distance changed from  $125.6 \pm 12.0$  mm to  $123.0 \pm 11.7$  mm (p=0.179). In the case of extension, the t-length changed significantly to  $88.7 \pm 10.4$  mm (p=0.005). The n-v-distance changed to  $126.9 \pm 12.2$  mm (p=0.501). The change of t-length was significantly larger than that of n-v-distance. These data suggest that the change of the position of the tube tip depends mainly on the change in the t-length. When the tube with cuff is used, we may need not be too nervous for the change of tube position at the vocal code.

**Conclusion:** According to the head and neck movements, the changes of the tip position of the tracheal tube in the trachea mainly depend on the changes of the t-length, not on the changes of the n-v-distance.

# 05AP04-5

The effect of different intraabdominal pressure on thiol/ disulphide homeostasis in children who underwent ambulatory laparoscopic surgery: A prospective randomized study

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Background and Goal of Study: Thiol/disulphide homeostasis is a significant parameter in determining the oxidative stress response after ischemia and reperfusion. We aimed to investigate the effects of applying different intraabdominal pressure (IAP) on thiol/disulphide homeostasis, ischemia-modified albumin (IMA) levels, and hemodynamics in pediatric laparoscopic surgery.

Materials and Methods: Blood samples were collected from 36 pediatric patients who were planned to undergo laparoscopic surgery for nonpalpable testis or varicocele under general anesthesia immediately after intubation as the baseline, and 5 minutes after abdominal desufflation for determining the thiol/ disulphide, and IMA levels. Group 1 received a pneumoperitoneum pressure of 8 mm Hg (n=18), and group 2 received 12 mm Hg (n=18).

Results and Discussion: No difference was detected regarding the clinical features between the groups. The comparison after intubation and after desufflation in group 1 demonstrated lower native thiol and total thiol levels, which was statistically insignificant. The serum native thiol level was found lower than baseline in group 2 where a 12 mm Hg IAP was applied, this difference was not statistically significant. The comparison of serum IMA levels after desufflation with the baseline in group 2 was found statistically significantly high. According to our literature search, our study is the first to compare thiol/ disulphide homeostasis in different intraabdominal pressures during laparoscopy surgery in pediatric patients.

Conclusion: We found that both 8 or 12 mm Hg IAP in pediatric laparoscopic surgeries caused no significant changes in thiol/ disulphide homeostasis parameters, and caused no oxidative stress that might affect the antioxidant pool of the human body. However, the early increase in IMA with 12 mm Hg IAP in children was interpreted as the organism's reperfusion response to a non-significant oxidative state.

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#### 05AP04-6

# Aicardi-Goutiéres syndrome - anaesthetic considerations in light of a case

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**Background:** The Aicardi-Goutiéres syndrome (AGS) is a rare genetic encephalopathy, with about 120 cases around the world. It manifests in early life with psychomotor retardation, skill regression, cerebral calcifications, microcephaly, axial hypotonia, limb dystonia, skin lesions, hepatosplenomegaly, among other findings.¹To the best of our knowledge, there are no case reports describing the anesthetic approach to AGS patients.

Case Report: The clinical case describes a 2-year-old patient with AGS referred for the placement of a cochlear implant. Preoperative evaluation showed low wheight, delayed psychomotor development, axial hypotonia, microcephaly, retrognathism, dental crowding and diffuse skin lesions. Imaging tests showed characteristic abnormalities with hepatomegaly and multiple cerebral calcifications. Because of anticipated difficult airway, different sizes of airway devices were provided. We performed an intravenous induction, no muscle relaxant was used and the intubation was done successfully, with a smaller tube, after three attempts. Anesthetic maintenance was achieved with a total intravenous anesthesia. The child remained stable throughout the entire procedure. He was successfully extubated and taken to the pediatric intensive care unit (ICU).

Discussion: The anaesthetic management of patients with rare syndromes characterized by multiorgan involvement is always a challenge. The involvement of physicians from other specialties is critical to the thorough assessment that is needed, and a carefull planning of the anesthesia should not neglect any point. The complete evaluation of the central nervous system and cardiorespiratory function allows us to be aware of the anaesthetic risk, which was increased according to the pre-existing dysfunction. A possible difficult airway should be anticipated in many of these cases and the airway management should be carefully planned. The possible need for mechanical ventilation demands rigorous care in the ICU in the immediate postoperative period

**Learning points:** AGS is a rare disorder with a poorly known anaesthetic management. This article is a concise review of the rigorous care and the need for multidisciplinary involvement in the approach to these patients when proposed for surgery. **Reference:** 

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#### 05AP04-7

### Children's caudal anesthesia during hypospadias repair

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Background and Goal of Study: Regional anesthesia techniques also in pediatric patients provide safe and effective pain relief during and after surgery. Epidural block by caudal route is the most popular technique in children's penile surgery. Adjuvants are safe and effective in pain control but are associated with some side effects. Goal of the study is to develop more efficient and safe anesthesia technique by a comparison of bupivacaine 0,25% vs bupivacaine 0,25% plus morphine 0,02 mg/kg for caudal block in children during hypospadias repair.

Materials and Methods: After local ethical committee approval and informed consent, 36 boys, (ASA I - II), who underwent elective hypospadias repair were included in the study. The bupivacaine 1 group (B=17 patients) received bupivacaine 0,25% in volume 1 ml/kg while the bupivacaine/morphine 2 group (BM=19 patients) received bupivacaine 0,25% in volume 1 ml/kg and morphine 0,1% in dose 0,02 mg/kg. All children received a sevofluran/oxygen/air anesthetic by laryngeal mask airway (LMA). The other anesthetic did not administer during surgery. The continual monitoring of hemodinamic indexes such as mean arterial pressure (MAP) and the heart rate (HR) was taken. CHEOPS scales were used for postoperative pain measurement in 2 hours after the surgery. The time of the 1stanalgetic supplementation and frequency of side effects were recorded. ANOVA test was used. P<0,05 were significant.

**Results and Discussion**: There were no statistically significant differences in age, body height and weight. Comparative assessment of the MAP and HR did not reveal statistically significant differences (p>0,05). The pain syndrome has estimated at 4,16±0,57, 4,0±0,5 points in 1, 2 groups respectively in 2 hours after the surgery. We did not get side effects such as respiratory depression, vomiting in our study. There were 5 cases of nose itch (group 2). Statistically significant distinctions were revealed during the 1st analgetic supplementation (P<0,05). Patients of the 1st group were transferred to urological department and patients of the 2nd group in ICU. The anesthesia complications were not revealed during the study.

**Conclusion**: In cases where children underwent penile surgery with the help of caudal block with bupivacaine 0,25% in volume 1 ml/kg and morphine 0,1% in dose 0,02 mg/kg produced longer analgetic effect, with fewer side effects and without any complications. This anesthesia technique is safe and effective for children.

#### 05AP04-8

# Immunogenicity and safety of inactivated vaccine in preoperative children

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Background and Goal of Study: It has been a common belief that surgical stress and anaesthesia suppress immune responses. However, there has been no report on changes in antibody titres and associated immunity to vaccines administered before surgery with general anaesthesia (1). Thus, we examined 1) whether anaesthesia modifies T lymphocyte populations, 2) whether the antibody responses to a vaccine administered before surgery are impaired, in children who undergo minor surgery with general anaesthesia.

Materials and Methods: Subjects were preschool children aged ≥1 year who underwent minor surgery with general anaesthesia and were received inactivated trivalent influenza vaccine 5-7days before the surgery (Group An). Age-matched healthy children who received the vaccine in the same season served as control (Group C). Total lymphocyte count, CD4/CD8 ratio and hemagglutination inhibition (HI) titer were measured before and 1 month after the vaccination. Total lymphocyte count and CD4/CD8 ratio were also measured 1 and 7 days after the surgery in Group An. The effects of the influenza vaccine was evaluated based on the standard of European Medicines Agency. Adverse events were also recorded. Mann-Whitney U test, chi-square test, student's t-test and an analysis of variance Results and Discussion: Fifteen subjects in Group An and 30 in Group C were enrolled in the study. There were no significant difference in the lymphocyte count and the CD4/CD8 ratio at entry between the 2 groups (p=0.22, p=0.28). There were no significant changes in the lymphocyte count, CD4/CD8 ratio during pre- and post-operative period in Group An and Group C. HI titers to influenza H1N1, H3N2 and B were significantly elevated after vaccination in both groups and there was no significant differences in the titers between the 2 groups. No significant adverse events were obserbed

Conclusion: Minor paediatric surgery had no major impact immune status of young children. Inactivated influenza vaccine is safe and immunogenic for children who undergo minor surgery

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#### Acknowledgements:

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### 05AP04-9

# Parental Presence at Induction of Anesthesia: A Survey Reflecting Parents' Experiences

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**Background:** Parents of children undergoing surgery are exposed to information addressing parental presence at induction of anesthesia (PPIA). This information often varies in presentation, content and quality. Through a survey, we investigated how parents are educated about PPIA and how preparation affects their PPIA experience. Additionally, we examined parental preferences for content and methods of conveying information, to guide future approaches.

**Methods**: Following QI project approval, a survey was administered to parents/ guardians of children presenting for elective surgery. The survey consisted of 29 questions, 15 common and 14 specific to their experience (PPIA versus No PPIA). Based on a ratio of 10-20 subjects per item, our goal was a minimum of 290 participants. Data was summarized using descriptive statistics.

Results 404 parents participated, from which 16.9% (95%CI 13.5-20.8) had PPIA. Half of the respondents (50.1%, 95%CI 45.3-55) were unaware of PPIA, 32.8% (95%Cl 28.4-37.5) were told on preadmission unit 3.7% (95% 2.3-6.1) on preanesthesia clinic, 9.4% (95%Cl 7-12.7) knew it from previous surgeries and 4% (95%Cl 2.3-6.4) from other sources. Among parents having PPIA, information was most often provided by anesthesiologists (62.7%, 95%Cl 50.7-73.3) and nurses (47.8 %, 95%Cl 36.3-59.5), followed by websites (16.4%, 95%Cl 7.5-25.3) or pamphlets (13.4%, 95%Cl 7.2-23.6). The majority of respondents (98.7%, 95%Cl 97-99.4) selected face-to-face discussion as the most effective way of preparation for PPIA, while websites were among the preferred methods for 9.7% (95%CI 7.1-13.1). In regards to content, 91% (95%CI 81.8-95.8) felt very well informed and 94% (95%Cl 85.6-97.7) felt very well prepared. The main points of interest were ways of assisting their child (78.4%, 95%Cl 74.1-82.1), the sequence of events during induction (75.1 %, 95%CI 70.7-79.1), the amount of time they can remain in the operating room (61.9%, 95%CI 57.1-66.6), the reasons for being (63.9%, 95%CI 59.1-68.5) or not being allowed to PPIA (59.5%, 95%CI 54.6-64.1) and the physician responsible for such decision (55.7%, 95%CI 50.8-60.5).

Conclusion: A small proportion of parents undergo PPIA at our institution. Despite the variation in the sources of information, the majority of parents felt adequately informed and prepared, with a preference for face-to-face methods. These results will help inform PPIA discussions while ensuring the points of main interest for parents are addressed.

# 05AP04-10

## Rigid bronchoscopy for airway foreign body removal -Complication related factors

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**Background and Goal of Study**: Airway foreign body aspiration is a risk in children, especially under the age of 3. Early removal of the foreign body by rigid bronchoscopy is crucial, but complications during the procedure may develop. One of the most frequent complications is hypoxemia. The goal of this study is to evaluate the appearance of complications during the anesthetic management of airway foreign body aspiration and also to compare groups in what concerns to intraprocedural complications development.

**Materials and Methods**: etrospectively reviewed all cases of rigid bronchoscopy anesthetic management (urgent and elective) of children from January 2012 to March 2017. Patients with complications were compared to those without them. Continuous variables were compared with the MannWhitney test and categorical ones with the  $\chi 2$ -test.

Results and Discussion: 36 patients were included in the study with a mean age of 4,2 years. Among the 36 children, 2 developed complications, including hypoxemia (N=1) and cardiac arrest (N=1). The other showed no reported incidents. From all considered variables, ASA physical status (I, II or IV) and ventilation mode (manual jet ventilation, automatic jet ventilation, controlled ventilation) were statistically significant between both groups. Other factors, such as gender, age, weight, elective or urgent surgery, duration of the foreign body in the airway, ventilation mode, type of anesthesia, foreign body location, duration of the procedure, time to emerge from anesthesia and successful foreign body removal were not significantly different between both groups.

Variables		Complications	No	P-value
			Complications	
ASA physical	I	0	24 (66,7%)	0.00
status				
	II	1 (2,8%)	10 (27,8%)	
	IV	1 (2,8%)	0 (0%)	
Ventilation mode	Manual jet ventilation	0	4 (11,1%)	0,018
	Automatic jet	1 (2,8%)	29 (80,6%)	
	ventilation			
	Controlled ventilation	1	1	

**Conclusion**: Airway management is a concern during bronchoscopy for airway foreign body aspiration and pediatric patients have increased complications and risks. Despite that, our sample showed a low rate of intraprocedural complications. It can be related to the experience of the multidisciplinary team that is activated in these situations. The development of complications appeared to be related to the ASA physical status and the ventilation mode used.

#### 05AP04-11

TIVA (total intravenous anaesthesia) for tracheoplasty surgery under ECMO (extracorporeal membrane oxygenation) in a 1 year old patient with congenital heart disease

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**Background**: Congenital obstructive anomalies of the trachea represent a unique perioperative challenge. Extracorporeal membrane oxygenation (ECMO) provides adequate respiratory support during tracheoplasty surgery and the use of total intravenous anesthesia provides hemodynamic stability. There are a few studies that recommend the use of bispectral index monitoring in pediatric patients by showing a correlation of BIS with end-tidal sevoflurane concentrations. We aimed to describe the use of TIVA in a patient diagnosed with a non-inherited genetic disorder who undergone tracheoplasty surgery under ECMO.

Case Report: A 13-month-old male infant weighing 6.7 kg, diagnosed with a noninherited genetic disorder, congenital heart disease (intra-atrial communication type Ostium Secundum and interventricular defect) and systemic pulmonary hypertension, tracheostomized and hospitalized in Pediatric Intensive Care Unit with respiratory failure due to recurrent tracheal granulomas, was scheduled for tracheoplasty surgery. A total intravenous technique was performed through TCI system (correlation with pediatric Paedfusor model through computerized software) and bispectral monitoring was used setting a BIS target of 45-55, dose titration. Anaesthetic induction was made with Fentanyl 5 mcg, propofol TCI 2mcg/ml, remifentanil and vecuronium 2mg. Anaesthesia was maintained with TIVA using propofol (TCI 2mcg/ml), midazolam and remifentanil. During ECMO we noticed an increase in propofol requirements to 2.5-2.8 mcg/ml. Resection and end-toend anastomosis was performed. Extracorporeal membrane oxygenation support (veno-venous) was sufficient for gas exchange during surgery and the patient was successfully weaned off intraoperatively (213 minutes). No ECMO-related complications occurred. The patient showed hemodynamic stability throughout the surgery, inotropic support was not necessary.

**Discussion**: TIVA allowed a safe handling of hypnosis and anesthetic depth during tracheoplasty surgery. We noticed an increase in propofol requirements to obtain BIS values of 45-55 when the patient was supported through ECMO. There was no need of inotropic drugs and the anesthetic technique showed hemodynamic stability.

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#### 05AP05-1

Ultrasound guided suprazygomatic maxillary block in infants for cleft repair: prospective observational study

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Background and Goal of Study: Cleft palate (CP) is a common and painful surgical procedure in infants. CP repair is associated with the risk of postoperative airway obstruction, which may be increased with administration of opioids, often needed for analgesia. Bilateral suprazygomatic maxillary nerve blocks approach improves pain relief after palate surgery and decrease opioids consumption in participatities period.

Materials and Methods: 58 children scheduled for surgical cleft palate repair were included. Ultrasound-quided suprazygomatic maxillary blocks were performed

according for 58 children scheduled surgical cleft palate repair were. The ultrasound probe was located optimally over the maxilla and under the zygomatic bone to visualize the pterygopalatine fossa. Depends on depth and visibility of pterygopalatinal fossa ultrasound navigated maxillary block were performed

with puncture side above (43 cases) or under zygomatic bone (15 cases). After identification of a maxillary artery 0,1ml/kg of 0,5% levobupivacain was injected. Spread of local anaesthetic, feasibility of block, opioid consumption and side effects were recorded.

Results and Discussion: 58 ultrasound-guided bilateral suprazygomatic maxillary nerve blocks were performed in 57 children. The needle movement was seen in all cases using an out-of-plane approach, worse visibility was observed with needle and probe in the infrazygomatic region. The spread of LA was clearly observed in all cases. A poor ultrasound imaging (absence of maxillary artery pulsation) was noted in 2 cases (3%), additional dose of opioid was needed in 1 case (2%). No complication related to maxillary blocks was reported.

**Conclusion:** Ultrasound navigated maxillary block for cleft repair is a technique with a very low technical failure rate and a good clinical success rate. Ultrasound appears to be a simple tool to improve success rate for suprazygomatic maxillary nerve block in children.

# 05AP05-2

Anesthesiological considerations on a case of a Giant Sacrococcygeal Seratoma (SCT) with a hybrid surgical approach

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**Background:** Sacrococcygeal teratomas (SCTs) can cause high output cardiac failure. Postnatal surgical interventions on SCTs have a much higher rate of survival than fetal interventions [Hedrick 2004]. Here we present a case of a giant SCT with a hybrid surgical approach including preoperative vascular embolization.

Case Report: Giant SCT (Altman stage III) was revealed at 34 weeks gestational age with moderate tumor vascularization. Postnatal angio-MRI revealed an extremely strong vascularization of the SCT. Vascularization had changed dramatically with transition of to the postnatal circulation. Two arteries with the same size as the aorta originating directly from the left iliacal artery were embolized preoperatively. With continuous transfusion, the infant was stable, during the early phase of surgical preparation. However, during preparation requiring manipulations on the embolized part of the tumor, the newborn's status deteriorated dramatically. Bleeding from all resected surfaces ensued rendering the resection of the tumor or even parts of the tumor impossible. Tranexamic acid was applied without any improvement. Extreme hyperkalemia and severe metabolic acidosis rapidly developed. In an attempt to correct hyperkalemia and acidosis, infusions of glucose/insulin, calcium chloride, hyperventilation, sodium bicarbonate and tromethamol were futile. Rapidly, the newborn demonstrated distinct signs of a systemic capillary leak syndrome including peritoneal swelling, lung edema and circulatory deterioration. requiring high dose catecholamine infusions. Pulmonary ventilation became literally impossible. At the point of repetitive epinephrine injections, a structured Team Time Out was performed and therapeutic aim was changed rigorously. The infant passed away in the arms of the parents.

**Discussion**: This is the first report of a hybrid surgical approach to resect a giant SCT. The case demonstrates that prenatal assessment of SCT perfusion can differ significantly from the perfusion post partum, due to the overall transition to postnatal circulation of the newborn. **References**:

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### Learning points:

- . Prenatal and postnatal vascualarization of SCT can differ immensely due to conversion of fetal circulation.
- 2. Hybrid procedure might be an option to facilitate surgical SCT resection.

# 05AP05-3

# Chronic Postoperative Pain in Paediatrics – a systematic review

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**Background and Goal of Study**: Chronic postoperative pain (CPOP) is an increasing public health issue considering its impact on the patients' quality of life and its associated costs for the healthcare systems. The incidence of CPOP in adults can be as high as 75%, depending on the surgical procedure and other factors. Little is still known about CPOP in paediatric age.

The goal of this study was to determine the incidence and known risk factors of CPOP in children.

Materials and Methods: The MEDLINE database from 2007 to 2017 was searched with the keywords: Chronic postoperative pain and children or pediatric.

**Results and Discussion**: Six randomized controlled trials that met inclusion criteria were obtained: 681 patients between 2 and 18 years old were submitted for orthopedic or general surgery. CPOP were defined differently by the trials.

The incidence of CPOP in children was of 11-38%. The risk factors indentified were Hispanic ethnicity, parents' catastrophization of pain, the existence of preoperative pain and non-controlled acute postoperative pain.

Conclusion: The incidence of CPOP was similar to the adult population. Several risk factors were indentified. A generally accepted definition of CPOP is needed.

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#### 05AP05-4

Effect of postoperative analgesia method on intraabdominal pressure in newborns at risk of abdominal compartment syndrome

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Background and Goal of Study: Intraabdominal pressure (IAP) is a steady state pressure in abdominal cavity. Normally it is about 5-7 mm Hg in adults and nearly 0 in children. Persistent IAP rise higher than 10 mm Hg in children is called intraabdominal hypertension (IAH), and its combination with organ dysfunction abdominal compartment syndrome (ACS). ACS is associated with high mortality rate. We hypothesized that the postoperative analgesia methods provide influence on the IAP level throw the abdominal wall compliance and intestine function state. Materials and Methods: Twenty newborns aged 0-28 days with body weight of 1200-4300 g who had undergone surgery due to gastroschisis, omphalocele and necrotizing enterocolitis were enrolled in the study. Children were randomized into two groups depending on postoperative analgesia method. Children in experimental group (group E, n=10) had continuous epidural analgesia in postoperative period (Th9-Th10 level, bupivacaine 0.2%, 0.2 mg/kg\*hour). In children of control group (group M, n=10) postoperative analgesia was performed with continuous intravenous morphine infusion (20 mcg/kg\*hour). IAP (mm Hg) was measured 4 times per day postoperatively in all children through urinary catheter. We also detected the days of first bowel movement, start of enteral nutrition and first defecation. Unpaired t-tests were used to analyse the differences between groups and a P-value of <0.05 was considered statistically significant.

Results and Discussion: Children of epidural group compared to controls had significantly 1.5-fold lower values of IAP (6.9±0.6 and 10.6±0,5 mm Hg, respectively, P <0.05). The children in epidural group presented earlier restoration of bowel function: the time of the first bowel movement (3,5±1.0 and 7,5±1,8 days, respectively, P <0.01), first defecation (4,5±1,5 and 9,5±0,5 days, respectively, P <0.01) was 2-fold shorter than in control group. The enteral nutrition was started on the day 5±0,9 in epidural group and on the day 9±0,7 in the morphine group (P <0.01). Epidural anesthesia enhances splanchnic circulation and promotes paretic ileus resolution. This leads to IAP decrease, ACS risk reduction and possibility of early enteral nutrition

**Conclusion**: Postoperative epidural analgesia in newborns after abdominal surgery leads to intraabdominal pressure decrease and earlier restoration of intestine function compared to systemic opioid analgesia.

#### 05AP05-

Effect of implementation of a specialised paediatric anaesthesia team and training programme on incidenes of perioperative paediatric cardiac arrest: a before and after analysis.

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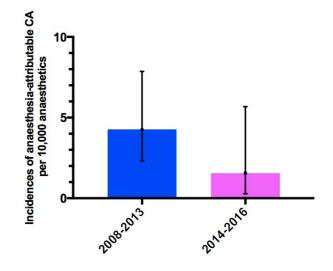
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Background and Goal of Study: This study analyses incidences of perioperative paediatric cardiac arrest (CA) before and after implementation of a specialised paediatric anaethesia team and training programme at tertiary care university hospital in Germany.

**Materials and Méthods:** Reports on perioperative paediatric (0-18 yrs) CA were identified from all critical incident reports 2008-2016. CAs were classified as anaesthesia-attributable or anaesthesia-unrelated. Incidences of CA were calculated from the anaesthesia database. A logistic regression analysis with risk factors (age, ASA physical status grade [ASA-PS], emergency) was used to evaluate the impact of implementation of a specialised paediatric anaesthesia team and training programme in 2014 on perioperative paediatric CA.

Results: Between 2008 and 2016, 25 perioperative paediatric CAs were identified. Of these, 12 were classified as anaesthesia-attributable CA. The incidence of anaesthesia-attributable CA was 4.3 (95%-Cl 2.3-7.9) in the period 2008-2013 and decreased to 1.6 (95%-Cl 0.3-5.7) in 2014-2016 (*Figure1*). Likewise, the incidence of overall CA was lower after 2013 [4.6/10,000 (95%-Cl 2.1-10.2) vs 8.1/10,000 (95%-Cl 5.2-12.7)]. Children anaesthetised after 2013, had nearly a 70 percent lower probability of anaesthesia-attributable CA (OR 0.306; 95%-Cl 0.067-1.397; p=0.1263) although proportions of children aged <1 year and classified ASA-PS 3-5 were greater in the period 2014-2016. For anaesthesia-attributable CA, young age was the most contributing risk factor whereas in overall paediatric CA, ASA-PS 3-5 played a more important role. During the study period, 91.7% (11/12) of anaesthesia-attributable CAs occurred in children ≤3 years.

Conclusions: Young age, ASA-PS and cardiac procedures contribute as main risk factors to perioperative paediatric CA. In this study on the incidences of perioperative paediatric CA from a European tertiary care university hospital, implementation of a specialised paediatric anaesthesia team and training programme was associated with lower incidences of perioperative paediatric CA and a reduced probability for anaesthesia-attributable CA.



#### 05AP05-6

# Pediatric emergence delirium from the anesthesiologist's point of view: a survey at our Tertiary Care Pediatric Center Sant Joan de Déu Hospital Barcelona

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Background and Goal of Study: Although pediatric emergence delirium (ED) is a frequent (10 to 80%)¹ complication occurring after anesthesia in children, evidence on different pharmacological and non-pharmacological preventive and therapeutic approaches is partially vague. General anesthesia in children may be related to adverse effects on children's brain development; ED may be involved.

As one of the most important Tertiary Care Pediatric Center in Spain, Hospital Sant Joan de Déu Barcelona aims to reach the highest quality level of anesthesia performance. In order to explore ED characteristics in our institution we have sought to elicit the experience and opinions of our professionals about definitions and diagnostic criteria for ED, preventive strategies, treatments, and their perceived efficacy.

Materials and Methods: A web-based survey was sent to the 40 pediatric anesthesiologists working at our academic health science center. It was based on a previous published survey on the topic<sup>2</sup> designed to elicit the opinions and practice around pediatric ED by an experienced set of pediatric anesthesiologists.

Results and Discussion: The response rate was 90% (36/40). Of respondents, 56% felt that ED was a significant problem at our institutions, with 69% giving medication before or during anesthesia to prevent the development of ED. Midazolam was the most common medication given to prevent ED (86%) and propofol the most frequet chosen drug to treat ED (51%). Only 11% considered total intravenous anesthesia (TIVA) a technique used to prevent ED. Medications used for treatment included propofol (51%), midazolam (46%) and fentanyl (3%) as a first line treatment, with 80% of respondents rating effectiveness of treatment as 'usually works quickly with one dose'. Surprisingly only 1/36 responders declare rutinary scale ED. Conclusion: We have discovered lack of ED scaling and inhomogeneous

preventive and therapeutic approaches to ED in our institution.

A local prospective observational research is being conducted, our goal is to define

A local prospective observational research is being conducted, our goal is to defin actual practice. We aim to archive a stepwise clinical intervention algorithm.

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### 05AP05-7

# Parental non-adherence to postoperative prescribed pain management for their child is not associated with higher pain scores

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**Background and Goal of the Study:** Pain at home after adenotonsillectomy is a major issue and parents often undertreat their children's postoperative pain (1,2). Aim: 1. to assess parental adherence to prescribed pain management for their child at home during the first three days after adenotonsillectomy; 2. to investigate the association between non-adherence and the child's postoperative pain scores.

**Materials and Methods:** After IRB approval a prospective cohort study was performed. Inclusion: eligible were all children between 1.5 and 6 years old, ASA 1&2, undergoing adenotonsillectomy in a day-care setting. Exclusion: known mental retardation.

Standardized prescribed pain management at home: consisted of oral paracetamol (syrup 15 mg/kg four times a day) and oral lbuprofen (syrup 5 mg/kg four times a day) administered 'by the clock'. Parents were asked to register medication adherence in a diary at home during the first three days.

Outcome parameters: 1. postoperative pain at home assessed using the sum

score of the Parents' Postoperative Pain Measure (PPPMsum) at home during the first 3 days; 2. the total number of administered pain medications during the first 3 postoperative days. Adherence was defined as having administered at least 13 of the 24 prescribed pain medications during the first 3 postoperative days. Accordingly, two groups were created: non-adherence group ('G1') and adherence group ('G2').

Statistics: Spearman's rank correlation was calculated to determine the association between the number of pain medications administered and postoperative pain. Differences in postoperative pain levels between G1 and G2 were analyzed using Mann-Whitney U (MWU) test.

Results and Discussion: This study included 144 patients (51% girls) with a mean age of 46.4 months (SD ± 11.2). The median total administered pain medications was 13 (IQR 10-17). Sixty-two (43%) parents were considered non-adherent. The median PPPMsum score was 17(IQR 8-25). Spearman rank correlation revealed no significant correlation between the total number of administered pain medications and the PPPMsum scores (r=.004; P=.967). MWU test between G1 and G2 was non-significant (P=.412).

**Conclusion(s):** Parental non-adherence to prescribed pain medication for their child is a problem. Surprisingly, no associations were found between parental adherence to pain medication and pain scores at home.

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#### 05AP05-8

# Change in internal jugular catheter tip position with head and neck movement.: A retrospective study

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Background and Goal of Study: Endotracheal tube displacement due to head and neck movement has been well described. We hypothesized that head and neck movement would also affect internal jugular catheter tip position. Changes in catheter position can sometimes lead to serious complications. The risk is particularly high in pediatric patients who are likely to move the head and neck. This

study aimed to determine whether head and neck movement affects internal jugular

catheter tip position in pediatric patients.

Materials and Methods: This retrospective study was performed between January 2014 and October 2017. All pediatric patients (aged 0-6 y) undergoing elective cardiac surgery were enrolled. Radiography was performed in both neutral and left head rotation positions. Using X-ray photography, we measured the change in distance between the catheter tip and the level of the 12th vertebral upper edge. Changes in catheter tip position between neutral and left head rotation position were analyzed using a paired t test. We defined clinically significant displacement as >1 cm.

**Results and Discussion**: The study enrolled 24 pediatric patients. Mean extent of movement was  $0.18\pm0.89$  (-1.58 to 2.42) cm (P =0.3). Maximum displacement of catheter tip position was 2.42 cm. Clinically significant catheter tip displacement (>1 cm) occurred in 25% of patients. Displacement occurred in an unpredictable manner (advancement in 2 patients, and withdrawal in 4). Our data showed that left head rotation did not significantly displace the catheter tip position in most cases. However, displacement of >1 cm still occurred in 25% of cases. Pediatric patients have difficulty holding the head and neck motionless, and the duration of catheter retention is shorter than that in adults.

**Conclusion**: In some cases, head and neck movement caused catheter advancement or withdrawal that could lead to severe complications. Factors that can affect catheter movement, such as puncture angle, puncture site on the neck, and fixed catheter position require further study.

# 05AP05-9

# Success of epidural technique in children could be predicted using pupillometry (algiscan®)

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**Background**: Regional and central blocks in children have usually been performed under sedation or general anesthesia. Success of the technique was usually assessed by haemodynamic parameters once the surgery was initiated. However, monitors of analgesia, as the pupillometry Algiscan, may help predict intraoperative levels of pain prior to incision.

Case report: Two paediatric patients, aged 4 and 10 years repectively, were scheduled for femoral osteotomy. They had previous history of subtrochanteric femoral shortening with no other important diseases. General anaesthesia was induced with sevoflurane 6% and once iv catheter was inserted, propofol 2 mg/kg and fentanyl 1 mcg/kg were administered. HR, SpO2, arterial pressure and BIS were monitored. Anaesthesia was mantained with Sevoflurane (BIS 50-60) and

remifentanil 0.05 mcg/kg/min. Epidural catheter was placed in L4-L5 interspace using a loss of resistance technique. L-bupivacaine 0.25% at a dose of 0.4 ml/kg was administered. An electrode on the same dermatome as the expected incision site was placed prior surgical field setting and was connected to the Algiscan. Pupillary dilation (using Pupillary Pain Index "PPI" from 1 to 10) produced by nociceptive stimulation caused by an increasing tetanic stimulation (from 10 to 60 mA) was measured every 15 minutes after epidural bolus. Once pupilar diameter reflex reaches 13 % (infranociceptive index) the tetanic stimulations stops and shows a PPI score, related to the quality of analgesia. On our recordings, none of the measures reached any value PPI score> 4, which correlates with good intraoperative analgesia. Haemodynamic parameters did not change when incision was performed, which also showed good correlation with PPI previous scores. VAS scale for immediate postoperative pain was also 0-2 respectively in the PACU. The patients remained haemodinamically stable during surgery.

**Discussion**: PPI score may be useful to predict the success of a regional technique in children prior to surgical incision. In our cases, PPI scores had good correlation with haemodinamic parameters and levels of postoperative pain. This may also be a good option to adjust analgesia before any noxious stimuli appears in the patient as per traditional haemodynamic parameters.

**Learning points**: Pupillometry may help predict surgical pain prior incision in children with regional blocks under general anesthesia. Further studies are still necessary to confirm these findings.

### 05AP05-10

# Perioperative Quality Improvement (QI) Project for Pediatric patients aged 6 months to 14 years, with Emphasis on Anxiety and Premedication in a Tertiary level Hospital

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**Background:** The Anesthetic Department undertook a QI project during 2017 to address the management of preoperative anxiety and sedative premedication among children. The collected data revealed only 10% received sedative premedication and 30% showed moderate to severe anxiety during induction. The findings indicated room for improvement.

**Methods:** From April to September 2017, awareness regarding the use of sedative premedication was raised through in-service lectures to staff in the Anesthetic Department and perioperative Nursing. A Sedative Pre-Medication Guideline was drafted and disseminated. Plan, Do, Study & Act (PDSA) technique was used to identify and overcome obstacles.

**Results:** Data were collected from 137 patients coming through Day Surgery Unit (DSU). The patients were divided into groups by age (Group I = 6 months to 6 years; Group II = 7 to 14 years).

There were 79 patients in Group I and 58 patients in Group II. 40% of patients (n=55) received sedative premedication of which 69% were in Group I (n=38) and 31% in Group II (n=17).

53% (n=57) received EMLA cream in acceptable time before intravenous cannula insertion

Moderate to severe anxiety was exhibited at induction of anesthesia by 33% of patients (n=45) as per VAS scale and 45% (n=62) as per the ICC assessment tool. In this subgroup 27% (n=17) received sedative premedication. On closer subgroup analysis we found that all 17 patients either received too low a dose in relation to weight or inadequate timing of premedication in relation to induction of anesthesia. **Conclusion:** We work in a multi-cultural hospital where only 40% of health care staff speak Arabic with a patient population that is almost exclusively Arabic speaking. This implies that sedative premedication is an important tool to deliver safe, efficient and high-quality care. A small investment in multiprofessional awareness was noted to have improved anxiety management by increasing sedative premedication to pediatric patients.

In the next step, we will focus on implementing non-pharmacological methods such as pre-operative information package to both children and relatives before anesthesia. In addition, we are trying to change the operating room sign-in process to facilitate a more silent and calm atmosphere for children unlike the current cituation.

#### 05AP06-

# A retrospective view of postoperative management in children undergoing hypospadias surgery

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Background and Goal of Study: Hypospadias is one of the most common congenital anomalies occurring in approximately (1/300) male births. If it is not surgically corrected the consequences may negatively impact on quality of life in adolescents. The surgery is very invasive and the post-operative phase very painful. To improve the control of post-operative pain, single dose caudal injection of bupivacaine or levobupivacaine +/- opioids in conjunction with intravenous meperidine PCA was implemented over years in our tertiary hospital, Sant Joan de Déu Barcelona Children's Hospital.

Surgeons refuse morphine intravenous instead of meperidine because the incidence of paralytic ileus seems to increase but there are not data recorded in our center. **Materials and Methods**: A retrospective study between January 2016 and November 2017 of children scheduled to hypospadias repair under general anesthesia with single dose caudal injection and a continuous infusion pump of meperidine (dose 0.6 mg/kg/h)

Demographic characteristics (age and weight), Ramsay scores at 12h and 24h; VAS (visual analogue scale) scores at rest and in motion after 12h, 24h, and 48h; dispensed boluses, nausea and vomiting; pruritus and complications were recorded **Results and Discussion**: 49 children were involved. 2 of them were reinterventions of hypospadias surgery repair.

Results are shown in table 1.

Age (mean)	Weight (mean)	404	VAS ≥3 12h (number of patients)	VAS ≥3 24h (number of patients)	Pruritus	Nausea and vomiting	complications
,		ASA (mediana)			(number of	(	
(years)	(kg)		Rest/in motion	Rest/in motion	patients)	(number of patients)	(number of patients)
3.3	17.3	2	2/3	0/0	0	2	0

Table 1.

There were no complications attributable to the caudal block recorded. Only 2 children presented nausea and vomiting and only one despite prohylaxis.

Other techniques to relief pain after hypospadias surgery include: continuous postoperative analgesia via epidural catheter, rectal and oral analgesics at scheduled times and on demand after penile block.

Many results were not recorded because nursing staff find difficulties evaluating pain scores.

**Conclusion:** Addition of meperidine to single dose caudal injection offers an adequate postoperative pain treatment and patient and parents satisfaction in our center.

# 05AP06-2

# Anesthesia with ketamine-propofol versus remifentanilpropofol from the perspective of children, their caregivers, gastroenterologists and recovery room staff

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**Background and Goal of Study**: Most children require general anesthesia to perform gastroscopy. The aim of the study was to compare anesthesia using ketamine-propofol versus remifentanil- propofol in terms of the opinion of patients and their parents, endoscopists and recovery room staff.

Materials and Methods: The prospective, randomized, single blind study included 90 children anesthetized for scheduled gastroscopy. Intravenous anesthesia with maintained spontaneous respiration was used. Group K included children anesthetized with ketamine and propofol, Group R children anesthetized with remifentanil and propofol. In order to obtain the opinion of children and their parents, an anonymous questionnaire was completed in the afternoon, after anesthesia. The endoscopist assessed the conditions of endoscopic examination as: difficult, good or excellent. The recovery room nurses defined the behavior of children after regaining consciousness as: serene/calm or confused/agitated. The evaluators did not know to which study group the patients belonged. Statistical analysis was performed using the STATISTICA 12 software.

**Results and Discussion**: All children who completed the questionnaire favorably evaluated the course of anesthesia. There was no significant difference between the groups in the assessment of the worst moment (p = 0.96). A statistically significant difference was in remembering the moment of falling asleep in Group R (p <0.001) and dizziness after anesthesia in Group K (p <0.05), figure 1. All parents were satisfied with the cooperation with the anesthesiologist and favorably assessed the course of anesthesia. There was no significant difference in the assessment of the child's condition after anesthesia (p = 0.99) or the occurrence

of disturbing symptoms (p = 0.89). There were statistically significant differences in assessing the conditions of examination by the gastroenterologist (p <0.05) in favor of Group K. The behavior of the child after recovery was significantly different in the groups (serene in Group K 45.7% vs. 90.9% in Group R, confused 54.3% vs. 9.1%, respectively; p <0.001), figure 2.

Conclusions: The combination of ketamine with propofol provides very good conditions for endoscopic examination, with more frequent confusion after regaining consciousness. The combination of propofol and remifentanil results in cheerful mood after waking up. Both anesthesia methods have been favorably assessed by patients and their parents/caregivers.

### 05AP06-3

# Application of Fibrinogen in Pediatric Craniosynostosis Surgery. A double-blind, placebo-controlled trial

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Background and Goal of Study: Surgical correction of pediatric craniosynostosis is associated with high perioperative blood loss. Recent studies advocate the intraoperative application of fibrinogen to reduce blood loss and the amount of blood transfusions. We performed a double blinded, randomized trial to evaluate the efficacy of fibrinogen (Haemocomplettan® P) in children undergoing craniosynostosis surgery.

Materials and Methods: 120 otherwise healthy children with non-syndromic craniosynostosis scheduled for surgical correction were randomized into two groups. The day before surgery a blood sample was taken to obtain a basic fibrinogen value. After induction of anesthesia the FIBRINOGEN-GROUP received a boost of fibrinogen (Haemocomplettan® P) to achieve a fibrinogen level of 3 g/l followed by an infusion of 60 mg/kg BW of fibrinogen (Haemocomplettan® P). The PLACEBO-GROUP received the same amount of NaCl in ml at the same time points. No medication affecting the clotting system such as tranexemic acid or heparin was used. Endpoints were perioperative blood loss and the amount of transfused blood products.

Results and Discussion: We included 114 children. No statistic relevant differences were found in the patient characteristics. A total of 79 mg/kg BW (median) of fibrinogen (Haemocomplettan® P) was given in the FIBRINOGEN-GROUP. No differences were found neither in the amount of perioperative blood loss, nor in the amount of transfusion of red blood cells (pRBC), plasma and platelets. This stands in remarkable contrast to recent publications.

Conclusion: Our findings suggest that the intraoperative application of 79 ml/kg BW fibrinogen (Haemocomplettan® P) has no effect on blood loss and transfusion requirement in children undergoing craniosynostosis surgery.

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	Fibrinogen (n=56)	Placebo (n=55)	Р
Age (months)	11 (9.7 11.3)	10 (9.8 11.3)	
Intraoperative esti- mated blood loss (ml/ kg BW)		45.9 (33.7 62.6)	0.524
Postoperative calculated blood loss (ml/kg BW)		27 (20.8 33.5)	0.242
Transfusion of pRBC (ml/kg BW)	30 (25.3 43.1)	28.8 (21.7 45.3)	0.351

Table: Age, perioperative blood loss and transfusion volume. Values are given as median (25% 75% quantile). P was calculated using Ranksum test.

### 05AP06-4

# The utility of sugammadex in ultra fast-track extubation after pediatric cardiac surgery

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Background and Goal of Study: Sugammadex reverses neuromuscular blockade by chemical encapsulation of rocuronium. It avoids the cardiovascular side effects of the anticholinesterase agents, which could be especially harmful in pediatric cardiac patients. This observational study explored efficacy of sugammadex in children undergoing cardiac surgery under bypass.

Materials and Methods: We studied 8 patients (American Society of Anesthesiologists class 2-4), undergoing scheduled Fast Track pediatric cardiac surgery under cardiopulmonary by-pass, median age: 48 months (11-156 months), median weight: 16.5 Kg (7-63 Kg). The procedures included: 4 surgical closure of septal defects, 1 Fontan procedure, 1 pulmonar valvuloplasty and 2 aortic valvuloplasty.

Induction was performed with midazolam 0.3 mg/Kg or propofol 2 mg/Kg, 5-10 mcg/Kg fentanyl and 0.6 mg/kg rocuronium. General anesthesia was maintained with sevoflurane CAM 0.8, remifentanyl 0.20 mcg/Kg/h and rocuronium 0.4 mg/ Kg/h. The perfusions were stopped at the end of the bypass. After the skin closure neuromuscular monitoring was performed using acceleromyography. If TOF< 75% they received a first dose of 2.0 mg/kg sugammadex, which could be repeated until the train-of-four (TOF) ratio was 0.9. Our objectives were to analyze time from sugammadex administration to recovery of the TOF ratio to 0.9, time until extubation and operating room exit time.

We recorded adverse events such as: broncospasm, laryngospasm, recurrence of blockade, re-intubation and EKG abnormalities.

**Results and Discussion**: The median initial TOF was 0.22 (0.10-0.37). After one minute of the administration of a first dose of 2 mg/Kg the median TOF was 0.66 (0.10-0.37). A second dose of 2 mg/Kg was necessary in 7/8 patients. After five minutes all the patients had a TOF>0.9.

Median time since sugammadex administration until extubation was: 17 (16-25 min). After sugammadex administration median operating room exit time was:28 (26-35 min).

Sugammadex was well tolerated. We didn't need to reintubate any patient. No reoccurrence of blockade or inadequate reversal were observed. In one case (1 yr) there was a laryngospasm that revert with the use of CPAP and a bolus of 10mg of propofol. There were no significant QT prolongations, or other EKG abnormalities. Conclusion: In our study Sugammadex was safely used in children after cardiac surgery. It's effectiveness and rapid recovery times contributed to an early extubation in our patients.

### 05AP06-5

# Balanced crystalloids versus saline intravenous fluid administration in children undergoing neurosurgery: a randomized clinical trial

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Background and Goal of Study: Balanced crystalloid solutions have been reported to induce less hyperchloraemia than normal saline, but their role as primary fluids replacement for children undergoing surgery has not been established yet. We hypothesised that perioperative use of balanced crystalloids induces less metabolic derangements than 0.9% saline in children undergoing brain tumour resection.

Materials and Methods: Fifty-three patients (range, 6 months and 12 years old) were randomized to receive either a balanced crystalloid (balanced group) or 0.9% saline solution (saline group) during and after (for 24h) brain tumour resection. Serum electrolyte and arterial blood gas analyses were performed at the beginning of the surgery (baseline), at the end of the surgery, and at day 1 postsurgery. The primary outcome of this trial was the acute postoperative variation in serum chloride, measured as the absolute difference between the end-of-surgery and the baseline plasma concentrations. As secondary outcomes, we measured the acute postoperative variations of other electrolytes and the brain relaxation score (BRS), a four-point scale evaluated by the surgeon for assessing brain edema.

Results and Discussion: The median postoperative serum chloride variation (mmol  $l^{-1}$ ) was lower in the balanced [0 (-1.0 to 3.0)] than in the saline group [6 (3.5 to 8.5)]; pc .01. Median variation in base excess (mmol  $l^{-1}$ ) was lower [-0.4 (-2.7 to -1.3) vs -4.4 (-5.0 to -2.3); p< .01], and metabolic acidosis less frequent (21% vs 68%; p< .01), in the balanced than the saline group. BRS was comparable between the groups. Despite safety concerns about hyperchloremia, there are few studies comparing saline and balanced solutions in children. We found a safer metabolic profile in the balanced versus the saline group. We also assessed BRS, since brain edema control is a priority in neurosurgery.

Conclusion: Balanced crystalloid solution infusion in children undergoing brain turnour resection reduced variation in serum chloride from preoperative to postoperative period. The findings of this trial support the use of balanced crystalloid solutions as compared to normal saline in children undergoing brain turnor resection.

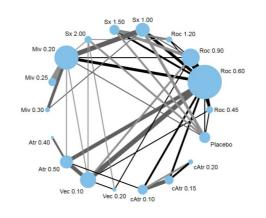
# 05AP06-6

# Systematic review with network meta-analysis of neuromuscular blocking agents to facilitate endotracheal intubation in children aged 1-12 years

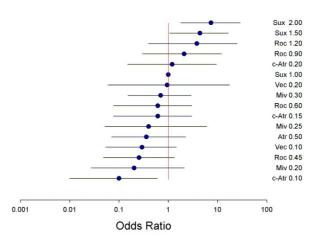
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Background and Goal of Study: Neuromuscular blocking agents (NMBAs) can help creating excellent intubating conditions (EIC) and prevent laryngeal morbidity. By reducing the amount of anaesthetic agent required, the use of NMBAs is associated with less haemodynamic depression and more rapid recovery of consciousness. However, efficacy of NMBAs to create EIC remains unclear owing to limited number of trials and by variability in study's design, participants and exposures. Network meta-analysis (NMA) expands the scope of conventional pair-wise meta-analysis by simultaneously comparing alternative treatment options, even when two of the treatments have not been directly compared. Materials and Methods: We followed PRISMA and GRADE [1] for guidance. RCTs related to the use of NMBAs to facilitate tracheal intubation in children aged 1-12 years were searched. Excellent intubation conditions (EIC) were selected as primary outcome. We explored heterogeneity using pair-wise meta-analysis on subgroups. Co-variables such as anaesthesia technique, time to intubation, rapid sequence induction (RSI), patient's age and continent of study were tested for their interaction with EIC. NMA was performed using multivariable random-effect metaregression models while odds ratios (ORs) were used to calculate a hierarchy of treatments to obtain EIC.

**Results and Discussion**: A total of 59 eligible trials including 5239 participants in 176 treatment arms were identified (Fig. 1).



Time to intubation, RSI, use of opioids, age of the children were significantly associated with EICs. Treatments are represented by the NMBA/dose (mg.kg¹) used. OR [95%CI] of EICs can be found in Fig2.



**Conclusion**: Network meta-analysis offers a set of methods to interpret the wider picture of the evidence and to understand the relative merits of different interventions.

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### 05AP06-7

Pulmonary vasodilator effects of Norepinephrine in combination with high epidural analgesia during the thoracoscopic correction of esophageal atresia

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**Background and Goal of Study**: Evaluation of the respiratory and the pulmonary circulatory effects of norepinephrine in newborn with thoracoscopy induced pulmonary hypertension.

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Materials and Methods: The study was carried out on 10 newborns (gestational age: 35 ± 3 weeks; birth weight: 2800.0 ± 700.0 g), who were scheduled for thoracoscopic correction of esophageal atresia. Surgeries were taken under the high epidural analgesia as a component of general anesthesia with infusion of Norepinephrine (NE). Single shot high epidural analgesia was performed by 20G Touchy needle on the level th4-th5 and 0.3 ml/kg sol.Bupivocaini 0.1% was injected and before the start of surgery NE 0,3-1 mkg/kg/min continuous infusion was done. General anesthesia was maintained with Sevorane, Atracurium. Monitoring: ECG, BP, EtCO2, SpO2, Hb, HR.

**Results and Discussion**: After starting norepinephrine the systemic pressure and HR increased for  $20.2 \pm 3.8$  mm Hg and  $8.4 \pm 1.6$  r/min respectively. Although the mechanical ventilatory variables had not been changed, the SpO2 increased from  $85\% \pm 2\%$  (after CO2 insufflation) to  $93\% \pm 3\%$  (p<0.05), whereas the oxygen need(O2/Air) decreased from 50%(1:1) to  $40\% \pm 3\%$ (1:2) (p<0.05). In the case of toracoscopic surgeries anesthesia problems are concerned with correcting hypoxemia, pulmonary hypertension and hypercapnia caused by gas induction. NE elevated both systemic and pulmonary artery pressures, but systemic artery pressure was elevated more, as a result pulmonary/systemic artery pressure ratio was decreased. Combined with high epidural analgesia component general balanced anesthesia, pulmonary perfusion increased, as a result hypoxemia decreased and SpO2 increased.

Conclusion(s): NE in condition with effective high epidural analgesia may improve lung function in newborn with pulmonary hypertension (induced by thoracoscopy) through a decrease in pulmonary/systemic artery pressure ratio and improved cardiac performance.

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### 05AP06-9

Dexmedetomidine versus fentanyl for prevention of the stress response in laryngoscopy and intubation in children. A prospective, randomized, double-blind study

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Background and Goal of Study: Dexmedetomidine is a highly selective alpha2 agonist, recently introduced to anaesthesia practice. In children it seems to be effective in several clinical scenarios, in sedation during mechanical ventilation, prevention of emergence delirium and procedural sedation during noninvasive radiological and other procedures. The scientific objective of this study was to compare the efficacy of dexmedetomidine and fentanyl for attenuation of the stress response during laryngoscopy and endotracheal intubation.

Materials and Methods: The present study included forty (40) patients, aged 3 to 12 years old, ASA I-II, that underwent elective surgery under general anesthesia. They were randomized using a sealed envelope method in one of two groups, namely group A that received 1 mcg/kg dexmedetomidine within 15 minutes and a bolus dose of normal saline (for blinding reasons) and group B that received a bolus dose of fentanyl 2 mcg/kg, 3 minutes before intubation and a normal saline infusion (for blinding reasons). Systolic, diastolic, mean arterial pressure and heart rate were recorded before induction, before laryngoscopy and immediately after intubation, 2 and 5 minutes after intubation.

Results and Discussion: All patients presented no difficulties in intubation. All hemodynamic measurements were increased after intubation in comparison with pre-induction and pre-intubation recordings. Group A showed statistically significant lower increases in systolic, mean arterial pressure and heart rate compared with group B, in all post-intubation recordings (p<0.05).

**Conclusion**: Dexmedetomidine is superior to fentanyl in blunting the stress response to the intense stimulation caused by laryngoscopy and intubation. **References**:

- 1. Phan H, Nahata MC. Clinical uses of dexmedetomidine in pediatric patients. Paediatr Drugs. 2008;10:49-69
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#### 05AP06-10

Comparison of Fresh Frozen Plasma (FFP) and Plasmalyte® for priming cardiopulmonary bypass in infants and children undergoing open-heart surgery: A double-blinded, randomised study

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Background and Goal of Study: Few studies in infants have investigated whether the addition of FFP to the cardiopulmonary bypass (CPB)priming shows any advantages in terms of bleeding and transfusion. 1.2We hypothesized that adding FFP to CPB priming is superior compared with Plasmalyte®.

Materials and Methods: This prospective double-blinded randomized trial (NCT02567786)included children of all age weighing between 7-15 kg undergoing surgery with CPB. Exclusion criteria were coagulation, renal and hepatic dysfunction. Primary endpoint is that adding 15mL/kg FFP to CPB prime decreases bleeding and/or exposure to blood products up to 6h postoperatively when compared with 15mL/kg Plasmalyte®. Secondary endpoint is the volume of transfused blood products. RBC was used in the CPB prime for all children to prevent hemodilution and unblinding. The perfusionist was unblinded. Blood was drawn for thromboelastometry and platelet aggregometry (POC tests) after the induction of anesthesia, at the end of CPB and at PICU arrival to help in deciding to transfuse in case of bleeding. In total 60 children will be included. Data is illustrated in mean ± SD, median (P25-P75) or numbers (%). A t-test, Mann-Whitney or Chi square tests are used.

Results and Discussion: 30 children were included. One patient in the Plasmalyte® group was excluded after inclusion because of refusal to continue.

	FFP(N=16)	Plasmalyte(N=13)	Р
Age(months)	25±17	23±14	0.66
Weight(kg)	10.4±2.8	10.6±2.4	0.82
Cyanotic disease	8(50%)	6(46%)	0.84
CPB time (min)	142±57	158±68	0.52
Patients transfused (OR&PICU)		8(62%)	0.20
Total N blood prod- ucts (OR&PICU)		1(0-2)	0.13
Blood loss 6h post- op(mL/kg)	6.4(4.2±10.9)	6.0(5.4±8.5)	0.79
Total volume blood products (OR&PI- CU) (mL/kg)		38(10-68)	0.29

**Conclusion**: Preliminary results of this first double-blinded study show that priming with FFP in small infants does not show beneficial effects in terms of bleeding and transfusion requirements and can be avoided.

#### References:

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# 05AP07-1

Title: 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.

# 05AP07-2

Feasibility and preliminary results of an observational study to investigate a relationship between post-operative emergence delirium (ED) and postoperative cognition alterations in young children - the NarcoKids trial

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**Background and Goal of Study**: Up to 80 % of children are affected by ED [1] with possible postoperative maladaptive behaviour [2]. The aim of this observational study was to examine interrelations between preoperative anxiety, incidence of ED in the recovery room and postoperative cognition impairment.

Materials and Methods: Following ethics committee's approval, registration of the study (NCT02481999) and parental written informed consent, children aged 0.5 to 8 yrs scheduled for elective surgery were enrolled. Children were assessed with the modified Yale Anxiety Scale (mYAS) preoperatively. Anesthesia induction and maintenance was applied as standard procedure. Postoperatively the children were monitored with PAEDscale1 for ED. children were invited for age-adapted cognitive testing at 7d and 90d following surgery. Data were analyzed with t-test and Mann-Whitney U test respectively.

Results and Discussion: 47 children of 141 analyzed (33.3%) experienced ED. Children with ED were younger, with experience of previous surgery and a higher rate of preoperative anxiety (mYAS 46.3 vs 37, p=0.035) immediately before induction of anesthesia. Induction and maintenance of anesthesia had no influence on incidence of ED. 36 children completed the cognitive follow-up testing. 48 children were lost to analysis due to preliminary study drop-out, 103 children did not attend the full cognitive follow-up testing.

Conclusion: Apart from cognitive follow-up testing which exhibited a very low compliance of the participating families to the study course, the study design was generally feasible and well accepted. A modification to the study protocol requests ethics approval to improve compliance for cognition testing. As anxiety and ED in young children with several anesthetic procedures are closely related cognitive impairment should be monitored [3].

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# 05AP07-3

The analgesic effect of clonidine as an adjuvant in dorsal penile nerve block for male circumcision: a placebo controlled trial

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**Background and Goal of Study**: Dorsal penile nerve block (DPNB) is a commonly performed regional anesthetic technique for male circumcision. The aim of this study was to assess the analgesic effect of the adjunction of clonidine to bupivacaine 0.5% in this block.

Materials and Methods: Methods: It was a prospective randomized double-blind clinical trial including 40 ASA1 boys aged from 1 to 4 years undergoing elective circumcision. Dorsal penile nerve block was performed under general Anesthesia. Patients were randomized in two groups:

Group 1 (G1): received 0.1 ml/Kg of bupivacaine 0.5 %with 1µg/kg of clonidine in each side.

Group 2 (G2): received 0.1 ml/kg of bupivacaine 0.5 % with placebo in each side. The failure of the DNPB was defined by the increase of heart rate by more than 25% comparing to baseline and in his case an intravenous injection of 20 µg/kg of alfentanyl was given. Post operative pain was assessed by CHEOPS score.

**Results and Discussion**: A total of 40 patients were enrolled. Demographic parameters were similar in both groups. We noted no case of DNPB failure in this study. The supply for additional analyesia was seen in 12 patients in group 2 versus 3 cases in group 1. CHEOPS score was significantly lower in group 1 from 2nd post operative hour until the 24th hour.

Conclusion: Clonidine can be used in dorsal penile nerve block to improve and to prolong its analoesic effects after male circumcision.

### 05AP07-4

Analgesic efficacy of caudal dexamethasone combined with bupivacaine in ilioinguinal pediatric surgery: prospective randomized controlled trial

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\*\*Anesthesia - Sfax (Tunisia)

**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.

#### 05AP07-5

Emergence delirium incidence in children undergoing adenoidectomy with or without tonsillectomy under general anesthesia and who received clonidine as preanesthetic medication

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Background and Goal of Study: Emergence delirium (ED) is an anesthetic complication very common in children. It is characterized by a behavior and cognition changes during early postoperative period. The incidence may be higher than 80%. Risk factors include preschool children, sevoflurane-based anesthesia, ophthalmologic and ear, nose and throat surgery. This study aims to evaluate the ED incidence in children undergoing adenoidectomy with or without tonsillectomy. Were also evaluated the incidence of other postoperative complications, pain (CHEOPS, Children's Hospital of Eastern Ontario Pain Scale), time to awake, time to discharge from post-anesthesia care unit (PACU), PAED inter-rater agreement and parental satisfaction.

Materials and Methods: A prospective and observational study of ASA I or II physical status children aged one to nine. All children received oral clonidine 4 mcg. kg-1 one hour before induction. Induction was performed with nitrous oxide/oxygen and sevoflurane. After insertion of a peripheral intravenous catheter, fentanyl 2 mcg.kg-1, propofol 2 mg.kg-1 and lidocaine 2 mg.kg-1 were administered. Two independent evaluators applied PAED at 1st, 10th, 20th and 30th minute and CHEOPS at 10th, 20th and 30th minute after awake. PAED and CHEOPS ≥ 10 indicate ED and pain, respectively.

Results and Discussion: 72 children were enrolled. The median age was 4.25 years. Thirteen children received a PAED score ≥ 10, with an overall incidence of 18%. Five children received a CHEOPS score ≥ 10. Kappa coefficient for PAED scale was 0.83 for the first minute after extubation and 1 for the others. Seven children presented laryngospasm. One child presented hypotension and another had bradycardia. One presented vomiting. Mean time for awake and discharge from PACU was 18.6 and 69 minutes, respectively. The majority of parents reported they were "very satisfied".

**Conclusion**: ED is very common in pediatric anesthesia and preventive measures should be instituted in high-risk patients. PAED scale is the only one validated and inter-rater agreement was considered perfect. Although it is a self-limited complication, the impact of ED on child's behavior and cognition is not yet elucidated, and risk stratification, correct diagnosis and preventive measures are recommended.

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### 05AP07-6

Emergence Delirium in children is not related to intraoperative Electroencephalogram suppression – findings from a prospective, observational study

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**Background and Goal of Study**: Emergence delirium (ED) is the most frequent brain dysfunction in children recovering from general anaesthesia. Postoperative delirium is related to prolonged duration of deep anaesthesia including burst suppression periods in elderly1,2. In children depth of anaesthesia as measured by Bispectral Index shows no correlation with ED3,4. The aim of this prospective, observational study (NCT02481999) was to determine whether the occurrence and duration of burst suppression (BS) periods influences the incidence of ED.

Materials and Methods: 100 children, aged 0.5 – 8 years, with planned surgery were included. Bodyweight adapted oral premedication with midazolam was administered in all children. Patients received i.v. induction with propofol (mg/kg) and/or mask induction with sevoflurane (etVol%) according to clinical needs. Bifrontal EEG was recorded from start of anaesthesia until extubation. Throughout this time period duration of burst suppression was visually analyzed (EEG viewer software / 50µV / 1s/div). Depth of anaesthesia as measured by Narcotrend Index (NI) was determined. ED was assessed during stay in the recovery room using the Pediatric Assessment of Emergence Delirium (PAED) Score.

Results and Discussion: 40 children developed ED (ED-group), whereas 60 children did not (Non-ED group). No significant differences in the occurrence (ED 47% vs. Non-ED 55%, OR 1.4 (0.6 / 3.1); p=0.541) and duration of BS (ED 475 + 538sec vs. Non-ED 645 + 604sec; p=0.174; Mann-Whitney-U Test) were seen with respect to ED (Fig 1). Depth of anaesthesia did not differ between the groups (mean NI: Non-ED 46 + 13 vs. ED 49 + 12 mean NI; p=0.597; Mann-Whitney-U Test). Overall, 50% of the children displayed BS, occurring mainly within 5min after start of anaesthesia (onset BS: 223sec (123/412)). Mixed anaesthesia induction - Sevoflurane and Propofol – led to an increased incidence of BS (mixed induction 68%; vs. Sevoflurane 24% and Propofol 46%; OR 3.3; 95% CI 1.4/7.8), p=0.008). A higher concentration of oral midazolam premedication was positively correlated with prolonged BS duration (R2 cubic = 0.133, p=0.021).

**Conclusion:** Our data revealed no significant correlation between the occurrence and duration of BS and the incidence of ED. BS, facilitated by a mixed induction and higher concentrations of midazolam, does not seem to have an unfavourable impact on cerebral function in children.

### 05AP07-7

# Postoperative cognitive dysfunction and age of children

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is defined as a new cognitive impairment arising after a surgical procedure and anaesthesia. Its diagnosis requires both pre- and postoperative psychometric testing. Its manifestations are subtle and manifold, depending on the particular cognitive domains that are affected. POCD is characterized by mild changes in personality, emotional instability after anesthesia and surgery, or some loss of cognitive powersc It has been underinvestigated in children. The cause is still unknow, but there are certainly many factors that can affect the occurrence of POCD. The aim of this study was to assess whether the age of children may impact upon the incidence of POCD.

Materials and Methods: Prospective study was conducted at the University Hospital on 64 children (aged 6-13, ASA I-II) undergoing elective adenotonsillectomy. The children were randomized into 2 groups: TIVA and sevoflurane (S). In TIVA group anesthesia was induced with propofol, fentanyl and vecuronium, and maintained with continuous infusion of propofol. In S group after fentanyl, anesthesia was induced and maintained with sevoflurane in O2/N20 (50:50) mixture. BIS monitoring was used and depth of anesthesia accordingly adjusted. Cognitive assessment was conducted with psychomotor evaluation test (PsychE). It is a computer program with two tests: simple reaction time and dual task. Each subject was examined preoperatively, 2 h and 24h after surgery.

Results and Discussion: Table 1 and 2 showed the differences between two age groups of children in simple and dual reaction time results. There were statistical differences (p<0.05) between children younger and older than 9 years in total reaction time and variability of reactions expressed as standard deviations. There weren't statistical differences (p>0.05) between TIVA and S group in total reaction time in the first postoperative measures but there were statistical differences (p<0.05) between TIVA and S group adjusted for age in standard deviation of total reaction time.

Conclusion: It is important to improve the identification and quantification of

preoperative risk factors for POCD, as this will assist clinicians and patients in the decision making process (and informed consent) when invasive procedures are planned. Type of anesthesia have impact on variability of reaction but not on the reaction time and there must be take into account the age of participants.

#### 05AP07-8

# Safety and quality in children anesthesia for gastroscopy

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Background and Goal of Study: Children undergoing gastroscopy require general anesthesia. The maintenance of respiratory and hemodynamic stability is the basis for safe anesthesia. Anesthesia with maintained spontaneous respiration may be associated with the symptoms of increasing respiratory failure. Bradycardia and hypotension can be dangerous complications of using intravenous anesthetic agents and opioids. Finding combinations of drugs for safe anesthesia in children is still a challenge. The combination of ketamine with propofol has very good reviews and clinical effects. The use of remifentanil with propofol is also popular. The aim of this study was to compare and evaluate the use of ketamine-propofol versus remifentanil-propofol in children undergoing anesthesia for gastroscopy in terms of respiratory parameters and hemodynamic stability.

Materials and Methods: The prospective, randomized, single blind study included 90 children anesthetized for gastroscopy. Intravenous anesthesia with maintained spontaneous respiration and oxygen insufflation with a nasal cannula (3 l/min) was used. Anesthesia protocol: Group K:Ketamine 1.5 mg/kg iv + Propofol 1.5 mg/kg, then Propofol infusion 6 mg/kg; Group R:Remifentanil infusion 0.1 µg/kg/min. + Propofol 1.5 mg/kg, then Remifentanil infusion 0.1 µg/kg/min + Propofol infusion 6 mg/kg. Analysis included: heart rate, systolic and diastolic blood pressure and saturation at four measurement points. At the end of gastroscopy, capillary blood gas was measured to evaluate pCO<sub>2</sub> and pO<sub>2</sub>. Statistical analysis was performed using the STATISTICA 12 software.

**Results and Discussion**: Study groups did not differ in pCO $_2$  (K: 44 ± 4 vs. R: 44.5 ± 5, p = 0.98). Hypercapnia (pCO $_2$  > 45mmHg) occurred in 16 (34.8%) of the subjects in Group K and in 18 (40.9%) in Group R, without affecting the child's behavior after regaining consciousness (p = 0.7). In 52.2% of children hyperoxygenation occurred (pO $_2$  >120 mmHg). Apnea and/or desaturation occurred in 8.8% of patients in both groups. These events did not require any intervention. In Group K the heart rate was significantly higher at the measurement points vs Group R (p <0.05), figure 2. Similarly, systolic and diastolic blood pressure was higher in Group K (p <0.001), figure 1. None of the children had bradycardia and/or hypotension requiring intervention.

Conclusion: Both methods of anesthesia were characterized by maintained respiratory function and hemodynamic stability.

### 05AP07-9

# Nasal RAM cannulae for breathing support and inhalation anaesthesia in infants during laryngoscopy

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Background and Goal of Study: The safe anesthesia for direct laryngoscopy can be performed in different ways. One of the main problems is to provide sufficient oxygen and ventilation support during the procedure with no collision with otolaryngologist. The use of nasal continuous positive airway pressure (CPAP) may be advantageous, especially in patients with respiratory problems. The RAM device, invented for nasal support of ventilation attached to an anaesthesia machine can provide both CPAP and delivery of sevoflurane.

Materials and Methods: In five infants with stridor and/or unsuccessful extubation direct laryngoscopy was undertaken. Patients were anaesthetized with a combination of sevoflurane in air/oxygen and boluses of i.v. propofol. For maintenance of anesthesia and ventilation assistance nasal RAM cannuale were used. Nasal CPAP technique was tried, manual breaths given when required.

Results and Discussion: Infants with weight from 3,0 to 4,5 kg were successfully anesthetized with inahalation of sevoflurane, only 2 out required i.v. doses of propofol. Paracetamol and fentanyl (0,5 mcg/kg) were used for analgesia. In one case i.v. lidocaine was also administered. After induction sevoflurane (1 MAC) was delivered through the RAM cannulae. There was an efficient anaesthesia level and proper gas exchange during procedures. This kind of delivery of anaesthetic mixture was very practical in an opinion of otolaryngologists. Two out of three intubated patients could be extubated and remained on nasal CPAP afterwards.

**Conclusion**: The use of RAM nasal cannulae is useful for gas and sevoflurane delivery during direct laryngoscopy.

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#### 05AP07-10

Transversus Abdominis Plane (TAP) Block with different bupivacaine concentrations in paediatric patients undergoing unilateral inguinal hernia repair surgery: A Prospective Randomised Double-Blinded study

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Background and Goal of Study: Transversus abdominis plane (TAP) block is a safe and effective analgesia technique for paediatric patients (1). This study is designed to compare the analgesic efficacy of different bupivacaine concentrations in paediatric patients undergoing ultrasound-guided TAP blocks for unilateral inquinal hernia repair surgery.

Materials and Methods: Seventy-four patients aging between 1 and 8 years, undergoing unilateral inguinal hernia surgery, were enrolled for this study after obtaining Institutional Ethics Committee approval and written informed consents from parents or legal guardians (2016/1281). Group 1 (n:37) received 1 mgkg¹ bupivakain 0.25% and Group 2 (n:37) received 1 mg kg¹ bupivakain 0.125% for ultrasound-guided TAP block following standard general anaesthesia induction. All patients received remifentanil 0,1 µg kg¹ h¹ infusion and paracetamol 15 mg kg¹ intraoperatively, and paracetamol 4x15 mg kg¹ per day postoperatively. FLACC (Face, Legs, Activity, Cry, Consolability) behavioral pain assessment scale was used for evaluating patients' postoperative pain levels at 15-, 30-, 45-minute and 1-, 2-, 6-, 24-hour. Tramadol 1 mg kg¹ was administered intravenously as rescue analgesic when FLACC score was ≥4. Total analgesic requirement, length of hospital stay and side effects were recorded.

Results and Discussion: Sixty-four patients, Group 1 (n:30) and Group 2 (n:34), completed the study. FLACC pain scores at all time points, total analgesic requirement and length of hospital stay were similar in both groups (p>0.05). None of the patients reported FLACC score ≥4 or asked for rescue analgesic after postoperative 6th hour. No perioperative and/or postoperative complication was

**Conclusion**: This study demonstrated that higher and lower concentrations of bupivacaine do not have any superiority over each other when the doses are kept equal in TAP blocks. TAP blocks are effective regional analgesic techniques for pediatric patients undergoing inguinal hernia repair surgery.

 Sahin L, Sahin M, Gul R et al. Ultrasoundguided transversus abdominis plane block in children: a randomised comparison with wound infiltration. Eur J Anaesthesiol 2013;30:409–14

#### 05AP08-1

Neuromuscular blockade in clinical practice in tertiary paediatric anaesthesia centre: retrospective observational trial

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Background and Goal of Study: Neuromuscular blockade is associated with improved airway conditions for intubation and superior conditions for surgical interventions. Residual neuromuscular blockade in postoperative period is, according to the recently published data, associated with the negative impact on perioperative morbidity and mortality. The primary outcome was to evaluate the frequency of neuromuscular blockade monitoring and the incidence of the active pharmacological block reversal at the end of the operation. Secondary outcome was the frequency of the different muscle relaxants usage according to the age of the patients and to the duration of the surgery.

Materials and Methods: After local Ethics Comittee approval and trial registeration on www.clinicaltrials.gov (NCT03086915), all paediatric patients who underwent general anaesthesia between 1. 1. 2016 and 1. 12. 2016 were retrospectively screened. The methods of descriptive statistics (incidence, mean, median) were used for study group data. Kruskal-Wallis H test was used to analyse the statistical significance by using the median values and Chi-squared test by using the average values (Table 1, 2).

Results and Discussion: Overall 8046 paediatric patients underwent general anaesthesia in the study period. Muscle relaxants were administered in 1650 cases (20.5%). Neuromuscular blockade monitoring was used in 2.5% (n=41) cases. Active neuromuscular blockade reversal was administered in 5.8% (n=95) cases, more frequently in older children (Table 1) and more frequently in block induced by rokuronium (27.8%) (Table 2). The most frequently administered muscle relaxant was mivacurium (48.2 %, n=795), followed by cis-atracurium (36.4 %, n=601), suxamethonium (10.3 %, n=170) and rocuronium (7.0 %, n=115).

**Conclusion(s)**: The low rate of neuromuscular blockade monitoring in combination with low rate of active block reversal can be considered dangerous due to the

relatively high risk of potential residual postoperative blockade, that can negatively influence the clinical outcome.

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	100	Neostigmine	Sugammadex	Without acitye	reversal	p value	
	nts	68 (4.1%)	27 (1.6%)	1555 (94.2	1555 (94.2%)		
	age	12.8 (1-19)	13.6 (6-19)	9.8 (0-19	9.8 (0-19)		
Age (in years) median		13	14	10	p<0.001		
Surgery duration (in m average	ninutes)	84.7 (30-300)	82.3 (25-170)	87.9 (10-65	55)	p=0.9744	
Surgery duration (in minutes) median		70	70		p=0.4096		
			duration of surgery and age accord				
	Mivacurium	Cis-atracurium	Rocuronium	Suxamethonium	Atracurium	p value	
lumber of patients	795 (48.2%)	601 (36.4%)	115 (7.0 %)	170 (10.3%)	18 (1.1%)	p<0.001	
lumber of patients rith block reversal	8 (1.0%)	53 (8.8%)	32 (27.8%)	0 (0%)	2 (11.1%)	p<0.001	
Age (in years)	10.4	9.8	11.3	7.2	12.2		
average	(0-19)	(0-19)	(0-19)	(0-19)	(0-17)	-	
Age (in years) median	11	11	12	6	13.5	-	
urgery duration (in minutes) average	69.8 (10-655)	116.1 (15-380)	94.1 (25-315)	71.6 (15-250)	65.8 (30-150)	p<0.001	
urgery duration (in minutes) median	60	105	80	60	60	p<0.001	

# 05AP08-2 Residual Neuromuscular Blockade in Paediatric Anesthesia: prospective observational trial

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Background and Goal of Study: Residual neuromuscular blockade (RNB) in postoperative period is frequent (26-88%) and associated with perioperative morbidity¹-². The safety cut-off measured by acceleromoetry is defined by Train-offour ratio (TOFr) ≥ 0.9. The primary outcome of the study was the incidence of RNB measured just prior extubation in the operating room (OR). Secondary outcome was the incidence of the RNB in postanethesia care unit (PACU).

Materials and Methods: The prospecitve observational study was approved by the local Ethics Comittee (9/2017) and trial registered on www.clinicaltrials.gov (NCT02939911). Paediatric patients between 1.1.2017-1.12.2017 undergoing surgery in general anaesthesia with muscle relaxation was eligible for inclusion in the study. The level of blockade was maesured just prior to extubation in OR (the moment the patient is eligible for extubation according to the anesthesiologist) and after arrival at PACU with acceleromtery – TOF-Watch®SX (Organon, Inc, West Orange, NJ). The mode for maesurement was TOFr or posttetanic count (PTC). Data were described by descripitive analytic methods.

Results and Discussion: In the study period 271 patients were included in the study. The incidence of residual blockade in the OR was 47.6% (n=129/271) and the incidence of RNB in PACU was 31.2% (n=35/112) (Graph 1,2). Active block reversal was administered in 23.9% (n=65) patients. The active reversal was administered in 67.7% patients in operating theatre after accelerometry measurement and in 32.3% cases the active block reversal was administered according to the physician's decision (before TOF measurement, Graph 3). Accelerometry measurement led to the change in clinical practice in 16.2% patients (44/271) overall and in 67.7% patients with RNB. In 29.5% (n=80) patients was the measured TOFr<0.9 before extubation and no reversal was administered (Graph 4).

Conclusion: Residual neuromuscular blockade is the clinical problem that has negative impact on perioperative morbidity and is frequent also in paediatric anaesthesia.

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### 05AP08-3

# Significant differences in paediatric trauma amongst Europeen centers?

Epidemiology in a Swiss trauma center

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Background and Goal of Study: Major paediatric trauma in Switzerland is rare and published data are scarce. In the western part of the country, the University Hospital of Lausanne (CHUV) serves as a tertiary center for trauma and burn injuries. Its first trauma registry dates from 2011. The purpose of this study was to determine the

epidemiology, risk factors and to compare the results with other European centers. **Materials and Methods**: We analysed all injured children below 16 years admitted to the resuscitation room (RR) after prehospital triage. Data included: age, gender, injury severity score (ISS), mechanism of injury, lactate level, emergency interventions, transfer unit location, length of stay and in-hospital mortality. The analysis covered the period from 1st January 2011 to 30th December 2016. p-values were calculated with the likelihood-ratio test from the chi-square distribution

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Results and Discussion: We included 328 children. 63% were male, the median age was 8. Severe trauma (ISS >15) occurred in 97 patients. Principal mechanisms of injury were falls (45%), road traffic (29%) and burns (14%). Repartition of home and sports accidents was similar (32%; 28%). Most affected areas were: head & neck (66%) and external body region (38%). Due to over triage, 43% of children were redirected from RR to the emergency department. Intensive care admission amounted to 27%. 20% underwent immediate surgical interventions (wound care, neurosurgery, and orthopaedic surgery). Overall mortality was 5,5% with a median ISS of 9 (United-Kingdom: 3,7%, median ISS 9 [Bayreuther 2009]). In the severe trauma subgroup, mortality was 17,5% with a median ISS of 22 (Germany: 13,4% median ISS 25 [Schoeneberg 2014]; United-Kingdom: 8,6%, median ISS 16 [TARN 2014]). Half of children died within 6 hours. The main mechanisms of death were falls from > 5m and traffic accidents as pedestrian. Mechanism, ISS, GCS, intubation (p<0,001) and lactate level (p =0,0008) influence mortality.

Conclusion: Compared to similar European trauma centers our mortality is slightly higher. However, falls and road traffic injuries are the main mechanism of injury. The elevated rate of early mortality suggests that improving pre-hospital care and early resuscitation is likely to decrease mortality. For the safety of children, we adopted a deliberate over triage strategy.

#### 05AP08-4

Bradycardia and asystole during intubation in a child with Dandy-Walker syndrome for an emergency operation at night: The possible causes

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**Background**: Anesthesia for Dandy-Walker syndrome (DWS) child may be challenging due to difficult airway. We report a case of bradycardia and asystole occurring at intubation in a child with DWS undergoing shunt revision, in which cause of cardiac arrest was difficult to determine.

Case Report: The patient was 18-month-old female with DWS diagnosed at birth. Cyst-peritoneal shunt was placed at 4-month-old. This time, she was undergoing emergency cyst drainage because of shunt obstruction and increased posterior fossa intracranial pressure (ICP). She had episodes of bradycardia while being taken care of in ward in supine position. Thus, she was placed in the supine position with the head turned to the left in OR table for induction of anesthesia. After induction, airway management turned out to be difficult because of enlarged head size. She was then placed in the supine position facing midline. During laryngoscopy sudden bradycardia developed. Atropine was injected and intubation was done. However, cardiac arrest ensued. Chest compression was initiated and epinephrine was given. End-tidal carbon dioxide was not detected. Reintubation was attempted twice. Placement of the endotracheal tube was finally confirmed fiberoptically. She was positioned in a lateral position to decrease the ICP. Return of spontaneous circulation was noted 23 minutes later. The operation proceeded uneventfully thereafter. At the end of the operation, she was able to move all limbs while breathing spontaneously. She remained intubated to the PICU, but did not require mechanical ventilation.

**Discussion**: The possible causes of bradycardia and cardiac arrest in this child may be increased ICP as well as esophageal intubation. This case highlights the importance of thorough preoperative evaluation, atropine premedication, and adjusting the body position, even for an emergency operation at night, in order to prevent ICP increase, asystole, bradycardia, and difficult airway.

**Learning points**: The anesthesiologists should be well prepared to manage ICP and airway difficulties by positioning in patients with DWS for an emergency operation





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#### 05AP08-5

# Successful anesthetic management of a living-donor liver transplant for a patient with severe methylmalonic acidemia: A case report

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Background: Methylmalonic acidemia (MMAemia) is a rare hereditary disease caused by a deficiency of methylmalonyl-CoA mutase (MCM), and can cause ketosis due to accumulated MMA. The prognosis of severe MMAemia is very poor, and around 50% of the patients die within 3 years after birth. Liver transplantation (LT) has been performed as a supportive therapy for severe MMAemia to improve the prognosis, but there are few reports on anesthetic management of LT for MMAemia [1].

Case Report: A 22-month-old girl with severe MMAemia (70 cm, 9.9 kg) was admitted to our hospital for a living-donor LT (LDLT) from her mother. Three days after her birth, metabolic acidosis and seizures appeared, and then, she was diagnosed as MMAemia. By treatment with protein-restricted diet and continuous infusion of glucose, vitamin B12 and L-carnitine to minimize the accumulation and facilitate the elimination of MMA, her symptoms were well-controlled in spite of metabolic acidosis

General anesthesia was induced and maintained with fentanyl, remifentanil, midazolam. sevoflurane and rocuronium. Infusion of glucose, vitamin B12 and L-carnitine was continued during the operation. LDLT was successfully performed, and the anesthetic time was 12 h 40 min. She was admitted to the intensive care unit under sedation with fentanyl and midazolam. Her serum MMA and ammonia quickly normalized. She was extubated on postoperative day (POD) 3 and discharged on POD 80.

**Discussion**: Preoperative fasting and surgical stress can worsen metabolic acidosis in MMAemia patients, which can be further worsened during the anhepatic phase in liver transplantation. Accordingly, we prepared for intraoperative blood purification in advance, and continued administration of glucose, vitamin B12 and L-carnitine. Perioperative management was successful, but long-term prognosis of our patient cannot be clearly predicted, because the MCM activity in the transplanted graft from the heterozygous donor should be less than normal.

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Learning points: Anesthetic management of a living-donor liver transplant for a patient with severe methylmalonic acidemia, which has been few reported, can be successfully performed by avoiding metabolic acidosis.

### 05AP08-6

# Malignant hyperthermia in a child submitted to urgent surgery

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Background: Malignant hyperthermia (MH) is a hypermetabolic syndrome, with incidence of 1:15000, that occurs in susceptible individuals primarily by the use of the volatile inhalation anesthetic agents and the succinylcholine muscle relaxant. The aim of this case report is to discuss the malignant hyperthermia confirmed by familiar muscle biopsy.

Case Report: Female, 5 years old, 20Kg, ASA I, was submitted to appendectomy under balanced general anesthesia, maintenance with sevoflurane. She evolved with tachycardia and increased end-tidal carbon dioxide (EtCO2=99 mmHg). Sevoflurane administration was stopped and manual ventilation was initiated with mapleson D and FiO2 100%. The gasometry indicated paCO2=84.2 mmHg and pH=7.031. Dantrolene sodium 2.5 mg/kg was initiated and required 2 cycles. The patient presented tachyarrhythmia and evolved to bradycardia and cardiorespiratory failure. Cardiopulmonary resuscitation had to be provided. The second gasometry indicated pH=7.43 and paCO2=30 mmHg. After all, the patient was maintained with continuous infusion of dantrolene for 48 hours. She awaits the possibility of muscle biopsy and after the parents' investigations, her father was tested positive for caffeine-halothane muscular contracture test.

Discussion: The hypermetabolism in MH causes an increase of carbon dioxide production, metabolic and respiratory acidosis, accelerated oxygen consumption. heat production, activation of the sympathetic nervous system, hyperkalemia, disseminated intravascular coagulation, and multiple organ dysfunction and failure. It is induced by an abnormal regulation of ryanodine receptors, producing a massive release of calcium in the sarcoplasmic reticulum of the striated muscle. The most frequent early clinical signs of MH include an increase of end-tidal carbon dioxide. tachycardia, muscle rigidity, tachypnea, and hyperkalemia.

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Learning points: Dantrolene sodium is the antidote that decreases the loss of calcium from the sarcoplasmic reticulum in the skeletal muscle and restores normal metabolism. The challenges of the treatment of the MH are the difficulty of dilution of the dantrolene and the needs for diagnostic confirmation with muscle biopsy that is dependent of the time of muscle recovery, child weight and the parents' diagnosis investigation.

# 05AP08-7

Anesthetic Management for a Pediatric Patient with Very Long-Chain Acyl-Coenzyme A Dehydrogenase Deficiency (VLCADD)

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Background: VLCADD is an AR disorder involving the initial steps in fatty acid metabolism with potential for hypoglycemia, rhabdomyolysis, metabolic acidosis There is a paucity of articles related to the anesthetic management of VLCADD. Opioids, NSAIDS, and regional anesthesia have been administered safely. Authors suggest avoidance of propofol and volatile anesthetic.[1,2,3] We present an alternative approach to the anesthetic management of a pediatric patient with VI CADD

Materials and Methods: A 14 y/o F(80kg) with childhood VLCADD for port insertion. PMHx: recurrent rhabdomyolysis due to VLCADD exacerbations with food, menses, exercises and dehydration. Plasma CK ranged 30-57,000 U/L during episodes. Medications: Paroxetine, levocarnitine. The patient was admitted the day prior to surgery and anesthesia was consulted. Baseline lab of liver/kidney action, electrolytes, glucose, and CK were WNL except for a CK (520 U/L). IVF with D10% ½NS at 125 ml/h was initiated. The patient refused local anesthesia/ sedation. General anesthesia was planned. On the day of surgery, IVF with D10% LR (glucose 4 mg/kg/min) was administered. Premeditated with midazolam 2 mg IV. Induced with morphine 10 mg IV slowly, lidocaine 50 mg IV, etomidate 24mg IV, and rocuronium 80 mg IV. Maintained with TIVA (remifentanil 0.1-0.2 mcg/kg/min, ketamine 50 mg). Sugammadex 160mg IV antagonized the NMB. Fentanyl (40mcg IV) and dexmedetomidine (20 mcg IV) were administered at extubation. The PACU course was unremarkable. Intra-op and post-operative laboratory showed no signs of hypoglycemia, hyperkalemia or CK elevation (preop lab: Glu 5.3 mmol/L. CK 520 U/L, K 3.6 mEg/L; intraop lab: Glu 11.1 mmol/L, K 3.1mEg/L; postop lab: Glu 11.4mmol/L, CK 359 U/L, K 3.9 mEq/L). Patient was discharged home the following day without any complications

Discussion & Conclusions: VLCADD is associated with abnormal fatty acid metabolism especially during stress. Glucose infusion to avoid hypoglycemia and dehydration is important. Opioids, benzodiazepine, NSAIDS, local anesthetic had been safely used. In view of the lack of reports in the literature for the anesthetic management for pediatric patients with VLCADD, we present a successful alternative anesthetic management never previously reported.

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# 05AP08-8

# Epidural morphine-induced hypothermia in a pediatric patient: a case report

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Background: Epidural morphine can be used for postoperative pain management. We describe a case of epidural morphine-induced hypothermia.

Case Report: A 10-years-old female patient, ASA III, 22kg, diagnosed with a chromosomopathy (47 XX +r(2)/46XX8469) in study that involved microcephaly epilepsy, scoliosis and delayed growth development, was scheduled for a bilateral emoral wedge osteotomy. The anesthetic procedure was explained and a parental informed consent obtained. Active warm with warming blankets was started 30' before induction and the patient was monitored according to ASA standards plus BIS with a room temperature of 21°C. After general anesthesia induction, an epidural catheter was placed at L4-L5 level with loss of resistance technique and ropivacaine 0.2% 0.2 ml/kg and morphine 15ug/kg were administrated. Hemodynamic and respiratory stability were maintained throughout the surgery but core temperature progressively decreased from 35.9°C to 33.3°C. A second bolus of ropivacaine 0.2% was administered 2 hours after the beginning of surgery that lasted 180 minutes. She was admitted to the recovery room with oxygen 8L/min and an epidural perfusion of ropivacaine 0.15% 0.2ml/kg/h. 60 minutes later, despite active warming, she maintained a tympanic temperature of 33.2°C and a RASS score of -3. Following administration of naloxone 40 ug IV, she became arousable, shivering started and her body temperature started to increase being discharge to the ward 3 hours later with a tympanic temperature of 35.9°C.

Discussion: Epidural local anesthetics and intravenous opioids both decrease the core temperature that triggers shivering. There are some case reports about intrathecal and epidural opioid-induced hypothermia 1, but none about epidural morphine-induced hypothermia. The postoperative hypothermia in our patient may be related to the cephalad spread of epidural opioid to reach the level of opioid receptors in thermoregulatory center of the hypothalamus, causing an altered

response to a temperature decrease and suppression of shivering thermogenesis. This can be corrected with administration of naloxone

#### References

1. Johnson M.D., Sevarino F.B., Lema M.J., Cessation of Shivering and Hypothermia Associated with Epidural Sufentanil, Anest Analg 1989;68:70-1

Learning points: Epidural morphine may cause disruption of the thermoregulation resulting in hypothermia. High suspicion index is key for the diagnosis of opioidinduced hypothermia.

#### 05AP08-9

To assess and describe sonological anatomy relevant to caudal epidural block, its correlation with surface anatomy, and its use to diagnose occult spinal dysraphism in children under 2 years of age coming for urogenital or anorectal surgery

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Background and Goal of Study: Urogenital surgeries are associated with occult spinal dysraphism. The ideal anaesthetic care for these children undergoing surgery is combined general and regional anaesthesia. The presence of these spinal anomalies can remain unnoticed when neuraxial block is performed purely based on surface landmarks, thus increasing the risk of injuries to the spinal cord and meninges. Ultrasound imaging of the spinal structures before the ossification of the posterior arches has been found to be a sensitive technique in identifying neural and spinal malformations in children ages less than two years.

Estimation of the prevalence of occult spinal dysraphism, to evaluate the variation in the location of the sacral hiatus and its relation to the posterior superior iliac spine as assessed by palpation and using ultrasound in children aged below 2 years

Materials and Methods: Type of study: Cross sectional study. 166 were approached but 159 were recruited as 2 parents declined to consent. The patients were placed in the left lateral position after induction. The skin over the lower back was inspected for any cutaneous markers. The surface anatomy relationship between the posterior superior iliac spines and the sacral canal was studied using a skin marker and a ruler. Subsequently ultrasound scan was performed by anaesthesiologist and parameters were assessed to rule out spinal dysraphysm.

Results and Discussion: Out of the 159 patients, only 5 patients had abnormal scan. The parents and the Pediatric surgeons were informed about the abnormal findings and were advised further imaging and follow up in neurosurgery department. The planned regional blocks were avoided and other peripheral nerve blocks were performed for analgesia.

Conclusion: The surface anatomy relation between the posterior superior iliac spines and sacral hiatus was found to be predominantly isosceles triangle. Perioperative ultrasound screening of the lower spinal anatomy by anaesthesiologists done prior to performing neuraxial block is worthwhile in ruling out occult spinal anomalies in children requiring urogenital or anorectal surgeries thereby avoiding injury to the spinal structures, thus enhancing safety in the practice of anaesthesiology.

## 05AP08-10

# Anaesthetic management of omphalopagus twins for Non-Operating-Room-Anaesthesia

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Background: Three-month-old conjoined female omphalopagus twins weighing 8.4 kg underwent preoperative SPECT/CT. The twins had shared liver and apparently only one gallbladder at previous abdominal ultrasound.

Case report: According to the experiences in few cases1, our anaesthetic team included two anaesthesiologists and two nurses, each twin had her own equipment. Two larvngoscopies, two orotracheal tubes, two monitors and two separate sources of oxygen were secured and the drugs were colour coded to each twin. The babies were called T1 and T2 to avoid confusion. Before the procedure, accurate clinical examination of the twins was performed. The anatomical connection under the xiphoid process and the absence of head or neck abnormalities made the airway simultaneously approchable by two anaesthesiologists. Sedation in spontaneous breathing was considered safe for a one-hour procedure. Two separate venous lines were cannulated, one for each twin, i.v. propofol was administered (3 mg/kg) to T1. No significant change in consciousness was observed in T2, suggesting little cross-circulation. T2 was also induced and i.v. continuous propofol was set at 7 mg/ kg/h for each twin to ensure stillness and to preserve spontaneous breathing. At the end of investigation, both infants were transferred to the paediatrics ward awake

**Discussion**: The conjoined twins are rare anomaly and every pair of twins has unique anatomical and physiological peculiarity: few centres in the world<sup>1,2,3</sup> reported experiences about their anaesthetic management. We decided to set up a sedation

in spontaneous breathing, considering the favourable anatomical configuration for access to the airway and duration of procedure. Moreover, the anaesthetic team, the equipment and the radiological room were carefully provided for contemporary

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### References:

- 1.Stuart and al. Seminars in Paediatric Surgery 2015, 24:224-28;
- 2 Thomas and al. Paediatric Anaesthesia 2004 14: 117-29:
- 3. Cumming and al. NEJM 2017, 377:1667-77

Learning points: Non-Operating-Room-Anaesthesia in conjoined twins should be planned in an appropriate context. They may assume a wide range of anatomical configurations that requires carefulness in airway evaluation and management; furthermore, the radiological room should be adequately scheduled to contain the duplicated anaesthetic team and equipment.

### 05AP08-10

# Anaesthetic management of omphalopagus twins for Non-Operating-Room-Anaesthesia

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#### References:

- 1. Stuart and al. Seminars in Paediatric Surgery 2015, 24:224-28;
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Learning points: Non-Operating-Room-Anaesthesia in conjoined twins should be planned in an appropriate context. They may assume a wide range of anatomical configurations that requires carefulness in airway evaluation and management; furthermore, the radiological room should be adequately scheduled to contain the duplicated anaesthetic team and equipment.

## 05AP08-11

The relation between gastroesophageal reflux and postoperative nausea and vomiting in pediatric patiens applied laparascopic appendectomy

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Background and Goal of Study: Postoperative nausea and vomiting is difficult for paediatric patients and their parents. In addition, it can result in aspiration of gastric contents, dehydratation and electrolyte imbalance, prolongation of hospital stay. Otherwise, it's been showed that anesthesia reduces gastric emptying and motility. The reduction of gastric emptying and motility cause gastroesophageal reflux. The monitoring of pH is a confidential method that used to detect reflux presence. We aimed to search the relation between gastroesophageal reflux and PONV with reflux measures in pediatric patients applied laparascopic apendectomy

Materials and Methods: After the approval of faculty ethics committee, 55 patients operated by the same surgeon team were included. Thiopental 5 mg/kg, rocuronium 0,6 mg/kg and fentanyl 2 mcg/kg were used for anesthesia induction.

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Sevoflurane(1MAC), 50% N2O+ 50% O2 were used in the maintenance. the tidal volume was set as 6-8 ml/kg and PEEP was 5 cmH2O. An esophageal pHmeter catheter 2. 1 mm diameter and 180 cm length was placed from the nasal passage to the patients as 3 cm above the lower esophageal sphincter. pH measurements were evaluated with DeMeester score. It was accepted acid reflux if the score was >14,72. A study form contains demographic data of patients, GER history, Verbal Descriptive Scale(VDS) and esophageal pH values. The data were recorded to SPSS 21 programme.

Results and Discussion: Of the patients 41,8% was girl,58,2% was boy, the average age and preoperative fasting time were 13,2 years and 7,47 hours respectively. The average values of preoperative fasting and operation times were not statistically significant in VDS group(p>0,05). Between the VDS group and gender no significant relation was found(p=0,287). There was no statistically significant relation between pH ans VDS groups(p=0,384). GER history was not detected in none of the patients. The DeMeester score was >14,72 in 9 of the patients. We didn't encounter a study searching gastric pH and PONV relationship in anesthetised patients. Although in some studies a relation between anesthesia and reflux can be attained and in our study reflux ocurred in 9 patients, reflux formation was not significant on PONV.

**Conclusion:** We could find different results if the patients having reflux history and risk factors for PONV were included. Further studies with large patient groups are needed to register about this subject.

## 05AP09-1

# The effect of Body Mass Index (BMI) on postoperative pain in paediatric surgical population

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Rackground and Goal of Study: The aim of this study is to evaluate the ef

**Background and Goal of Study**: The aim of this study is to evaluate the effect of body mass index (BMI) on postoperative pain and postoperative analgesia requirements in paediatric surgical patients.

Materials and Methods: 757 children, aged 1 to 15 years old, ASA PS I-III, were included in this study. Participatns were allocated into four groups according to BMI classification and BMI percentile interpretation of WHO child growth standards: underweight (Group 1, n=110), normal weight (Group 2, n=456), overweight (Group 3, n=106) and obese (Group 4, n=85). All patients underwent elective surgical procedures under general anesthesia and received 0.003-0.005mg/kg fentanyl, 20mg/kg paracetamol and 0.02mg/kg nalbuphine intraoperatively according to standard department protocol. Demographic data were obtained from patients records. Postoperative pain scores with Hanallah and Wong Baker (WBFPS) pain scales at rest and movement (deep breath) and Aldrete score were assessed in 1(st) hour following surgery. Postoperative analgesic requirements after discharge were recorded. Statistical analysis was performed with ANOVA posthoc and chi square tests. Level significance was set at p≤0.005.

Results and Discussion: There were no differences in patients demographic data except for the body weight and BMI. Obese children (Group 4) reported statistically significant more pain in Hanallah scale compared to group 2 and 3 (p<0.05). No statistical differences were noted between groups regarding WBFPS at rest and movement. Underweight children (Group 1) received statistically significant less analgesics after recovery compared to normal (Group 2) (p<0.05). Moreover, there was statistically significant difference in analgesia consumption in Group 2 compared to groups 3 (p<0.05) and 4 (p<0.05). In Group 3 NRS scale was statistically significant lower compared to group 1 (p<0.05). There was also statistically significant higher Aldrete scale score in group 2 compared to group 4 (p<0.05).

Conclusion: BMI may relate with immmediate postoperative pain scores and analgesia. Underweight and normal children received less analgesics and reported less pain compared to overweight and obese children, postoperatively.

## 05AP09-2

# The effect of pneumoperitoneum on optic nerve sheath diameter in paediatric patients undergoing laparoscopic appendectomy operation

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Background and Goal of Study: Variations in optic nerve sheath diameter (ONSD) measured by ultrasonography may be an indirect marker of intracranial pressure (ICP) alterations, especially for ICP increases. The primary aim of this study is to observe the effect of pneumoperitoneum on ONSD measured by ultrasonography, where the secondary goal is to investigate the changes of ONSD caused by perioperative body position in paediatric patients undergoing laparoscopic appendectomy.

Materials and Methods: This study is compromised of the observation over 28 patients (5-12 years in age). After premedication with midazolam 0.5mgkg¹po, induction was achieved with propofol 3mgkg¹, rocuronium 0.6mgkg¹, remifentanil 0.3-0.5mcgkg¹ following the routine ASA monitoring. Anaesthesia maintenance was provided by 2-3% sevoflurane in a mixture of 40%O₂-60%N₂O. Intraabdominal pressure was maintained as 12mmHg during pneumoperitoneum. Both left and

right ONSD measurements were performed as a transverse diameter of the sheath on 3mm far from the exit of the optic nerve with the linear probe of 7-12 MHz frequency. The values were recorded as follows:3 min after induction (t0), 5 min after insufflation (t1), 5 min after trendelenburg and 15 degrees to the left titled position (t2), 15 min after insufflation (t3), 30 min after insufflation (t4) and 5 min after desufflation (t5). For statistical analysis, one way ANOVA, Paired t-test and Wilcoxon tests were applied.

Results and Discussion: ONSD was determined as t0:5,12±0,49 mm, t1:5,41±0,49 mm, t2:5,63±0,58 mm (%95Cl t0 and t1 for: p<0.001, t1 and t2 for p=0.001) on the right and t0:5,12±0,46 mm, t1:5,42±0,49 mm, t2:5,58±0,46 mm (%95Cl t0 and t1 for p<0.001, t1 and t2 for p=0.003) on the left side. There was no difference between t0 and t5 (t0:5,12±0,49 mm, t5:5,28±0,53 mm %95Cl p=0.27) on the right side. However, there was a statistically significant difference between t0 and t5 (t0:5,12±0,46 mm, t5:5,30±0,48 mm %95 Cl p=0.019) on the left side. There are numerous studies showing that pneumoperitoneum increases the ONSD. However, the effect of the body position on ONSD is controversial. The present study revealed that pneumoperitoneum along with body position might affect ICP and accordingly ONSD.

**Conclusion:** The ultrasonographic measurement of ONSD might be an alternative method of monitoring the degree of ICP changes during laparoscopic procedures in paediatric patients.

## 05AP09-3

# Dandy Walker syndrome with VP shunt and laparoscopic surgery- an anesthetic challenge

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Background: Dandy Walker Syndrome is a congenital brain malformation involving the cerebellum, oftenly accompanied with hydrocephalus and associated with neurologic impairment and heart, face and limbs malformations. Laparoscopic surgery is being increasingly performed for the management of abdominal problems in children

Case Report: 9-year-old male (weight 26 kg) with Dandy Walker syndrome and ventriculoperitoneal shunt was scheduled for elective laparoscopic splenectomy and cholecystectomy due to spherocytosis and cholelithiasis respectfully. He had enuresis and fecal incontinence but no associated heart malformation. Neurosurgeon was consulted prior to surgery to verify the proper functioning of the VP shunt. Standard American Society of Anesthesiologists anesthetic monitoring was used. Pre-medication with midazolam 4 mg PO was given. Anesthesia induction was conducted with propofol, fentanyl and rocuronium bromide. Patent was intubated with endotracheal tube and anesthesia was maintained with sevoflurane, fentanyl and rocuronium bromide. Arterial CO2 was measured: after induction, after insufflation of CO2 and after 1 hour of operation. Measured arterial CO2 reflected the values of etCO2. The shunt reservoir was checked occasionally for over inflation. Vital signs were stable during the operation, which underwent uneventfully. The patient was discharged from the recovery room 2 hours after procedure without any complications.

**Discussion**: The concern with laparoscopic surgery in patients with VP shunt is that pneumoperitoneum and required positioning of the patient may cause an increase in intracranial pressure and shunt malfunction. Associated heart malformation can in addition complicate anesthetic management. In two cases complications related to laparoscopic surgery in patients with VP shunts were reported but there is a small body of evidence indicating that it is safe to perform laparoscopic surgery on pediatric patients with VP shunt with routine anesthetic management.[1] **References**:

1.Chet W Hammill,Laparoscopic Cholecystectomy in a Patient with a ventriculoperitoneal Shunt, Hawaii Med J. 2010 Apr; 69(4): 103–104.

Learning points: Presence of a VP shunt makes anesthetic management of Dandy Walker Syndrome challenging and it must be carried out with good anesthetic and monitoring facilities.

# 05AP09-4

# Emergence agitation in children: a randomized clinical trial

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Background and Goal of Study: Emergence Agitation (EA) is described in the literature as a mental disturbance during recovery from general anesthesia consisting of hallucinations, delusions and confusion. In pediatric anesthesia EA is considered an important complication due to its high incidence (up to 80%). Many factors have been suggested to play a potential role in the initiation of EA, including factors related to anesthesia, surgery, the patient, and adjunct medication. Some studies suggest that these children are at risk of developing postoperative maladaptive behaviour changes. EA can cause injury to the child and damage to the surgical site.

The aim of this study was to evaluate the incidence of EA in children receiving

general anesthesia with either sevoflurane or desflurane in day case surgery. EA was assessed using the Pediatric Anesthesia Emergence Delirium (PAED) scale. Other possible factors influencing EA were also evaluated, such as differences in postanesthesia recovery between both agents and postoperative complications.

Materials and Methods: After approval by the Ethics Committee of "Hospital Universitario La Paz", a <u>randomized controlled trial</u> was conducted. A total of 200 patients received anesthesia with either sevoflurane or desflurane. Furthermore, 71 patients were premedicated with midazolam and 78 patients received additionally a single propofol bolus

Results and Discussion: The data obtained in the study confirmed an overall EA incidence of 21.3%. Incidence and severity of EA (mean PAED scale score) were reduced over time, decreasing by half 15 minutes after awakening. The main factors implicated in the development of EA were: age, postoperative pain and preoperative anxiety. The incidence and severity of EA was reduced in the children who received propofol. EA was found to be higher in sevoflurane than in desflurane anesthesia, however this difference was not statistically significant. EA characteristics were different between both inhaled anesthestics. Mean time to wake up was shorter with desflurane compared with sevoflurane. Patients with EA did not have a longer duration of PACU stay, although some patients had complications.

Conclusion(s): In order to reduce the incidence of this adverse event, it is advisable to identify children at risk of EA and take preventive measures, such as reducing preoperative anxiety, removing postoperative pain, and providing a single intraoperative bolus of propofol.

## 05AP09-5

# When is the benefit greater than the risk?

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**Background:** Pseudohypoaldosteronism type I (PHA I) is characterized by a mineralocorticoid resistance caused by an inactivating mutation of the gene encoding ENaC. It can lead to salt wasting crises and severe hyperkalemia causing life-threatening cardiac arrhythmias. The systemic form of the disease requires a life-long salt supplementation (1).

Case report: A 6-year-old boy, weighting 16,5 Kg, diagnosed with systemic PHA I was proposed for tonsillectomy, adenoidectomy and myringotomy. Treatment included 51 mEq Na+/kg/day fractioned in 5 meals (total of 240ml NaCl 20%).

By suggestion of his paediatric endocrinologist, we request an analytic study at admission which revealed hyponatremia (129 mmol/L) being salt supplementation desirable during the surgery. After induction and orotracheal intubation, a gastric tube was placed and 50ml de NaCl 20% was administered. Metoclopramide, dexamethasone and ondansetron were administered. Surgery lasted for 90 minutes. The child was extubated uneventfully when fully awake. Postoperative plasma sodium was 145 mmol/L. The recovery was made in a pediatric intermediate care unit. He was discharged home two days after surgery, asymptomatic.

**Discussion:** PHA I is a rare disease that places patient at risk of severe dehydration and ionic imbalance (2). In this case, we decided to administer NaCl through a gastric tube in order to prevent severe hyponatremia and hypercalemia. The ionic variations in this child are difficult to predict, so we decided to prompt correct the imbalances. It would be impossible to perform this amount of sodium supplementation intravenously due to the large volume of fluid needed in short time. Although there was the possibility of supplementation at the end of surgery it would still exist possibility of regurgitation and aspiration. We are aware of some conditions that we could optimize before surgery, namely oral ingestion of liquids until 2 hours before surgery and early onset of fluid therapy. We noticed that we inadvertently overcorrect the sodium level to which may contribute intraoperative use of dexamethasone and hydrocortisone.

### References:

- 1. Toshihiro Tajima et al. Clin Pediatr Endocrinol 2017; 26(3), 109-117
- 2. Nasifa Nur et al. Case Reports in Pediatrics (2017); 1-6

**Learning points:** Anaesthesiologist always must balance the risks and the benefits of his attitudes. Maybe sometimes it is worth to take the risks.

## 05AP09-7

Rate and factors leading to postoperative extracorporeal membrane oxygenation (ECMO) requirement after a slide tracheoplasty for congenital tracheal stenosis in pediatric patients

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Background: Congenital tracheal stenosis (CTS) is a rare disease usually requiring surgical repair in infancy. Surgical slide tracheoplasty, which has improved the survival rate of patients with CTS, is usually performed under ECMO or cardio-pulmonary bypass (CPB). The majority of patients are weaned from CPB or ECMO when sufficient ventilation via the reconstructed trachea is achieved. However, some patients continue to require ECMO postoperatively. This study aimed to investigate the rate of postoperative ECMO requirement and factors causing patients to continue requiring ECMO.

Methods: This was a retrospective observational study and was approved by the institutional review board. We collected data from the medical records of CTS patients from March 2010 to September 2017. The primary outcome was the rate of postoperative ECMO requirement, and the secondary outcome was the morphological attributes and surgical factors significantly related to the requirement for postsurgical ECMO. We collected data on age, height, weight, comorbidities, preoperative mechanical ventilation, CTS length and width in CT, presence of bridging bronchus, anesthesia and operation time, types and duration of extracorporeal support, and simultaneous cardiovascular surgeries. Statistical analysis was performed with the t-test for continuous variables and the Chi-squared test for categorical variables.

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Results: Thirty-six CTS patients with a median age of 6 months were enrolled. Of these, 34 patients were supported by an extracorporeal circuit during surgery. Two patients were placed on ECMO support before surgery due to unilateral lung hypoplasia and continued to require ECMO support after surgery. The median extracorporeal circulation time was 4.7 hours during surgery.

Ten patients required postoperative ECMO. Twenty-four patients returned to the PICU without ECMO, but one patient was placed on ECMO again on postoperative day 1. Patients with bridging bronchus had a significantly higher incidence of postoperative ECMO use (5/7 P=0.0041). Other morphological or surgical factors did not indicate any significant difference.

Conclusion(s): Some 29% of patients with CTS required postoperative ECMO. Patients rarely required a second ECMO course in the PICU if they were weaned from CPB or ECMO during surgery. The rate of postoperative ECMO use was significantly higher in patients with bridging bronchus.

## 05AP09-8

de Coimbra - Coimbra (Portugal)

# The utility of EEG spectral analysis in epileptiform activity identification in a child under general anesthesia

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**Background**: In a patient under general anesthesia, epileptiform discharges may only be diagnosed if an electroencephalogram is performed. Intraoperative monitoring with bilateral BIS may be used to diagnose epileptiform activity in this setting, namely spectral analysis. We report a case in which bilateral BIS allowed for the diagnosis of epileptiform discharges.

Case Report: A 12-year-old girl was submitted to surgical correction of a lumbar scoliosis through posterior approach. She also suffered from a spastic quadriplegic cerebral palsy (post-anoxic). She was submitted to a total intravenous anesthesia, with a propofol and remifentanil under target controlled infusion (TCI). Monitoring was ASA standard plus cerebral oximetry monitoring and bilateral processed EEG (INVOS® and BiS® respectively). After anesthetic induction, high frequency waves were noted in the bilateral BIS EEG monitor and spectroscopy showed activity through the whole spectrum which, after excluding possible artifacts, led to the suspicion of epileptiform activity (Figure 1). After 300mg of IV levetiracetam were administered and the propofol target-dose increased there was a significant shift in the density of wave frequency, with a preponderance of low frequency waves (<4Hz). The remaining procedure was uneventful and BIS and spectrogram patters were compatible with propofol anesthesia. After surgery, the patient was admitted in the pediatric ICU under midazolam and morphine perfusions (Figure 2). Bilateral BIS/spectroscopy was kept in the post-op monitoring. After direct inquiry, the mother remembered some episodes compatible with absence seizures, which were medicated until the first year of life.

**Discussion**: Bilateral BIS spectroscopy may allow for the recognition of epileptiform discharges, but confirmation with conventional EEG is necessary. There seems to be a good correlation between spectroscopy patterns and the utilized drugs and concentrations, allowing for a better control of the anesthetic process. The use of bilateral BIS in the ICU setting may detect epileptiform activity and impact clinical and therapeutic decisions.

**Learning points**: Spectrogram monitoring with bilateral BIS may be used as a supplementary tool to detect epileptiform activity, especially when continuous EEG monitoring is not available.

The definite diagnosis of epileptiform activity may only be established with an conventional EEG.

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### 05AP09-9

# Anaesthetic implications for 4-year-old girl with anti-NMDA receptor encephalitis: a case report

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Background: Anti-NMDA receptor encephalitis is caused by autoantibodies binding to NMDA receptor1. It is an uncommon disease, but it is serious-life threatening with slow recovery. Anaesthesia for surgery may be required in some of patients with anti-NMDA receptor encephalitis NMDA receptor is target of many anaesthetic agents. Therefore, anaesthesia in these patients is challenging.

Case Report: A 4-year-old-girl patient (130cm and 24 kg) presented with dystonia and behavioural change. The CSF analysis was positive for NMDA antibody. She was diagnosed with anti-NMDA receptor encephalitis. During hospitalization, she developed generalized seizure. She was intubated and transferred to a paediatric intensive care unit. She was given anticonvulsive drugs, cyclophosphamide, intravenous immunoglobulins and corticosteroids. Unfortunately, her conditions did not completely improved. She can be extubated but she cannot be eat by herself. She was perform gastrostomy tube replacement under general anaesthesia.

For preoperative management, emergency drugs (i.e. vasopressor, atropine adrenaline) and reserving PICU were prepared. General anaesthesia was induced with 30-mg of propofol and 10-mg of fentanyl. She was intubated an uncuffed oral endotracheal tube number 5 and 15 cm in depth. Anaesthesia was maintained by air-oxygen mixture and 2%sevoflurane throughout the gastrostromy. After the successful operation, the patient was extubated. She was observed in a recovery room for an hour and transferred to a ward in a stable condition. No anaesthetic related adversed event was observed after 24-hours of postoperative period.

Discussion: Symptoms of anti-NMDA receptor encephalitis are abnormal movements, seizures and autonomic nervous disturbance (i.e. hyperthermia. arrhythmia, hypo/hypertension, apneoa). Those symptoms are similar to the action of some anaesthetic agents. Anaesthetic agents with an action on NMDA receptor antagonist including nitrous oxide, ketamine, tramadol and xenon should be avoided. In this report, the paediatric patient underwent successful general anaesthesia using propofol, fentanyl and sevofurane.

### References:

1. Dalmau J, et al.: Anti-NMDA receptor encephalitis: case series and analysis of the effect of antibodies. Lancet Neurol 2008. 7(12):1091-8.

Learning points: General anaesthesia is safe for anti-NMDA receptor encephalitis by using propofol, fentanyl and sevofurane. Nitrous oxide and ketamine should be

# Neuroanaesthesiology

Neuroanaesthesiology

# 06AP01-1

Correlation between B-type natriuretic peptide with hyponatraemia and delayed ischaemic neurological deficit after subarachnoid haemorrhage

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Background and Goal of Study: Serum brain natriuretic peptide (BNP) is elevated after subarachnoid haemorrhage (SAH). This rise could be related to the occurrence of hyponatraemia, or delayed ischaemic neurological deficit (DIND), or indeed both. There are two mechanisms that have been proposed as possible causes of this correlation, cerebral salt wasting syndrome (CSWS) or the syndrome of inappropriate antidiuretic hormone secretion (SIADH). This study aimed to correlate changes in serum BNP with hyponatraemia and DIND after SAH

Materials and Methods: A prospective study was carried out on 30 adult patients presenting with aneurysmal SAH, who were admitted to the Neurosurgical Intensive Care Unit at Alexandria University Hospital. Serum NT-proBNP and serum sodium (Na) levels were measured over the 14 days post SAH onset. The 14 days were subdivided into 4 observational periods. DIND onset was plotted against both NT-proBNP and Na. Statistical analysis was performed using Spearmann's rank correlation and the Mann Whitney U test.

Results and Discussion: NT-proBNP median levels dropped from the first observational period untill the fourth. Serum Na showed no significant difference among the 4 observational periods.

In the second observational period 10 patients (34.5%) developed a more marked hyponatraemia than those recorded in other periods. A significant correlation tween serum Na and NT-proBNP was observed only in the 4th observational period (r=-0.43, p=0.03). This correlation was not significant for any other observational period.

DIND occurrence was 40%. The median serum Na levels among DIND cases was lower than that for cases without DIND. (134.6 (133.6-135.8), 137.7 (137.2-139.7) respectively. These differences were statistically significant (Z=-3.28, p=0.001) Regarding serum NT-proBNP, DIND cases had a median of 841.6pg/ml while the cases without DIND showed a median of 406.5 pg/ml. There was no statistical difference (Z=-1.61, p=0.11).

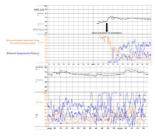
Conclusions: This study showed a positive correlation between serum Na levels and DIND status (r=0.67, p<0.001). There was not significant correlation between DIND status and serum NT-proBNP levels (r=0.33, p=0.11).

### 06AP01-2

Absence of typical intraoperative EEG signature of general anaesthesia and continuous suppression ratio as detected with NeuroSENSE® depth-of-anaesthesia monitor allow considerable decrease of the dose of anaesthetic agents during cardiac surgery: A case report

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Background: A prominent feature of EEG under general anesthesia (GA) is anteriorisation of alpha(α) waves. ¹Studies suggest that α power under GA reflects the degree of brain vulnerability. 2 This would correlate with the increased percentage of EEG suppression in older adults with poor neurocognitive reserve. Case Report: A 63-year-old male(106kg) with history of diabetes, arterial hypertension, CVA (no sequella) and renal transplantation (GFR= 77mL/min/1. 73m<sup>2</sup>) was schedulded for on pump CABG. After full monitoring including frontal EEG (NeuroSENSE®) and NIRS. GA was induced with 2mg midazolam. 50 mg propofol, 50µg sufentanil and 25mg ketamine. Because of the appearance of bilateral suppression ratio (SR)despite perfect hemodynamics no anesthetic was administered during the insertion of CV line. He continued showing SR (Fig1). Flumazenil(0. 4mg) was administered with no effect. A 8 channels-EEG(Datex Ohmeda) confirmed the observations(Fig 2). International 10-20 EEG was performed showing very slowed (δ and sub-δ) hypovoltaged EEG without asymmetry. A decision to do off pump CABG was taken. Surgery was performed under 0. 4% exp sevoflurane and remifentanil at 0. 02µg/kg/min. NeuroSENSE® spectral analysis showed only delta waves in absence of α frequencies till the end.



	Fp1 - T3	Fp2 - T4	C3 - O1	C4 - O2	
EF	8.2	2.7	3.5		Hz
m	1.6	0.8	0.0	***	Hz
implitude	3.2	4.8	9.0	***	$\mu V$
Delta%	86	99	97	***	%
'héta%	9	1	2	***	%
Alpha%	4	1	1		%
léta%	0	0	0		%
ISR	93	91	96		%
MGF	0.2				$\mu V$
mpédance +	0.4	0.4	0.8		kOhm
mpédance -	0.7	0.3	0.3		kOhm

He was extubated 2h after arrival in the ICU and showed neither awareness nor neurological complications till hospital discharge.

Discussion: This is an example of extreme sensitivity of the aged/frail brain to anesthetics and illustrates that age-related EEG changes can be extremely enhanced in some cases.

#### References

1. Purdon P. BJA 2015/2. Giattino C. Front Syst Neurosci 2017

Learning points: Our case confirms that typical EEG signatures of GA may be absent in patients with poor brain reserve and EEG SR reflects this vulnerability. It moreover illustrates the importance of intraoperative EEG monitoring to avoid anesthetic overdoses

### 06AP01-3

## Effects of fluid strategy and hypertonic saline on cortical cerebral microcirculation and markers of endothelial glycocalyx damag

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Background and Goal of Study: Fluid strategy and hyperosmolar solutions used during neurosurgery may modify cortical brain microcirculation and endothelial glycocalyx (EG). The aim of this animal study was to compare the short-term effects of restrictive (R) and liberal (L) fluid strategy followed by osmotherapy using hypertonic saline (HTS) on cerebral cortical microcirculation and morphological and biochemical markers of EG integrity.

Materials and Methods: Rabbits (weight 2.6-3.0 kg) were anesthetized, ventilated mechanically, and subjected to a craniotomy. The animals were allocated randomly to receive either less than 2 ml/kg/h (R group, n = 14) or 30 ml/kg/h (L group, n = 14) of balanced isotonic fluids (Plasmalyte, Baxter) for one hour. In the second phase of the study, animals were randomized to receive 3.75 ml/kg intravenous infusion of either 3.2% HTS (HTS group, n = 14) or normal saline (NS group, n = 13) in 20-min infusion. Microcirculation in the cerebral cortex using sidestream dark-field (SDF) and morphological index of glycocalyx damage - perfused boundary region (PBR) in sublingual and cortical brain microcirculation were evaluated after fluids and after hyperosmolar solution infusion. Global hemodynamic data were recorded and blood samples for laboratory analysis including serum syndecan 1 and 4 levels were obtained at the time of SDF image recording.

Results and Discussion: After fluids, lower proportions of perfused small vessel density (P = 0.0178), perfused vessel density (P = 0.0286), and total vessel density (P = 0.0447) were observed in the L group compared with those in the R group. No differences in the microcirculatory parameters were observed between the HTS and NS groups. PBR and syndecan 1 and 4 values were also not different between

**Conclusion**: Our findings suggest that restrictive infusion strategy better preserves perfusion of cortical brain microcirculation compared to liberal strategy in a rabbit craniotomy model. The choice of infusion strategy and the use of HTS did not influence markers of endothelial glycocalyx damage.

### 06AP01-4

The neuroprotective effects of individual and combined administration of edaravone and hypothermia against hypoxic insults

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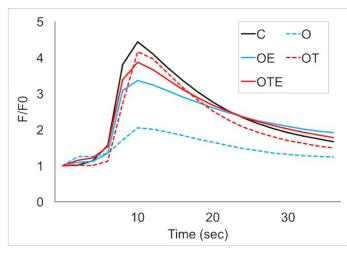
Background and Goal of Study: There are no reports referring to the cellular functional evaluation of the cortical neurones protected with both edaravone (Edv) and hypothermia (HT) against hypoxic insults (HI). We compared the neuroprotective effects of the combined administration of Edv and HT with each individual administration on rat primary cultured cortical neurones against prolonged

Materials and Methods: Neurones prepared from E17 Wistar rats were used after 10-11 days in culture. Shortly before 24h HI, 50µM Edv was administrated to the neurones. During HI, neurones were exposed to mild HT (32°C). As a cellular function, the degrees of glutamate (Glu) -induced intracellular calcium ([Ca2+] i) elevation were measured using fluorescence measurement systems after HI To evaluate the effects of Glu on neurones, the mean maximum change in fluorescence intensity (Fmax) upon addition of Glu was measured and normalized to the baseline fluorescence obtained before Glu application (F0). We measured the mean value of Fmax/F0 (height) calculated from the integration of [Ca2+]i response curves of the surviving neurones. A height ratio (HR) was calculated as follows:

the height of the [Ca2+] i response in an experimental culture divided by the height of the [Ca2+]i response in the control culture (normoxia, normothermia, no Edv). Data are expressed as the mean ± SEM. The differences between the means were assessed using ANOVA followed by post-hoc Tukey-Kramer HSD tests. P-values < 0.05 were considered significant.

Results and Discussion: HR of hypoxic neurones with HT was significantly higher than those with no neuroprotectants (0.95  $\pm$  0.18 vs 0.41  $\pm$  0.06, P = 0.01), while those with Edv alone was not so significantly different (0.66  $\pm$  0.13, P = 0.47). HRs of these two individual administrations did not differ significantly from control (P = 1.00; 0.19) or combined administration of Edv and HT (0.88  $\pm$  0.05, P = 0.99; 0.62). Conclusion(s): Mild HT by itself preserved the response of hypoxic neurones to Glu. Even if Edv was also co-administrated, there was no significant change

Figure: 2+ Fluorescence change in [Ca 2+]i imaging



### 06AP01-5

Effect of remote ischaemic preconditioning with remote ischemic postconditioning on neorologic outcomes in Patients Undergoing Superficial temporal artery-middle cerebral artery for moyamoya disease

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Background and Goal of Study: Superficial temporal artery-middle cerebral artery (STA-MCA) anastomosis is the most commonly used treatment method for moyamoya disease. During surgery and postoperative period, patients are exposed not only cerebral hypoperfusion (TIA) but also transient postoperative transient neurological deterioration due to cerebral hyperperfusion, which is a kind of ischemic - reperfusion injury. We investigated whether remote ischemic preconditioning (RIPC) with remote ischemic postconditioning (RIPostC) reduces the major neurological complication in patients undergoing STA-MCA anastomosis. Materials and Methods: One hundred and eight patients planned for STA-MCA anastomosis were randomly assigned to a RIPC with RIPostC group (n=54) or a control group (n=54). In the RIPC with RIPostC group, 4 cycles of 5-min ischemia and 5-min reperfusion were done on a lower limb before craniotomy and after STA-MCA anastomosis (RIPostC)

**Results and Discussion**: The duration of hospital stay was significantly longer in control group than in RIPC with RIPostC group  $(17.8 \pm 11.3 \text{ vs. } 13.8 \pm 5.9, \text{P value})$ = 0.023). The overall incidence of neurologic complication was significantly higher in control group than in RIPC with RIPostC group (13 vs.3, P value = 0.013).

Conclusion(s): Remote ischemic preconditioning (RIPC) with remote ischemic postconditioning (RIPostC) can be effective in reducing the patient's neurologic outcome and also it appeared to reduce the duration of hospitalization can be effective in reducing the patient's neurologic outcome and shortening the term of hospitalization.

### 06AP01-6

# Bispectral Index and encephalogram monitoring in rats during dexmedetomidine infusion

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Background and Goal of Study: Bispectral Index (BIS) monitoring is one of the most popular techniques for evaluating the depth of anesthesia in human. Moreover, BIS is becoming a useful tool for estimating the sedation level. Dexmedetomidine (Dex) shows preferable profiles for perioperative sedation, and studies are increasing; however, there is scarce reports studying the effect of Dex on BIS values in experimental animals. In the current preliminary study, we investigated the validity of BIS monitoring in awake and sedated rats using Dex.

Material and Methods: Male SD rats weighing 220-240 g were used. The rats were received brief anesthesia and were attached the 4 pierced electrodes on the head. Each rat was given 48-h recovery period. The electrodes were connected the leads and EEG signal was analyzed by Vista A-3000 (Nihon Kohden, Tokyo, Japan). Study 1: The rats were administered Dex. The infusion rates were changed every 15 minutes and was randomly set at 0 (control), 20, 40 and 80 μg/kg/h.

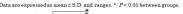
Study 2: The rats were infused Dex at 40 µg/kg/h. After the stabilization of BIS value, each animal was received gentle stimuli (patting).

The BIS Index, spectral edge frequency and amplitude were recorded after the equilibrium period. The results were analyzed using ANOVA and a P value less than 0.05 was considered as statistically significant.

**Results and Discussion:** Dex significantly reduced BIS values in a dose dependent manner (Table, Fig. 1). In Study 2, the BIS value was temporarily increased immediately after the patting stimuli (Fig. 2). The changes in BIS values indicated the sedation and anesthesia states of the rats.

Table. The dose of dexmedetomidine and the values of Bispectral Index, Spectral edge frequency and amplitude

Dexmedetomidinel infusion rate	BispectralIndex	Spectral edge frequency 95 (Hz)	Amplitude
$0 \; (\mu g \; kg^{\text{-}1} \; h^{\text{-}1})$	97.1 ± 0.8 [95.6 - 97.7]	** 23.6 ± 3.1 [20.3 - 29.0] *** 1	14.1 ± 3.0 [9.1 - 18.6]
20	81.7 ± 9.4 62 - 97.7] 🚁	7* 17.8 ± 5.3 [11.2 · 28.5] 1 7	16.9 ± 5.3 [8.8 - 28.1]
40	74.4 ± 9.1 [61.9 -87.8]	16.6 ± 5.5 [11.5 · 28.5]	19.5 ± 6.3 [8.8 - 31.6]
80	60.1 ± 12.1 [38.5 · 87.5]	13.6 ± 3.8 [10.4 · 26.8]	20.2 ± 6.7 [9.2 - 34.4]



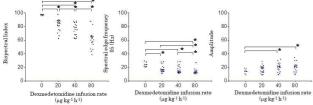


Fig. 1. The dot plots of the results. Each plots indicate the value at the infusion rate of dexmedetomidine, \*P < 0.05 between groups



Fig2. The typical change in the value of Bispectral Index during dexmedetomidine infusion (40  $\mu g\,kg^1h^3$ ). Gentle patting stimuli temporarily increased the value of Bispectral Index (yellow arrow) . The stimuli raised the value of BIS Index by 17.2  $\pm$  6.3 (mean  $\pm$  S.D.) from the base line.

**Conclusion:** We evaluated the changes in BIS values in awake, anesthetized and sedated rats. BIS monitoring might be useful and reliable tool for evaluating the effect of drugs modifying the activity of central nervous system in experimental animals.

### 06AP01-7

Amantadine alleviates postoperative cognitive dysfunction possibly by increasing both brain-derived neurotrophic factor and glial cell line-derived neurotrophic factor in mice and rats

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**Background and Goal of Study**: Postoperative cognitive dysfunction is a clinical entity that is associated with poor outcome. We determined the effectiveness of amantadine in reducing surgery-induced cognitive impairment and the role of brain-derived neurotrophic factor (BDNF) and glial cell line-derived neurotrophic factor (GDNF) in this effect.

Materials and Methods: In the first experiment, eighteen-month old male C57BL/6J mice were randomly assigned to: 1) control group, 2) surgery group (right carotid artery exposure), and 3) surgery plus amantadine group (25 μg/g/day for three days). One week later, these mice were started to be tested in Barnes maze and fear conditioning, and then their brains were used for Golgi staining. In the secondary experiment, eighteen-month old male Fischer 344 rats were assigned to: 1) control group, 2) surgery plus amantadine and anti-GDNF, anti-BDNF or heat-denatured antibody group (intracerebroventricular injection of two micrograms antibody). One week later, some rats were started to be tested in Barnes maze and fear conditioning, and then their hippocampus was used for Golgi stain; the others were used to harvest the right hippocampus for Western blotting.

Results and Discussion: Surgery increased the time for mice to identify the target box when tested 1 day and 8 days and reduced tone-related freezing behavior in the fear conditioning test. Surgery reduced BDNF and GDNF expression in the hippocampus of rat. These effects were attenuated by amantadine. Intracerebroventricular injection of anti-BDNF antibody reversed the effects of amantadine in the Barnes maze and reduced the branching complexity in the proximal region of CA1 hippocampal neurons. Intracerebroventricular injection of an anti-BDNF or anti-GDNF antibody but not the denatured antibody reduced the total dendritic length of the basal dendrites and the number of branching points in stratum pyramidale (Fig 1).

**Conclusion:** Our results suggest that amantadine attenuates surgery-induced learning and memory impairment. This effect may be mediated by BDNF and GDNF. BDNF also promotes the ramification of basal branches of CA1 hippocampal neurons.

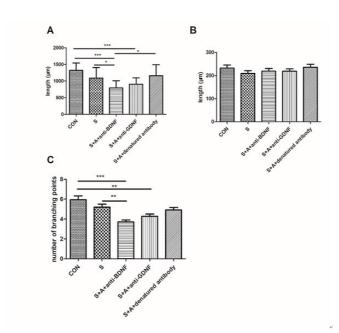


Fig. 1 Dendritic length and branching pattern of CA1 pyramidal neurons in rats. The average lengths of basal branches or total dendrites (A), the average length of basal trunk (B) in control, surgery, surgery plus amantadine and anti-GDNF or anti-BDNF, or surgery plus amantadine and denatured antibody group (n = 20, for each group). (C) Branching points. The graph represents the number of dendrites from the cell body of basal dendrites in CA1 pyramidal neurons (n = 20, for each group). \*P < 0.05, \*\*P < 0.01.

## 06AP01-8

# Comparative analysis of memory impairment after general anesthesia in different age groups

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Background and Goal of Study: Actuality: Anesthesia is a risk factor for the postoperative cognitive dysfunction (POCD). This research was aimed at studying possible cognitive deficiency including memory impairment in patients of different age groups. Abstract: Various studies indicated that general anesthesia led to a significant risk of early postoperative cognitive dysfunction in elderly patients. The incidence of POCD is often underestimated, it usually occurs in elderly patients but memory problems of younger subjects undergoing general anesthesia have not been studied thoroughly. Hypothesis: The application of general anesthesia leads to memory impairment in young and middle age patients. Objective: To assess memory decline in different age groups of patients after the spinal neurosurgical treatment with general anesthesia (propofol and fentanyl).

Materials and Methods: Neurocognitive tests according to Luria, 10 words test, visuospatial memory testing (complex images), Wechsler Memory Scale, MoCA, HADS, Pain Detect were used. Neurocognitive tests were performed preoperatively and at the moment of discharge. Descriptive statistics and hypothesis testing using Mann–Whitney U test were applied for analysis.

Results and Discussion: In our study 60 patients with chronic back pain undergoing neurosurgical treatment were divided into two equal groups of 30 persons in each. Group A consisted of young patients (avg. age 32.37 (range 18-44)), Group B included middle age patients (avg. age 51.33 (range 45-60)). Anesthesia duration was 4 hour on average. A significant memory decrease was observed in both groups 6 days after anesthesia.

**Conclusions:** Our results showed a significant memory decrease after 6 days of general anesthesia.

### 06AP01-10

## Pretreatment with erythropoietin improved the long-term neurological function induced sevoflurane exposure in neonatal rats

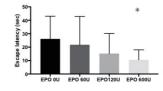
Goyagi T.1, Nishikawa T.1

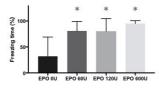
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Background and Goal of Study: Anesthetic exposure is known to induce neural apoptosis and degeneration in neonatal immature brain. Although erythropoietin (EPO) has provided neuroprotection against hypoxic ischemic injury in neonatal animals, relatively little is known whether EPO has the neuroprotective effects against anesthetic-induced neurodegeneration<sup>1,2</sup>. This study was examined whether EPO improves the long-term cognitive dysfunction after 3% sevoflurane exposure in neonatal rats.

Materials and Methods:7-day-old rats received intraperitoneal saline (EPO 0U) and EPO (60, 120, 600U), respectively, 30 min before 3% sevoflurane exposure for 4 hours with 21% oxygen (n=5 for each group). Acquisition trials were carried out using Morris water maze 3 weeks after anesthesia exposure, while rats were evaluated for spatial memory 6 weeks after anesthesia exposure. Fear conditioning test was conducted 5 and 6 weeks after anesthesia exposure. After the cognitive test, the brains were stained for NeuN. Data (mean ± SD) were analyzed using one-way ANOVA. P<0.05 was considered statistically significant.

Results: The escape latency was significantly reduced in the EPO 600U treatedrats compared with the EPO 0U rats (Figure). The freezing times were significantly longer in the EPO treated-rats than the EPO 0U group (Figure). The number of NeuN-positive cells in the CA1 region of the hippocampus and cortex in the EPO treated-rats was significantly greater compared with that in the EPO 0U group (Table).





EPO 0U EPO 60U EPO 120U EPO 600U 
CA1 hippocampus 72 ± 4 89 ± 5\* 92 ± 7\* 92 ± 8\*

Cortex 95 ± 8 116 ± 10\* 118 ± 10\* 115 ± 10\*

Number of cells/0.15mm² \*

149

Table. The number of NueN positive cells

**Conclusion**: These findings indicate that pretreatment with EPO is likely to improve long-term cognitive function and ameliorate neuronal degeneration induced by sevoflurane exposure in neonatal rats.

#### References:

P<0.05 vs EPO 0U

- 1. Pediatr Anesth 2011; 21: 1209-13.,
- 2. Pediatr Anesth 2014; 24: 749-59

### 06AP01-11

# Development of a novel model to assess cognitive and memory impairment in rats after stroke

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Background and Goal of Study: Stroke is a leading cause of mortality and morbidity worldwide. Survivors of stroke frequently suffer from motor deficits, cognitive impairments, and neuropsychiatric complications that can result in disturbances in learning and special memory, impairing quality of life. Cerebrovascular disease and dementia are closely linked. Dementia has been described in about 30% of those with a history of stroke with a relative risk ranging from 3.6 to 5.8. The risk of dementia after stroke is high immediately after the insult and remains high even 25 years later. Interesting, elderly patients without a history of stroke but with cognitive decline have a higher risk of stroke. The pathophysiology of post-stroke dementia remains elusive and appears to be multifactorial rather than purely biological or psychosocial. Thus, valid animal models would contribute to the study its etiology and treatment. This study describes a novel rat model for post-stroke dementia using middle cerebral artery occlusion (MCAO).

Materials and Methods: 40 Sprague Dawley rats (weight 350–450 g) were randomly assigned to receive MCAO using an uncoated 4-0 monofilament, or as a sham-control. An MRI was performed 24hrs post-surgery to evaluate the severity of brain injury by measuring brain edema, infarct zone and blood brain barrier breakdown. On day 30 post-surgery the rats were introduced to the Barnes maze, an experimental tool to measure spatial learning and memory. After three days of training, time spent finding the escape box and the number of errors before finding the escape box was measured during two trails.

**Results and Discussion**: On day  $ildе{4}$  of the Barnes maze, there was a significant increase in the time spent finding the escape box and the number of errors before finding the escape box, during both trials in the post-stroke rats (p<0.001). There was a significant increase in brain edema (p<0.001), infarct zone (p<0.001), and blood brain barrier breakdown (p<0.001) in the post-stroke rats compared to controls. Rats from control group did not show any significant differences.

**Conclusion**: The findings of this study provide evidence that special learning and memory impairments following cerebral ischemia in rats are demonstrable. Animal models of post-stroke dementia may be useful in identifying the biological mechanisms underlying these symptoms and the development of therapeutic interventions.

### 06AP02-1

# Clinical experience in the use of dexmedetomidine for deep brain stimulation

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**Background and Goal of Study**: Dexmedetomidine (DEX) provides sedation without respiratory depression and it seems not to interfere with electrophysiological records (EPRs) and neurocognitive tests (NTs) during deep brain stimulation procedures (DBS). The goal of the study was to confirm the usefulness of DEX for DBS in patients with movement disorders in our setting.

Materials and Methods: Seventeen consecutive patients scheduled for DBS during 2015-2016 were included (14 Parkinson, 2 essential tremors, 1 dystonia). The stereotaxic frame was placed under local anaesthesia. Monitoring included electrocardiogram, pulse oximeter, BIS®, capnography and invasive blood pressure. Oxygen was provided through nasal prongs. A total of 1 μg. kg-1 of DEX was administered along 10 minutes at the beginning of the procedure, followed by perfusion (0. 1-1 μg. kg-1. h-1) adjusted as needed. Sedation was assessed with Richmond Scale (RASS). If necessary, propofol and/or opioids (fentanyl or

remifentanil) were added in bolus or "target controlled infusion" system. Ropivacaine 0. 75% 10 ml + Lidocaine 2% 10 ml was used for bilateral 'scalp block' prior to cranial incision. The variables analysed were sedation level, patient comfort by Visual Analogue Scale (VAS), hemodynamic changes and respiratory depression. The correct placement of the stimulators, guided by EPRs, and possible incidences during NTs were also recorded.

**Results and Discussion**: All patients reached an adequate level of sedation. The RASS ranged from -1 to -3, without respiratory depression. One patient presented oversedation (-4) after the bolus of DEX. Mean perfusion DEX doses were 0. 5  $\pm$  0. 2  $\mu g$ , kg-1, h-1, VAS remained <3 except in a patient with VAS 5, who required higher doses of fentanyl. Hemodynamic complications were episodes of mild bradycardia and hypotension in two different patients, both solved with atropine and phenylephrine respectively. Arterial hypertension was needed to treat in six patients with urapidil, another one required clevidipine. One patient presented postoperative agitation, and a surgery was stopped for pneumocephalus. Both, the location of the implantation site of the stimulators through EPRs and NTs were carried out without evidence of drug interferences.

**Conclusion:** DEX provided conscious sedation and comfort without respiratory depression and with an appropriate hemodynamic profile. In addition, we did not detect interferences with NTs or EPRs during DBS location in our patient population.

## 06AP02-2

Decompressive craniectomy in patients with refractory intracranial hypertension after traumatic brain injury: a systematic review and meta-analysis of current evidence

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Background and Goal of Study: Decompressive craniectomy (DC) to control refractory intracranial hypertension in patients with traumatic brain injury (TBI) has been listed as possible but controversial therapeutic approach in the latest version of TBI management guidelines. This study aims to perform a systematic review and meta-analysis on efficacy and safety of DC compared to standard care in TBI patients.

Materials and Methods: A database search (PubMed, EMBASE, CENTRAL and International Web of Science) from 2011 to 2017 was conducted to identify randomized clinical trials (RCTs) and observational studies pertinent to DC compared to standard care after severe TBI. The primary outcomes were mortality and functional outcome upon hospital discharge and at 6 and 12 months after intervention, whereas intracranial pressure (ICP) control, hospitalization data and occurrence of DC-related adverse events or systemic side-effects served as secondary outcomes.

Results and Discussion: Three RCTs and two observational studies, enrolling 1269 patients, were selected for qualitative analysis, among which one deemed unsuitable to be included in meta-analysis. Most of the retrieved studies were of high risk of bias and rather low quality. Mortality and functional outcome constituted the combined end-points in 4 studies, whilst in one trial the main point of interest was mortality. DC-treated patients showed a significant reduction in their overall mortality (RR, 0.57; 95%CI, 0.5–0.66; P<0.001; I²=17%) with no profound beneficial effect on their functional outcome (RR, 0.89; 95%CI, 0.78–1.02; P=0.09; I²=58%) compared to those receiving standard care. However, a notable improvement on functional outcome was recorded only at 12 months after intervention (RR, 0.80; 95%CI, 0.70–0.92; P=0.001; I²=0%). Although, DC yielded a positive impact on ICP control and duration of ICU stay, its effect in reducing the length of hospitalization was less clear. In terms of safety, DC was associated with an augmented risk of adverse effects.

Conclusion: Based on current evidence, DC emerges as a superior practice to standard care for intracranial hypertension control, with a subsequent short- to long-term survival benefit in TBI patients. Available evidence also suggests a trend towards to late functional outcome improvement; yet no definite conclusion can be drawn due to limited quantity and considerable heterogeneity of available data.

### 06AP02-3

The potential of thromboelastometry for the diagnosis and treatment of coagulopathy in patients undergoing craniotomy due to isolated traumatic brain injury (TBI)

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Background and Goal of Study: Craniotomy to treat TBI is a major neurosurgical intervention associated with significant bleeding. Adequate assessment of coagulation status is crucial as coagulopathy (CGP) in patients with TBI is prevalent. Rotational thromboelastmetry (ROTEM) is a coagulation assay proven to be useful in trauma and major surgery. We hypothesize that ROTEM might better reflect the actual coagulation status and predict bleeding, as compared with standard coagulation tests (SCT).

Materials and Methods: We performed a prospective, observational pilot study in a cohort of adult TBI patients requiring urgent craniotomy. Patients with multiple trauma, hematologic disease, use of anticoagulants or antiplatelets, were not included. Isolated severe TBI was defined as Abbreviated Injury Scale for head (AIS<sub>head</sub>)>3 and AIS<sub>extracranial</sub><3. Blood was collected preoperatively and analyzed with SCT (prothrombin time index [PTI], partial thromboplastine time [APTT], platelet count [PLT], fibrinogen concentration [Fib.]), and ROTEM assays (EXTEM, INTEM, FIBTEM). CGP was defined as any abnormality on ROTEM and/or PT<70%, APTT>38s, Fib.<1.5g/L, PLT<100\*10\*/L. Intraoperative blood loss was estimated and compared between patients with CGP according to SCT; ROTEM; and SCT/ROTEM. High blood loss was considered>300mL. Data are expressed as percentages or median(O1-O3). Significance level for comparisons. p<0.05.

Results and Discussion: 32 patients were enrolled. The incidence of CGP was 40.6% (N=13), 31.3% (N=10), and 53.1% (N=17) according to SCT; ROTEM; and SCT/ROTEM, respectively. Blood loss in study cohort was 350(300-500)ml. Significant ROTEM parameter differences (CT, CFT, α-angle, A10, MCF) between high (HBL) and low (LBL) blood loss groups were detected, whereas according to SCT, only Fib. differed. There was no significant relationship between CGP in SCT, and HBL. Despite Fib.>1.5g/L in all cases, there were 4 patients (12.5%) with impaired clot firmness according to ROTEM findings. Significant relationship between overall CGP in ROTEM as well as in ROTEM/SCT, and HBL was detected. Sensitivity and specificity of CGP in ROTEM to predict HBL was 50% and 87.5%. CGP in SCT/ROTEM predicted HBL with 68.8% sensitivity and 75% specificity.

**Conclusion:** ROTEM may aid in predicting blood loss, and can be superior in characterizing and optimizing coagulation, especially if SCT values are marginal. Lower target for fibrinogen (1.5g/L) in TBI may be too low.

### 06AP02-4

The prevalence of hyperfibrinolysis detected by rotational thromboelastometry in neurosurgical patients with traumatic brain injury (TBI) requiring craniotomy and hematoma evacuation

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Background and Goal of Study: Hyperfibrinolysis is proposed as one of the mechanisms leading to coagulation substrate consumption and excessive blood loss in trauma patients. Consequently, the use of antifibrinolytic agents has become widespread. However, the efficacy and possible benefits of their use in TBI patients remains debated. Viscoelastic assays are increasingly used to detect, quantify fibrinolysis, and predict the potential effect of antifibrinolytic agent administration. We aimed to clarify the prevalence of hyperfibrinolysis using thromboelastometry (ROTEM) in isolated TBI patients, and to evaluate the potential effect of antifibrinolytic agent administration.

Materials and Methods: We performed a prospective, observational pilot study in a cohort of adult TBI patients requiring urgent craniotomy due to intracranial hypertension. Patients with multiple trauma, known hematologic disease, use of anticoagulants or antiplatelets, and preoperative exposure to antifibrinolytics, were not included. Isolated severe TBI was defined as Abbreviated Injury Scale for head (AIS, and AIS of the A

Results and Discussion: In a cohort of 33 patients (Glasgow coma score: 7(5-11.5); midline shift>0.5 cm on CT in 75% cases; ASA status>=3 in 97% cases), abnormal preoperative coagulation pattern according to ROTEM was found in 10 (30.3%) patients. Hyperfibrinolysis according to the aforementioned definition was found in 2 (6.1%) patients. Of note, overall coagulation pattern on APTEM was better in the majority of patients - 18 (54.5%), but the difference was slight: CT 58(53-72) vs 59(54-78)s; CFT 88(64-120.5) vs 85(72.5-127)s, MCF 60(53-

65.5) vs 62(53.5-65.5)mm and ML 5(3-6.5) vs 4(2.5-6)% in EXTEM and APTEM, respectively. Statistically significant difference between EXTEM and APTEM was found only with regard to maximum lysis (ML), p<0.05. However ML<sub>EXTEM</sub> was<15% in all cases.

**Conclusion**: Hyperfibrinolysis might be not as prevalent as expected in isolated TBI patients. The role of antifibrinolytic agents in brain trauma is vet to be defined.

### 06AP02-5

Vagus nerve stimulator in a patient with Angelman Syndrome. A challenge for the anesthesiologist. A case report

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Angelman syndrome (AS) is characterized by a partial deficit of paired autosomal chromosome 15, which contains a subunit of the GABA receptor¹. Important considerations include the unpredictable effects of drugs that act on the central nerve system, epilepsy, the dominance of the vagal tone with potential refractory bradyarrytmia and airway difficulties. There were no incidents during surgery in our patient but the characteristics of the procedure can lead to intraoperative difficulties that the anesthesiologist should not underestimate. Our main objective is to transmit the basic knowledge through this case.

We describe the general anesthesia of a 14 year-old patient with AS who underwent surgery for vagus nerve stimulation (VNS) due to unresponse to antiepileptic drug (AED) treatment. He had developmental delay, speech disorder, ataxia, microcephaly and myoclonus epilepsy. He was premedicated with midazolam, fentanyl and atropine and general anesthesia was induced with propofol and rocuronium and maintained with propofol and remifentanil. We could extubate the patient without reversal agents.

VNS with surgical placement is a treatment modality for medically refractory epilepsy². Stimulation at high intensities has a chronotropic effect on the heart. Bradycardia, complete atrio-ventricular block and ventricular asystole after initial left vagus nerve intraoperative stimulation have been reported in literature. Postoperative complications include seizures, peritracheal hematoma, vocal cord paralysis, hoarseness and dyspnea. Seizures should be considered in patients with delayed awakening.

There are few studies with AS patients and they show different results and recommendations³. Discrepancies involve hypersensitivity versus insensitivity to the hypnotics (both volatile and endovenous), benzodiazepines and neuromuscular blockers. AEDs must be maintained perioperatively, which can alter the metabolism of drugs related with cytochrome p450 enzyme. Medicines have different effects on seizure threshold and it should be avoided those who predispose patients to seizures, as ketamine² and enfluorane.

We must be cautious when we deal with an AS patient who has been programmed for a VNS implant. Pathology and surgery have different, but at the same time summative, mechanisms that can trigger the complications of this pathology more often than usual.

# 06AP02-6

# Assessment Perioperative Cardiac Risk for Neurosurgical Patients with Supratentorial Tumors

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**Background and Goal of Study**: Cardiac complications are one of the leading causes of mortality in the early postoperative period, including neurosurgical patients after surgery brain tumors. Determination of the leading factors in the formation of the perioperative risk of cardiac complications in patients operated of brain tumors of supratentorial localization.

**Materials and Methods**: A prospective observational study was conducted, which included 19 patients (men 7 (37%) and women 12 (63%)) aged 38 to 67 years (53.1  $\pm$  9.5) operated of brain tumors of supratentorial localization. One day before the operation, an evaluation of perioperative cardiac risk was carried out using the Gupta Perioperative Cardiac Risk (GPCR) scale [1]. The correlation of each of the GPCR indices was assessed with the risk of developing cardiac complications.

Results and Discussion: The physical status of ASA was III in 11 (58%) patients, IV - in 8 (42%). Evaluation of functional status showed that total independent occurred in 6 (32%) cases, partially dependent - in 11 (58%) and totally dependent in 2 (10%) observations. The risk of perioperative cardiac complications in the examined patients on the GPCR scale ranged from 0.65% to 7.1%. The highest risk for the development of perioperative cardiac complications was in patients who in addition to the high risk of ASA also had a decrease in functional status. Correlation relations are presented in Table 1.

Age ASA Creatinine Functional status R<sup>2</sup> 0.45 0.87 0.02 0.38

The closest correlations were founded between the risk of perioperative cardiac complications and the assessment of the patient's state on the ASA scale. When analyzing the risk ratio of perioperative cardiac complications with ASA IV assessment and concomitant severity of dependence.

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**Conclusions**: 1. The level of physical status according to ASA III and more is a risk factor for the development of perioperative complications in patients operated of brain tumors of supratentorial localization. 2. The highest risk (up to 7.1%) of perioperative cardiac complications occurred in patients of grade IV in ASA with the presence of totally and partially dependent.

#### References

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## 06AP02-7

# Management of muscle relaxant in a patient with bulbar symptoms and advanced inferior motor neuron disease

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**Background and Goal of Study**: Lower motor neuron diseases are characterized by abnormal response to muscle relaxants that may result in prolonged mechanical ventilation in the postoperative period (1).

Theobjective is to present a case of general an esthesia in a patient with lower motor neuron disease reviewing the latest evidence of the management of neuromuscular blockade in these pathologies.

Case report:: A clinical case of a woman of 45-year-old with progressive distal musculature weakness in inferior limbs and right arm, as well as bulbar symptoms. She presented odynophagia for solids with weight loss in the last year of 25 kg, dysphonia and fluctuating stridor. Bilateral paralysis of vocal cords in adduction was seen in fibrolaryngoscopy, so laryngeal microsurgery was needed.

Anesthesia was induced with fentanyl, propofol, rocuronium 30 mg and maintained with sevorane and continuous perfusion of remifentanil. The neuromuscular response was monitored by train of four during all the intervention. A new dose of rocuronium 10 mg after 30 minutes of induction was needed. After one hour value of TOF ratio was 97% and was not required reversal of neuromuscular blockade. Awakening and extubation was performed without complications. The patient does not have residual muscle blockade, weakness, stridor or respiratory symptoms.

Conclusions: These patients with motor neuron diseases are hypersensitive to non-depolarizing neuromuscular blockers. However, rocuronium has been demonstrated to be safe due to its rapid onset of action and the possibility of antagonizing the blockade with sugammadex (2). Depolarizing relaxants are extremely contraindicated in these patients because they may cause myotonic reactions and massive hyperkalemia. The use of other non-neuromuscular relaxants is not recommended due to the risk of residual postoperative blockade. Reversal with cholinesterase inhibitors is not indicated since they may produced unwanted cholinergic and the unpredictable effects that can lead to respiratory complications (1-2).

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### 6AP02-8

Comparison of the effect of continuous infusion and bolus doses of rocuronium during anesthesia for lumbal discectomy on the quality of patient recovery assessed with Qor-40 questionnaire

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Background and Goal of Study: Continuous infusion of rocuronium enables better and stable degree of relaxation, avoiding periods of unsufficient or too deep neuromuscular block, compared with bolus dosing. Due to the specificity of kneechest position in a lumbar discectomy, many complications during anesthesia and surgery are possible so effective and balanced neuromuscular block is needed. The hypothesis of this research was that continuous infusion of rocuronium during general anesthesia for a lumbar discectomy enables better quality of patient

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recovery as measured by questionnaire.

Materials and Methods: 80 patients (ASA I and II), aged between 18 and 65, for whom a lumbar discectomy was planned were randomly divided into two groups of 40 patients. In both groups general anesthesia was maintained with propofol and remifentanil with standard monitoring, BIS and TOF. In the control group rocuronium was administered in separate bolus doses with the TOF ratio of 5% while in experimental group rocuronium was administered via continuous infusion so that the TOF ratio was 5%

The quality of recovery after general anesthesia and surgery can be measured by Quality of recovery questionnaire (Qor-40). Qor-40 was assessed three times: before anesthesia, 24 hours after, and 30 days after anesthesia.

The results were analysed with t-test for independent samples using IBM SPSS Statistics version 24

Results and Discussion: The continuous rocuronium infusion group displayed better quality of recovery in terms of physical independence both in period 24 hours after anesthesia (p=0.035) and the 30 days after (p=0.011) (Fig 1). With regard to the other Qor-40 parameters (pain, patient support, emotional state and physical comfort) there were no statistically significant differences between the groups.



Conclusion: Continuous infusion of rocuronium enables better quality of recovery than bolus doses in terms of physical independence both in early postoperative period as well as 30 days following lumbal discectomy. Further research on a larger sample and longer follow-up period coud additionally explain that influence

## 06AP02-10

## Service evaluation audit of awake craniotomy cases in a UK tertiary referral teaching hospital

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Background: Awake craniotomy (AC) is commonly performed for epilepsy and deep brain stimulation surgery and to help preserve eloquent areas during tumour resection. While it is increasingly used to reduce the length of hospital stay, ICU admissions and avoid general anaesthesia (GA) risks, they pose a unique challenge to anaesthetists. The aim of our audit was to review the anaesthetic practice and outcomes for awake surgery in Addenbrooke's neurosurgical unit.

Methods: We retrospectively obtained a database of patients who had AC surgery from 1/1/15 to 15/5/17 from the hospital's IT department. Using Excel for data entry and analysis, the required information was obtained from the e-records.

Results: 510 patients underwent craniotomy over 2 1/2 years and 48 cases were done as AC. 40 were ASA I/II and 8 were ASA III. 21 cases were for resection of low grade glioma, 22 for high grade glioma and 3 for metastases. The tumour locations included the temporal (12), frontal (15), parietal (14) and insular (7). The airway assessment of most patients was without concern and one was predicted difficult. With regards to the awake techniques, 43 patients were asleep-wake, 5 patients were asleep-wake-asleep (AWA) and no patients had local anaesthesia alone with/without sedation. Three AWA patients were unplanned due to agitation/brain swelling or low GCS. All three patients had a LMA reinserted for GA conversion. The two planned AWA patients had their airway secured with an endotracheal tube (ETT) using an AirTrag device. The airway used for the asleep phase of AC was evenly divided into ETT (24) and LMA (24). Three patients who initially had LMA inserted were subsequently intubated due to ventilation problems while one patient with ETT had severe coughing on awakening. Two patients had seizures during the awake phase (the first resolved spontaneously, the second had recurrent seizures despite Keppra, phenytoin and cold saline irrigation). There were 4 cases (8%) where AC ultimately failed (one case of recurrent seizures and three cases of unplanned AWA).

Conclusion: Our current anaesthetic practice for AC is associated with a high degree of success for the patients. Despite the slightly higher failed AC rate with our techniques compared to the reported 2% incidence in the literature, we attribute it to our low sample size. As our case numbers and experience with the procedure grow we expect the rate to fall and patient outcomes to improve.

### 06AP02-11

Intracavernous internal carotid artery rupture during pituitary adenoma transsphenoidal surgery: a case report

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Background: Intraoperative internal carotid artery (ICA) bleeding due to injury of its cavernous portion is a severe complication of transsphenoidal surgery

Case report: A 47-year-old man with a pituitary tumour involving the right intracavernous ICA was scheduled for transsphenoidal tumour removal. During surgery, an ICA rupture occurred with hemorrhagic shock that required adrenaline noradrenaline perfusion, fluids, tranexamic acid and massive transfusion; surgical attitude included intranasal haemorrhage control and proximal carotid looping at cervical level; then the patient was transferred to angioradiology and a stent was installed in the bleeding area. In the following 24 hours, stent thrombosis and stroke of the watershed territory between the anterior cerebral artery (ACA) and the right middle cerebral artery (MCA) appeared. As neurologic symptoms were related to cerebral perfusion pressure, a surgical extra-intracranial bypass of the superficial temporal artery to the distal branch of MCA was performed. Despite three consecutive attempts of anastomosis, bypass flow absence was evidenced by indocyanine green. Three days later, brain CT scan showed right cortical acute ischemic lesions in MCA area, watershed territory between ACA and MCA and in the right internal capsule. Despite adequate compensation through the anterior and posterior communicating arteries, an acute right hemispheric syndrome occurred. Neurological signs progressed favourably until complete remission in 17 days.

Discussion: Risk factors for intracavernous ICA injury in transsphenoidal surger include bulky, invasive adenomas; previous radiotherapy; medical treatment of the adenoma (1). Its complications may be fatal so transsphenoidal pituitary surgery should be performed where endovascular therapy is immediately available (2).

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Sylvester, PT et al. J Neurosurg. 2016 Nov;125(5):1256-1276. doi: 10.3171/2015.6.JNS142483.

Learning points: Patients at risk of carotid injury should be always identified during the preoperative period and a multidisciplinary approach needs to be planned due to potential ICA damage. If it happens, a protocolized approach allows a better outcome. Cerebral watershed territories may not be well perfused despite a functional polygon of Willis if it is not accompanied by an adequate carotid flow.

## 06AP02-12

# Awake fiberoptic intubation through the I-gel supraglottic device in cervical spine injury

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Background: Direct larvngoscopy for orotracheal intubation may be difficult in patients with cervical spine injury due to limitation in neck mobility<sup>1</sup>. These patients may benefit from intubation techniques with no movements in cervical anatomy<sup>2</sup> Fiberoptic intubation through the I-gel device can be carried out without the need of neck flexo-extension and rotation movements.

Case Report: We present the case of a 32 year old man who suffered cervical vertebral fractures in C3 and C4 due to a car accident. The patient was taken into the theater in spontaneous ventilation and conscious. He also presented other difficult airway predictors, such as beard, retrognatia and limited mouth opening (2,5 cm). We talked to him about awake intubation but he refused. So we decided to administer oropharyngeal local anesthesia and then induce sedation in order to insert the I-gel under spontaneous breathing. After confirming proper ventilation through the I-gel with capnography curve, we inserted the fiberscope with a reinforced endotracheal tube (ETT) over it. Once the glottic structures were observed, general anesthesia with neuromuscular relaxants was induced thus preventing coughing and neck movements. The fiberscope was then passed through the vocal cords until the carina was seen and finally the ETT was railroaded over the fiberscope inside the airway.

Discussion: Cervical vertebral fractures are one of the most dangerous clinical situations that anesthesiologists could face. Once cervical stabilization is achieved, endotracheal intubation should be performed without any neck movement not to damage the spinal cord. By using the I-gel to achieve a patent airway, we prevent the patient from suffering neck mobility. The I-gel lies just above the glottic structures

so that it facilitates the passage of the fiberscope through the vocal cords as few maneuverability is needed.

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2. Waltl B et al. Tracheal intubation and cervical spine excursion: direct laryngoscopy vs. intubating larvngeal mask. Anaesthesia, 2001 Mar:56(3):221-6

Learning points: Neck movements should be avoided to achieve endotracheal intubation in cases of cervical vertebral fractures. The I-gel can be inserted in spontaneous ventilation in cases of cervical spine injury. Fiberscope intubation through the I-gel device can be performed without the need for flexo-extension neck

### 06AP03-1

Sphenopalatine ganglion block may be an efficient treatment of headache after lumboperitoneal shunt placement, a Case Report

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Background: Low pressure cerebral spinal fluid (CSF) headache following intended or non intended dural puncture occurs mostly in obstetrics and its recommended treatment consists in performing an epidural blood patch. Sphenopalatine ganglion block (SPGB) is an alternative treatment that is being used in obstetrics with success (1). We report its use, a novelty to our knowledge, to treat a patient with severe headache after the placement of a lumboperitoneal shunt (LPS).

Case Report: A 20 years old male, ASA II, GCS 15, was submitted to surgical insertion of a silicone LPS under general anesthesia to treat intracranial hypertension secondary to venous sinus thrombosis. Twenty four hours later he developed head and neck pain, rated 8 in the Numeric Rating Scale (NRS), accompanied by nausea, vomiting and diplopia. A low CSF pressure headache was diagnosed and a transnasal SPGB with 7,5% ropivacaine was performed. Pain relief was immediate, complete and sustained for about 24 hours with no complications. The following day pain recurred and was rated as 4 when lying and as 8 when supine, so a second block was performed resulting in complete pain relief. On the third day the pain remained well controlled with oral analgesics and so the patient was discharged home. When contacted 5 days, and 2 months later, he was asymptomatic.

**Discussion:** Severe headache may occur following the placement of a LPS (2). While symptomatically identical to the most frequent obstetrics related postdural puncture headache, in obstetrics the headache is due to the unintended CSF leakage following dural puncture, while in LPS it is due to intended CSF drainage. While the treatment for postdural puncture headache uses a blood patch, this may not work for LPS headache (3) due to the ethiology of CSF hypotension, since sealing an eventual leak around the catheter does not stop CSF drainage. Based on this physiologic approach we decided to perform, as first treatment, a SPGB. The success obtained in this case suggests that SPGB may be a new and valid analgesic approach, as the underlying analgesic mechanism relies on the meningeal nociceptive transmission block without cerebral fluid dynamics modification. References:

1. Cohen S. Reg Anesth Pain Medicine 2014 Nov;39(6):563: 2. Sinclair A Cephalalgia, 31(16)1627-1633; 3. Allmond L, Anesth Analg 2005;101:1497-8 Learning points: SPGB may be a safe and efficient treatment option for the CSF hypotension headache secondary to lumboperitoneal shunt.

# 06AP03-2

## Determination of risk factor of new onset shivering after neurosurgery. A single center case control study

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Background and Goal of Study: Shivering after neurosurgery is common but undesirable because it increases oxygen consumption and intracranial pressure. Although past investigations identified several risk factors of shivering, 2) the role of intraoperative narcotics remains unclear. Because anaesthesia for neurosurgery often involves fentanyl or remifentanil-based techniques, it is conceivable that narcotics induce acute tolerance and subsequent withdrawal symptoms including shivering when they are discontinued at the end of surgery. Conversely, the proper use of narcotics may prevent shivering. 3) The purpose of this study was to investigate whether the amount of intraoperative narcotics affects the occurrence of shivering at the end of neurosurgical operations.

Materials and Methods: We retrospectively collected data of patients who underwent neurosurgery (mostly craniotomies for tumors) at Yokohama City University Hospital from January 2011 to September 2016. Because shivering per se was unreliably documented, administration of pethidine at the end of anaesthesia

was used as evidence of shivering. Because we identified 48 cases with shivering. and the ratio of case to control was a priori set at 1 to 4, we randomly selected 176 cases without the use of pethidine as controls. Perioperative information was extracted from electrical health record and analyzed using unpaired t tests and multivariable logistic regression.

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Results and Discussion: There was no difference in the calculated blood concentration of remifentanil and fentanyl at extubation (0.50 ng/ml vs. 0.50 ng/ ml. p = 0.58, 0.75 ng/ml vs. 0.70 ng/ml, p=0.56, respectively), nor the amount of remifentanil and fentanyl used per hour (668µg/hr vs. 724µg/hr, p = 0.06. 70.1µg/ hr vs. 67.6µg/hr, p=0.58, respectively). There was also no significant difference in the highest body temperature (37.2°C vs. 37.3°C, p=0.59) and the lowest body temperature (35.9°C vs. 36.0°C, p=0.87) between the two groups. The blood loss was significantly larger in the shivering group. (253 ml vs. 186 ml, p = 0.04). Multivariate analysis showed that transfusion was an independent risk factor for shivering. (Odds ratio: 2.44, 95% Confidential Interval: 1.04 - 5.70, p=0.04).

Conclusion(s): Neither the calculated blood concentrations of narcotics nor the amount of intraoperative narcotics was identified as a risk factor of shivering after neurosurgical operation. Blood loss and transfusion may be associated with postoperative shivering.

### 06AP03-3

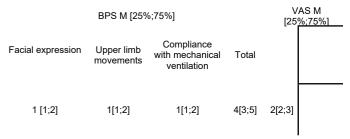
## Assessment of the Severity of Pain Syndrome During Ventilation by BPS and VAS Scales

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Background and Goal of Study: The use of scales to assess the degree of pain in patients with ventilation is still insufficiently studied, requiring additional study [1]. To evaluate the relationship between the evaluation of the severity of pain syndro in the conduct of mechanical ventilation in patients after surgery for supratentorial tumors (meningiomas) of the brain in the early postoperative period.

Materials and Methods: A prospective observational study was conducted, which included 20 patients with meningiomas (men 8 (40%) and women 12 (60%)) aged 28-55 years (44.3 ± 8.6) operated on a routine basis. The level of consciousness before surgery in all patients was 15 on the CGS. The duration of operations was from 100 to 240 minutes. Extubation on the operating table was not performed. All patients were transferred to the ICU on an extended mechanical ventilation. The pain assessment was carried out at the following stages; when the clear consciousness was restored before extubation (Stage I) according to the Behavioral Pain Scale (BPS) and after extubation (II stage) on the Visual Analogue Scale (VAS). The correlation coefficient was estimated between the values of the degree the severity of the pain syndrome according to the BPS and the VAS.

Results and Discussion: The severity of pain syndrome according to BPS and VAS is presented in Table 1, while the correlation coefficient R<sup>2</sup> was 0.111. Table 1



Conclusion: 1. BPS scales have a weak correlation (R2 = 0.111) with VAS in patients after surgical interventions for supratentorial tumors (meningiomas) of the brain in the early postoperative period 2. When assessing the pain syndrome according to the BPS scale, there is an overestimation of the indices compared to the VAS due to asynchrony with a respirator.

### References:

1. Rijkenberg S, Stilma W, Endeman H, et al. Pain measurement in mechanically ventilated critically ill patients: Behavioral Pain Scale versus Critical-Care Pain Observation Tool. J Crit Care. 2015;30(1):167-72.

### 06AP03-4

# A Case of propofol infusion syndrome at predicted concentration 1.8 $\mu g/mL$ after 3.5 h infusion

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**Background**: The pathophysiology and risk factors of propofol infusion syndrome (PRIS) remain unknown, despite it being potentially fatal. This is a suspected PRIS case in which plasma concentration of propofol was significantly higher than the estimated level following short-term infusion. Written consent for presentation was obtained from the patient.

Case Report: A 55-year-old male (weight 88 kg, height 1.7 m, ASA-PS Class 3) harbouring a left frontal glioma was planned for awake craniotomy. Plasma targeted target-controlled infusion of propofol with Marsh model was commenced at 4.0 µg/ mL, then maintained at 1.8 μg/mL to achieve a Bispectral Index value around 50. Bicarbonated Ringer solution was used. Although the first arterial blood gas (ABG) analysis withdrawn after induction was within normal range, the second analysis at 212 minutes from induction showed severe lactic acidosis with hypercapnia (pH 7.208, PCO, 48.2 mmHg, HCO3<sup>-</sup> 19.4 mmol/L, base excess -8.7 mmol/L, lactate 10.5 mmol/L). No hypoxia, anaemia, hypoglycaemia or peripheral circulatory failure was observed. Patient bladder temperature was 37.4 °C. Since PRIS was suspected to have caused the lactic acidosis, sevoflurane administration was commenced with hyperventilation instead of propofol. In total 1380 mg propofol was administered for 226 minutes. As lactic acidosis and hypercapnia did not change 2 hours after PRIS development (pH 7.234, PCO<sub>2</sub> 50.9 mmHg, HCO3<sup>-</sup> 21.4 mmol/L, base excess -6.0 mmol/L, lactate 13.0 mmol/L), the whole surgery was performed under general anaesthesia. ABG analysis at 508 minutes after PRIS development revealed that metabolic acidosis was greatly improved (pH 7.451, PCO, 31.7 mmHa, HCO3 21.6 mmol/L, base excess -1.6 mmol/L) with a lower lactate level of 4.6 mmol/L. The postoperative course was uneventful. The propofol plasma concentration of intraoperative blood samples, determined by high performance liquid chromatography, far exceeded estimated levels; 7.2 µg/mL and 3.6 µg/mL at 25 minutes and 120 minutes from propofol cessation, respectively. Renal function deteriorated as eGFR 49.4 mL/min/1.73m² during surgery.

**Discussion**: This is the first report of propofol plasma concentration far exceeding the estimated level following PRIS onset, suggesting that metabolic propofol disorder may be the pathoaetiology of PRIS.

**Learning points**: Propofol plasma concentration elevates in patients with PRIS. The aetiology of PRIS might involve metabolic disorder of propofol.

## 06AP03-6

Intraoperative regional cerebral oxygen saturation monitoring using near infrared spectroscopy device during spinal neurosurgery in prone position and postoperative cognitive dysfunction

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Background and Goal of Study: Postoperative cognitive disturbances may occur following different types of surgeries. Prone position, used during spinal neurosurgery, may contribute to diminished cerebral oxygen supply. Intraoperative regional cerebral oxygen saturation (rScO2) monitoring, using cerebral oximeters, allow to avoid hypoxic brain events.

The goal of the study was to determine rScO2 variations during spinal neurosurgery in prone position and link to postoperative cognitive dysfunction (POCD).

Materials and Methods: 46 patients were included in the prospective observational study. All patients were scheduled for spinal neurosurgery in prone position. Patients were randomized in 2 groups - in the study group (n=38) rScO2 values were acquired throughout the surgery using INVOS 4100 NIRS device. The control group (n=8) didn't receive rScO2 monitoring. Standard general anaesthesia was provided. We also recorded intraoperative blood loss, duration of the operation, preoperative Hb level. Cognitive function was assessed in both groups using Montreal - Cognitive Assessment (MoCA) scale before surgery and 2 days after. MoCA scores range between 0 and 30. A score ≥26 is considered to be normal.

**Results and Discussion**: We didn't observe any significant changes in our medium rScO2 values throughout the surgery rScO2 lying supine was 72±9%, in prone position 73±9% (min56%, max94%).

Medium MoCA score before surgery was 24±3 points in the study group, 24±4 points in the control group. MoCA 2 days after the surgery was 25±3 points - study group, 24±2 points - control group. In our study group 1 patient showed POCD–from MoCA 27 to 23 points and 1 patient showed MoCA decrease for 1 point. In the control group in 5 from 8 patients we observed MoCA decrease for 1–2points. The study group patients with postoperative cognitive disturbances showed the similar intraoperative rScO2 values as those without.

The average duration of operation was 105±37min-study group, 126±48min-control group, average blood loss 289±310ml-study group, 175±148ml-control group and

medium Hb 13±2g/dl-study group, 13±1g/dl-control group. We didn't observe any correlation to POCD.

**Conclusion**: We didn't find any significant changes in our calculated medium MoCA scores between patients who intraoperatively received rScO2 monitoring and patients who did not receive it.

Postoperative cognitive impairment individually was observed in more patients in the control group than in the study group.

### 06AP03-7

# Central venous catheter: is it really necessary in neurosurgery?

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**Background**: Central venous cannulae are widely used in neuro-anaesthetic practice although their use may be associated with serious complications (inadvertent arterial puncture, pneumothorax, haemopneumothorax and infection). Any consensus exists among neuroanaesthetists as to the indications for elective central venous cannulation (1). This case report supports its importance in a venous air embolism

Case Report: After diagnosis of posterior fossa meningioma, operation was planned for a 35-years-old female patient in a sitting-position. ASA I. The procedure lasted 8 hours under general anaesthesia. Right internal jugular central line catheterization was done under ultrasound successfully. After 6 hours, bigeminal heart rhythm appeared, blood pressure dropped to 60/30mmHg, Sp02 to 80% and etC02 to 17 mmHg. Following the ABC guide, the most probably diagnosis was venous air embolism (VAE). The neurosurgeons started the irrigation of the surgical field and 250 ml of air was aspirated from the central venous catheter with a 10ml syringe. In 50 minutes, the patient parameters were normal.

**Discussion:** VAE is a potentially serious neurosurgical complication. The anaesthesiologist plays an important role in its management, from diagnosis to treatment

Although a transesophageal echocardiography (TEE) is the most sensitive invasive method for diagnosing air embolism, it is not always available and requires adequate training. However, the capnography and conventional hemodynamic monitoring should be enough for a rapid diagnosis like in this case.

A rapid treatment is the essential key: the neurosurgeon reducing the entrance of air with irrigation and the anaesthesiology aspirating the air from the right atrium (2). Routine use of an atrial catheter in posterior fossa craniectomies has been questioned because subjected the patient to unnecessary risks. However, a central cannulation in a sitting or semi-sitting position should be essential because includes the possibility of aspiration of venous air emboli. Pre-operative X-ray confirmation of correct placement should be recommended to have the catheter tip in o near the right atrium.

### References

1. S. J. Mills, et al. Anaesthesia.2001 May,56 (5): 465-470

2. F. Gunther, et al. Acta Neurochir (Wien). 2017 Feb,159(2):339-346

Learning points: The presence of a central venous cannulae in any patient where venous air embolism is anticipated increases the patient safety and should be recommended it.

### 06AP03-9

# After Elective Craniotomy, what proportion of patients can safely bypass ICU admission?

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Background and Goal of Study: After surgery, patients are usually admitted to an intermediate care unit (IMCU) or an intensive care unit (ICU), more often for 24 h. However, in our centre, shortage in intensive care beds has led to a policy of direct transfer to neurosurgical ward, if possible. This study investigates the safety of this approach.

Materials and Methods: Between April 2016 and July 2017, 306 consecutive adult patients undergoing elective craniotomy in our centre were included. Immediately after surgery, the anesthesiologist chose whether to attempt to awake or whether to carry on sedation: if sedation was to be prolonged, the patients were transferred to an ICU; otherwise, they were transferred to a Post-Anesthesia Care Unit (PACU), still being intubated. The extubation was attempted, according to their recovery and neurological status and they were followed for at least 4 h before being discharged. They were followed up for 24 h after surgery to determine the incidence of major early postoperative complications, their time to occurrence and their management. Potential predictive factors for these complications were investigated. The study was approved by the local Ethics Committee.

Results and Discussion: At the end of surgery, 5 patients were directly admitted in ICU. Among the 301 patients directly admitted to the post-anesthesia care unit (PACU), 50 patients (16%) presented a severe complication in the first 24 h after surgery. Neurological complications were the most frequent. The median time to occurrence was 2 h and 80% of complications occurred in PACU: 33 patients needed unplanned admission in IMCU or ICU. Among the 256 patients directly transferred to neurosurgical ward, 7 (2.7%) developed a complication and only 2

(0.8%) had to be transferred to IMCU or ICU. The factors identified as predictive of complications were: the absence of known hypertension, intensive care within the past year, temporal lobe surgery, prolonged surgery and anesthesia, extensive peroperative blood loss, substantial volume expansion, blood transfusion, and delayed extubation.

Conclusion(s): The low incidence of major complications occurring in neurosurgical ward indicates that a large majority of patients can safely be admitted directly to neurosurgical ward after elective craniotomy.

### 06AP03-10

# Spontaneous Intracranial Hypotension and a successful epidural blood patch: Case Report

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**Background:** Spontaneous Intracranial Hypotension is secondary to a loss of cerebrospinal fluid (CSF) volume, which is usually caused by spontaneous CSF leaks1. Although this uncommon entity has a common presentation, its diagnosis, evaluation and treatment2 are challenging.

Case Report: A 39-year-old woman developed orthostatic headaches, pain in the posterior triangle of the neck and shoulders, as well as nausea and vomiting, without focal signal abnormalities. Her medical history includes hypothyroidism and two epidural anaesthesias prior to caesarean sections.

Pain treatment consisting of conservative measures, bed rest, 500/50mg of paracetamol/caffeine 8/8 hours, 250mg of naproxen 12/12 hours and 4mg of thiocolchicoside 8/8 hours was ineffective and meningitis was ruled out after a lumbar puncture.

A head MRI with intravenous injection of paramagnetic contrast material showed bilateral frontoparietal dural signal enforcement correlated with CSF hypotension. A spine CT scan combined with a myelography showed a meningeal leaking at the level of D3.

With anesthesia's collaboration, neurosurgery decided the epidural blood patch would be performed in the OR under aseptic technique and with radiologic guidance to identify the space between D6-D7. An epidural space puncture was performed with a G18 Tuohy needle, with loss of resistance at 4,5cm and 18ml of homologous blood were injected epidurally.

One week later the patient was discharged without any symptoms.

Materials and Methods: Spine CT scan, Myelography

**Discussion:** The anatomy of spontaneous CSF leak is frequently complex. CT myelography is the study of choice1 to locate the site of the leak and epidural blood patch is the main and most effective treatment.

**Learning points:** Spontaneous intracranial hypotension, epidural blood patch **References:** 

1. Mokri Bahram, MD, FAAN, Spontaneous intracranial hypotension. American Academy of Neurology 2015; 21(4): 1086-1108. 2. Maurya VK, Ravikumar BR, Intracraneal hupotension: an uncommon entity with common presentation. Med J Armed Forces India 2017.

# 06AP03-12

# Postoperative complications of surgery in the sellar region: about 79 cases

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Background and Goal of Study: The tumors of the sellar region represent 10% of the intracranial tumors, they are generally benign but considered as malignant by their location and their postoperative complications. Our objective is to establish a protocol in order to prevent and reduce as much as possible the occurrence of such complications

**Materials and Methods**: It is a retrospective study of 79 patients operated over a period of one year from June 1, 2016 to September 10, 2017, the parameters studied were collected from the patients' files

Results and Discussion: The evolution was favorable in 62.3% of the cases, with the occurrence of a CSF fistula in 13.79% of the cases of which 50% developed meningitis, diabetes insipidus is found in 6.8% of the cases, the anterior pituitary insufficiency in 10.3% cases, severe hyponatremia in 3.4% of cases, adrenal insufficiency in 3.4%, and two cases of death

Conclusion: The medical and anesthesia management of surgery of the sellar region remains a challenge for the resuscitator and requires a good preoperative assessment, immediate and remote postoperative biological and neurological monitoring. This requires a multidisciplinary approach, it is necessary to establish a protocol of service to properly support these patients.

### 06AP04-1

EEG-based monitoring of BIS and burst suppression associated with intracranial pressure in a patient with severe traumatic brain injury: a case report

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**Background**: When managing traumatic brain injury (TBI) special care should be taken to prevent secondary damage to brain. An adequate oxygen supply and brain perfusion pressure are required to meet the metabolic demands of the injured brain. EEG-based monitoring of BIS and burst suppression (BS) may be a useful tool in this scenario.

Case Report: A 64-year old hypertensive male victim of a pedestrian accident was admitted to the ER with lowered consciousness, AP 180 x 110 mmHg, HR 60 bpm, SpO<sub>2</sub> 99%, Glasgow 11, iso-photoreactive pupils and left hemiplegia. Cranial tomography (CT) revealed subarachnoid hemorrhage, right temporal contusion and extensive acute subdural hematoma. A catheter was implanted to monitor intracranial pressure (ICP), after sedation and tracheal intubation. Findings after the procedure: ICP 63 mmHg, BIS 60, BS 18, suggesting severe cerebral distress. A second CT revealed increase in hematoma and the need for cranial decompression. Anesthesia was induced with fentanil, etomidate and cisatracurium and maintained with propofol (TCI), after which findings were: ICP 86 mmHg, BIS 24, BS 47, MAP 130 mmHg. The patient was submitted to left decompressive craniectomy and drainage of the right intracranial hematoma. Findings after decompression: ICP 14, BIS 25, BS 40.

**Discussion**: In TBI patients, BIS and BS levels are observed to vary according to perfusion, metabolism, hypoxia, intracranial hypertension and sedative use. In the present case, the low BIS and high BS levels were important indications of deterioration, suggesting a second CT to reassess the hematoma. The persistence of high BS and low BIS levels after decompression is evidence of possible brain damage. In other studies, BIS has provided useful information for the identification of patients with better chances of recovery from TBI. **Reference**:

1. Myles PS, Daly D, Silvers A et al. Prediction of neurological outcome using bispectral index monitoring in patients with severe ischemichypoxic brain injury undergoing emergency surgery. Anesthesiology. 2009;110:11061

**Learning points**: BIS and burst suppression (BS) may be useful in signaling changes in perfusion and cerebral metabolism after TBI.



## 06AP04-2

# Utility of processed electroencephalogram power spectrogram during general anesthesia. Two clinical cases: 1) intraoperative convulsion and 2) brain death

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**Background**: Electroencephalogram (EEG) monitoring is now common but its usefulness has not been used to its potential. Besides helping the assessment of the level of anesthesia, it may detect neuronal dysfunction¹ and is the only means of detecting non-convulsive epileptic activity². We describe two clinical cases demonstrating the importance of EEG power spectrogram detecting a case of intraoperative epileptic event and in a case of brain death.

#### Case Report:

- 1. A 29 years old male, ASA II, was proposed to elective exeresis of a grade II oligodendroglioma. He was admitted after an inaugural seizure in the emergency department, but with no subsequent events or deficits. Craniotomy was performed with bilateral EEG monitoring with power spectrum display, under total intravenous anaesthesia (Remifentanii/Propofol). Two convulsive tonico-clonic events occurred during surgery despite preoperative sodium valproate therapeutic level. Towards the end of surgery two other events were detectable in the EEG monitoring but with no other clinical manifestation Fig. 1. Deep sedation was maintained until antiepileptic therapeutic optimization. At 32 hours the patient was successfully extubated, with no epileptic events. He was discharged with only speech lentification.
- 2. A 62 years old female, ASA II, was admitted to the emergency room with subarachnoid hemorrhage secondary to intracranial aneurysm. She was proposed to angiographic embolization under general anesthesia. At the end of an apparently successful and uneventful embolization, there was a difficulty in awaking. A normal EEG power spectrogram pattern for propofol anesthesia was replaced by decreased activity in all frequencies Fig. 2. A new angiography showed total absence of cerebral circulation and brain death was declared a few hours after.

**Discussion**: The diagnosis of epileptic non-convulsive activity is a challenge during general anesthesia and muscle relaxant use. When not diagnosed it is a cause for delay the treatment of an epileptic event. EEG monitoring by power spectrogram allowed the epileptic activity detection during general anaesthesia. **References**:

### 1. Resuscitation.2017 Nov;120:8-13; 2- Seizure.2017 Aug;50:109-117

**Learning points**: Continuous EEG monitoring provides a dynamic monitoring of the brain. EEG power spectrogram is useful for epileptic events and even for possible detection of brain death when conventional EEG could not be done or interpreted by a specialist.

## 06AP04-3

# Follow your heart but don't forget your brain – a case report of a serious intraoperative neutrally mediated hypertension

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**Background:** Cardiovascular problems due to brain stem manipulation can present an anaesthetic challenge during surgery for resection of brain tumour located in the posterior cranial fossa.

Case report: A 65-year-old normotensive female presented with right sided diminished visual and hearing acuity, balance problems and swallowing difficulty caused by a supra and infra tentorial meningioma. She had initially undergone a craniotomy via orbitofrontal approach to decompress N.III but due to incapacitating gait problems and dysphagia a decision was made to attempt a tumour debulking in the posterior cranial fossa.

She underwent TIVA with TCI propofol and remifentanil. Anaesthesia was uneventful until the opening of the dura mater. Once the dissection of the brain stem started the patient's blood pressure became increasingly unstable. Blood pressure surges – systolic blood pressure (SBP) rising from 100 mm Hg to peaks of 180 mm Hg in a matter of minutes- alternated with significant falls in SBP. Surgery had to be interrupted a number of times while the anaesthesiologist normalized the patients cardiovascular parameters through pharmacological and non-pharmacological means.

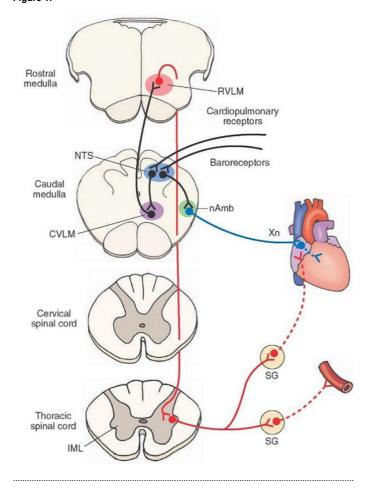
**Discussion:** Brain stem plays a central role in blood pressure control. Afferent peripheral (N. X and N. IX) and central sensory cardiovascular information is integrated in the nucleus tractus solitarius (NTS). It modulates the function of primary sympathetic (SYM) and parasympathetic (PSYM) output centres namely the rostral ventrolateral medulla (RVLM) and the nucleus ambiguous (nAmb)<sup>1</sup>. These centres project to the end organs and modulate the blood pressure. Surgical manipulation of input, integration and output structures can alter the SYM/PSYM balance and cause rapid blood pressure changes<sup>2</sup>.

Learning points: Surgery for resection of brain stem tumours can cause intraoperative hemodynamic instability. Proper preparation and collaboration between the anaesthesia and the surgical team are of paramount importance to ensure optimal tumour resection while ensuring physiologic stability.

#### References:

1. Philos Trans R Soc A Math Phys Eng Sci 2016;374: 20150181 2. Ann Surg 1985;201: 391–8

#### Figure 1



# 06AP04-4

# Effect of local anaesthesia with lidocaine versus bupivacaine on cognitive function in patients undergoing elective cataract surgery

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Background and Goal of Study: The neurotoxicity among local anesthetics was extensively studied in the medical literature. A large number of studies suggested that lidocaine is more neurotoxic than equipotent concentrations of bupivacaine Aim: To determine which of the two local anaesthetics (lidocaine vs bupivacaine) has worse effect on cognitive function in patients undergoing elective cataract surgery

### Materials and Methods:

This is a prospective study carried out on 61 patients undergoing elective cataract surgery under local anaesthesia. 28 patients received lidocaine 2% and 33 patients received bupivacaine 0.5%. The motor and sensory functions were evaluated using Ocular Anaesthetic Scoring System (OASS). Intraoperative pain was determined using the Visual Analogue Pain (VAP) Scale. Cognitive assessment for all patients was done preoperatively and one week postoperative using Paired associate learning test (PALT) and category verbal fluency test (VF) (animal category).

Results and Discussion: Regarding motor score of OASS, lidocaine group was found to have significantly higher mean values than bupivacaine group (P-value < 0.001), while there was no statistically significant difference between lidocaine group and bupivacaine group in sensory score of OASS (P-value = 0.168) or VAP Scale (P-value = 0.787). Regarding cognitive assessment of patients in lidocaine group, there was a statistically significant difference between the mean value of preoperative PALT and postoperative PALT (P-value = 0.004), and there was also a statistically significant difference between the mean value of preoperative VF and postoperative VF (P-value = 0.002). As for bupivacaine group, there was a statistically significant difference between the mean value of preoperative PALT and postoperative PALT (P-value = 0.021), there was also a statistically significant difference between the mean value of preoperative VF (P-value = 0.037).

**Conclusion**: Lidocaine is more potent as a local anaesthetic than bupivacaine. Both drugs cause cognitive impairment but lidocaine has worse effect on cognitive functions than bupivacaine.

### 06AP04-6

## Perioperative treatment meningeoma complicated by intracerebral haemorrhage in patient with Klippel-Trenauney syndrome - case report

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**Background**: Klippel-Trenauney syndrome (KTS) is a syndrome characterized by cutaneus hemangiomas (port-wine stains), abnormal growth of soft tissues and bones, and venous malformations with tendency to bleeding or thrombosis. The association of KST with intracranial tumors is extremely rare and is described as a sporadic case in the literature.

Case Report: Patient in our case was a female, 41 years old, with KTS and a meningeoma complicated by postoperative intracerebral haemorrhage. The patient was hospitalized for partial seizures and right hemiparasis (Todd's paralysis). After diagnostic treatment (CT and MR), the diagnosis of intracranial tumor was established. A surgery was performed in a balanced anesthetic technique (Sevofluran-Fentanyl-Atracurium). Immediate postoperative period went without complications - patient was conscious, haemodynamically stable, spontaneously breathing, without neurological deficits. During the second postoperative day, the neurological condition of the patient had worsened with loss of consciousness and the development of right-sided hemiplegia. The control CT scans showed intracerebral hemorrhage with generalized edema and threatening transententoral herniation. The patient was put on mechanical ventilation, conservatively treated (antiedematous and corticosteroid therapy) and introduced into the barbiturate coma (Tiopental). Four days later, Tiopental was disconnected. On the seventh day, the patient awoken - conscious, stable vital signs, weaned from mechanical ventilation with residual right-sided hemiparasis. Control CT scans showed a decrease in the size of the hematoma and brain edema. The ninth day patient was transferred to the neurosurgery department for further treatment.

**Discussion**: The association of KTS with intracranial lesions requiring surgical treatment presents the challenge of the entire surgical and anesthetic team. Venous and capillary malformations lead to significantly frequent bleeding intraoperatively and postoperatively, which requires the administration of transfusion and prolongs the postoperative recovery and duration of treatment.

### References:

 TevfikYilmaz, UlasCikla, Alice Kirst and Mustafa K Baskaya. Glioblastoma multiforme and Klippel-Trenaunay-Weber syndrome: a case report. Journal of Medical Case Reports (2015) 9:83.

**Learning points**: It is necessary to pay attention in postoperative period due to early recognition and effective treatment of complications.

# 06AP04-7

# Asymptomatic hyperthyroidism in a thyroid-stimulating hormone secreting pituitary adenoma. An unexpected anaesthetic challenge: Case report

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**Background:** Pituitary adenomas that produce thyroid-stimulating hormone (TSH) represent only 1% of functioning pituitary adenomas and commonly cause symptoms of hyperthyroidism of diffuse goiter. No cases where found regarding a TSH secreting tumour surgery with elevated laboratory values and no symptoms of hyperthyroidism.

Case report: We present a case of a 45-year-old male, proposed for endoscopic resection of pituitary adenoma with mass effect causing intense headaches. He was 188cm tall and weighed 107kg. He had a history of hypocortisolism and hyperthyroidism with altered laboratory values caused by the pituitary adenoma. The endocrinology department was contacted and reported that, despite having a TSH of 2.26mUI/mL (0.27-4.2) and a free thyroxine level (T4L) of 25.1pmol/L (12-22), the patient was asymptomatic without signs of thyroid hyperfunction and so, they would not contraindicate the surgery. Vital signs, chest X-rays, electrocardiogram, and other laboratory values were unremarkable. The case was managed with a remifentanil and proporol target-controlled infusion and rocuronium (0.6 mg/kg). Laryngoscopy and intubation were performed and he was ventilated to maintain a carbon dioxide pressure of 35-40 mmHg and heated to maintain a central temperature of 35-37°C. Immediately after induction, the patient began to show blood pressure (BP) instability with values that increased to 190/110mmHg. Esmolol infusion failed to normalize BP and only after the addition of an isosorbide dinitrate infusion did we control the patient's BP to values of 110/70mmHg. Vital values were stable throughout the rest of the surgery. Postoperative nausea and vomiting prophylaxis with dexamethasone and ondansetron was given and postoperative analgesia was managed with paracetamol, metamizole and morphine. Corticosteroid supplementation was done with methylprednisolone. Propofol and remifentanil infusions were stopped, neuromuscular blockade reversed with sugammadex (2 mg/kg) and extubation occurred after full reversal of the blockade He had an uneventful postoperative course with BP around 135/82mmHg and was discharged after 4 days. His biochemical values were normal at the time of discharge

**Discussion:** Although rare, secretory pituitary adenomas can cause severe hemodynamic changes and be an anaesthetic challenge. This case aims to alert the anaesthetic community to the risk of TSH secreting pituitary adenomas with hyperthyroidism even in asymptomatic patients.

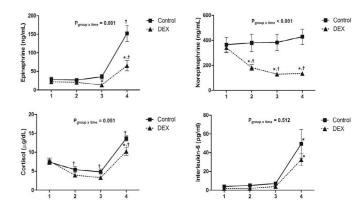
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### 06AP04-8

# Intraoperative dexmedetomidine reduces stress responses in patients undergoing major spinal surgery

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**Background and Goal of Study**: Surgical stress induces stress hormone release and sympathetic hyperactivation, resulting in hemodynamic instability and adverse events. Dexmedetomidine, an α2 adrenoreceptor agonist, has sympatholytic effect and attenuates stress responses. We investigated whether perioperative dexmedetomidine administration could attenuate stress responses in patients undergoing major spine surgery.

Materials and Methods: Fifty-two patients undergoing elective spine surgery were randomly assigned to placebo (n = 26) or to dexmedetomidine (n = 26) groups. Dexmedetomidine was infused at a rate of 0.4 μg/kg/h, starting immediately after anesthetic induction and continuing until the end of surgery. Serum levels of norepinephrine, epinephrine, cortisol, and interleukin (IL)-6 were assessed at the following time points: 1-before surgery, 2-1 hour after surgical incision, 3-2 hour after surgical incision, 4-1 hour after surgery. The hemodynamic variables and the balance of the autonomic nervous system were evaluated at the same time points. Results and Discussion: The levels of norepinephrine and epinephrine were lower in the dexmedetomidine group than in the control group, with significant differences between the groups (P = 0.001 and < 0.001, respectively). Low-frequency/high-frequency power ratios during surgery were significantly higher in the IV PCA group, compared with baseline and those in the epidural PCA group. Mean blood pressure and heart rate were comparable between the groups.

**Conclusion**: Intraoperative dexmedetomidine administration reduced stress response hormone release and maintained the autonomic nervous system. Dexmedetomidine could attenuate surgical stress response without compromising hemodynamic stability during major spinal surgery.

### 06AP04-9

### Awake craniotomy anesthesia: our experience

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wake craniotomy (AC) is a high-risk procedure that implies a challenge to anaesthesiologists. In recent years its indications have been widened, mostly to include resection of tumours in eloquent areas.

This technique is based on the patient being fully conscious during part of the procedure, so the patient can perform specific tasks that are used to cortical brain mapping.

Our goal is to describe our experience in AC.

**Materials and Methods**: Retrospective observational study (2012-2017) in 30 patients. Patients had also been selected based on adequate motivation and collaboration and acceptance of informed consent. The asleep-awake-asleep technique was used in most cases.

The following data were collected: demographic variables, tumour characteristics, drugs and doses used, score in direct laringoscopy, time for patient wake-up (min), complications and hospital stay (days).

**Results and Discussion**:30 patients were operated on (57,1% male, 42,9% female) and the mean age was 43.71 years. Most frequent tumour localization was left hemispheric (42,9% frontal, 34,3% temporal, 17,1% parietal, 5,7% insular), and the more frequent diagnosis was diffuse astrocytoma (57,1%).

Since there is no evidence regarding which is the best protocol to follow for AC, we

will now describe how our team approaches AC:

Patient selection and preoperative interview, very important to gain the patient's trust and mitigate his anxiety. Pre-awake phase, where anaesthesia induction, airway management, patient position and local analgesia take place. Awake phase, the critical moment for the anaesthetist, due to the risk of severe airway-related complications. Mean time since induction to awake phase was 180 min. In post awake phase, light sedation was necessary to alleviate patient's tiredness. Finally the patients are recieved in The Neurocritical Unit; 82.9% had an uneventful postoperative period. Mean hospital stay was 8.69 days.

Conclusion: Successful AC is a risky procedure that depends mainly on an adequate patient selection.

Delays in waking-up are a problem we faced frequently. We are trying to change to a full time AC (awake-awake-awake) technique taking advantage of new indications for dexmedetomidine.

The technical abilities, experience and coordination anaesthesiologist-surgeon are key elements when performing AC.

### 06AP04-10

## Anesthetic Management of a Pediatric Patient During Surgical Excision of Primary Cerebral Hydatid Cyst

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**Background**: Hydatid cysts develop in humans with the transmission of Echinococcus Granulosus or more rarely Echinococcus Multilocularis. The disease develops in the liver 50-75%, and in the lungs 15-35% of the cases. Intracranial hydatid cyst has seen 0.5-3% of the cases. In this case report, we aimed to present the anesthetic approach and possible anaphylactic reaction in a giant primary intracranial hydatid cyst.

Case Report: A five years and eight months old boy (19 kg, 114 cm) was admitted to the emergency room with complaints of headache, nausea, vomiting, and deviation of the eyes for about 1 month. Fundus examination revealed bilateral disc elevation and severe papillary edema. Cranial magnetic resonance imaging showed a large hydatid cyst with 6 cm diameter in the right parietal lobe. The patient underwent hydatid cyst screening for other organs. The abdominal ultrasonography (USG) was normal. The echocardiography (ECO) showed a small ostium secundum atrial septal defect (ASD) and patent foramen ovale (PFO). Thorax computed tomography (CT) revealed a hydatid cyst located above the major fissure in the upper posterior segment of the left lung. The patient was scheduled for surgery by the neurosurgery department. After induction and endotracheal intubation, 1 mg.kg-1 pheniramine hydrogen maleate and 1 mg.kg-1 methylprednisolone were administered as a protective measure against anaphylaxis. The cyst excised by Dowling method, and no rupture observed. The patient, who did not have any perioperative complication was extubated and followed at the intensive care unit of neurosurgery department. Discussion: Cerebral hydatid cyst is rare and usually seen in children. This could be explained by the presence of right-to-left shunts. Primary cerebral hydatid cysts are usually single and mostly located in the supratentorial area, which is perfused by the middle cerebral artery (1-3). Patients usually present with symptoms due to increased intracranial pressure and/or focal neurological findings. The gold standard in the treatment of cerebral hydatid cysts is surgical removal. In order to prevent recurrence and anaphylactoid reaction, the cyst should be removed without rupturina it.

# References

- 1. Ciurea AV et al. Acta Neurochir 2006; 148: 421-6
- 2. Uzun Ş et al. J Anest Reanim 2008; 6:33-7
- 3. Khan MB et al. Surg Neurol Int 2015:6:125

**Learning points**: This is a rare condition. The patient had herniation symptoms. The anesthetic and surgical approach are discussed.

## 06AP04-11

# Anesthetic challenges placed by deep brain stimulation surgery in a child with severe Hallervorden-Spatz disease

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**Background:** Hallervorden-Spatz disease is a rare neurodegenerative disorder with extrapyramidal dysfunction. Deep brain stimulation (DBS) of the basal ganglia is a high-risk treatment option. General anesthesia is mandatory, however it must be compatible with good quality electrical recording and free movements, a challenge in the case of a child.

Case Řeport: A 9-year-old of 17-kg with permanent generalized dystonic movements came for bilateral DBS. He required BIPAP at night, feeding through a PEG and while mentally sound he had lost manual control of an iPad or a joystick. After standard monitoring a Bilateral Bispectral Index sensor was placed for raw and spectral EEG analysis. BIS was 98. Remifentanil was started at 0, 13ug/kg/

min. BIS decreased to 60 and eyes closed. Propofol 1% was then started at 50ml/h and infused until loss of the corneal reflex which occurred after 21mg. Propofol was stopped, ventilation started and intubation performed after 20mg of rocuronium. BIS remained beteween 40 and 60 with the spectrogram showing the normal propofol pattern. Propofol was then resumed and titrated to BIS. When deep-brain electrical recording started, BIS was maintained very close to 60. For the stimulation phase, 50mg sugammadex reversed NMB. Remifentanil infusion was doubled. During both recording and stuimulation there was no reaction to the tube, recordings were excellent quality and movement could be observed when stimulus intensity was increased. This allowed the surgical plan to be performed. Total duration was 587 minutes. Average propofol was 3, 6mg/kg/h and remifentanil 0, 12ug/kg/min. en minutes after the end of surgery the patient woke up and was extubated. Records were kept. On day 1 the battery was turned on and on day 3 the child was already capable of eating by mouth and of using the iPad.

**Discussion:** This case shows that intraoperative deep brain electrical recording and observation of movement during DBS surgery may be compatible with general anesthesia in a child. Using EEG monitoring and the corneal reflex were key to titrate anesthesia. Remifentanil permitted tube tolerance without paralysis. Our management differed significantly from the two published reports<sup>1,2</sup>:it may be useful to help the management of future cases.

# Refs:

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**Learning points**: EEG and NMB monitoring and rapid acting propofol, remifentanil and sugammadex, may allow general anesthesia compatible with DBS surgery in a child

### 06AP04-12

Time is brain, pressure is brain, anaesthesia matters: a retrospective analysis of blood pressure management during thrombectomy for acute ischaemic stroke

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Background and Goal of Study: Acute stroke is the leading cause of long-term disability worldwide. Acute ischaemic stroke (AIS) is responsible for 87% of the cases. Anaesthetic management for AIS endovascular treatment has been shown to affect outcomes. It seems that patients who receive general anaesthesia have worse outcomes compared to those who receive sedation/local anaesthesia. This may be related to lower blood pressures (BP) during general anaesthesia. The actual ranges at which BP should be kept are specific to the patient's baseline and the characteristics of the stroke and cerebral vasculature, and are subject of ongoing investigation. The Society for Neuroscience in Anesthesiology and Critical Care recommends systolic BP (SBP) >140 mmHg and <180 mmHg upon recanalization. The purpose of our study is to analyze whether the target SBP was achieved when different anaesthetic techniques were used for the management of patients with AIS.

Materials and Methods: Retrospective analysis of patients who underwent thrombectomy for AIS from 2016 to 2017. Data collected from anaesthesia records. Patient who underwent successful thrombectomy with a registered time of recanalization were included. Cases of unsuccessful recanalization, complications during the procedure or lack of records were excluded. From the 53 medical records collected, 36 were considered for analysis. The final sample was divided in two groups. Group A: patients undergoing general anaesthesia and group B: patients undergoing sedoanalgesia/local anaesthesia. For each patient, first SBP value and SBP values recorded during the procedure upon recanalization were registered. Mean first SBP and mean SBP during the procedure were calculated for each group.

Results and Discussion: Group A (n=23): mean first SBP: 163,95 mmHg ± 29,59 (95% CI 151,85 - 176,05); mean SBP during the procedure: 118,78 mmHg ± 15,00 (95% CI 112,65 - 124,91). Group B (n=13): mean first SBP: 160,30 mmHg ± 22,13 (95% CI 148,27 - 172,33); mean SBP during the procedure: 148,15 mmHg ± 17,06 (95% CI 138,87 - 157,42).

Conclusions: In our sample, target SBP was not achieved in group A. Our results suggest that general anaesthesia is associated with lower SBP during thrombectomy in AIS. General anesthesia has many advantages and should be used when indicated but careful intraprocedural BP monitoring and treatment are crucial to maximize the benefits of endovascular treatment.

### 06AP05-1

# Effects of surgery under anesthesia with different concentrations of sevoflurane on the acquisition of spatial memory in adult rats

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Background and Goal of Study: There is an ongoing debate whether the depth of anesthesia correlates to the incidence of postoperative cognitive impairment in elderly patients (1). However, many reports have not detected a significant association between the depth of anesthesia and postoperative cognitive dysfunction. To obtain fundamental data for our future experiments using aged rats, we investigated the effects of surgery under anesthesia with different concentrations of sevoflurane on the acquisition of spatial memory in adult rats.

Materials and Methods: After approval of animal research committee, male, seven- to nine-month-old SD rats were randomly assigned to one of three groups; light anesthesia (LA: n=5), deep anesthesia (DA: n=5), and control group (C: n=5). Rats in the LA and DA groups received 2% and 4% inspired concentration of sevoflurane, respectively, plus 33% oxygen in nitrogen. A catheter was inserted into the tail artery in LA and DA groups. Norepinephrine was infused continuously in the DA group to maintain the same blood pressure as the LA group. The rats in both groups underwent fracture of the left femur and pinning surgery during anesthesia. Control group did not receive both anesthesia and surgery. Spatial learning was assessed on the 1,2,3,6, and 7th day after anesthesia and surgery by using Morris Water Maze, recording the time taken to reach the platform and the total swimming distance. Data were expressed median (min, max), and Mann-Whitney U test was used for statistical analysis.

Results and Discussion: There were no significant differences among the three groups in the time taken to reach the platform from the 1st to 6th day. However, on the 7th day, the time spent in the LA group (57 [51-89]) was significantly longer than those in the DA group (39 [6-46]) and C group (14 [5-27]). The swimming distance was significantly shorter in the DA than C groups on the 2nd day, and longer in the LA group than C group on the 7th day.

Conclusion: Acquisition of spatial cognitive function was similar among groups until 6 days after anesthesia and surgery, regardless of sevoflurane concentrations. However, on the 7th day, spatial cognitive dysfunction became apparent in the LA group. Our findings suggest that surgery under light anesthesia is likely to cause delayed central nervous system dysfunction.

### References

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## 06AP05-2

Dexmedetomidine attenuates up-regulation of the Rtn4rl2 gene and restores down-regulation of the Syt1 gene induced by sevoflurane/surgery stress in the hippocampus of elderly mice

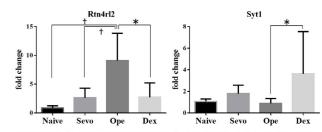
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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is an important complication after sevoflurane/surgery stress. In human studies, it has been shown that surgery causes systemic inflammation, neuronal inflammation and cognitive dysfunction in elderly patients. We reported that the comprehensive mRNA profile of neurons in the mouse hippocampus were dramatically changed by exposure to sevoflurane<sup>1)</sup>. We hypothesized that sevoflurane/surgery stress regulates the target genes associated with neuronal inflammation and that dexmedetomidine (Dex) has the neuroprotective effect. The goal of this study was to determine the influence mRNA expression in the hippocampus of elderly mice. Materials and Methods: All of the experimental protocols were approved by the Animal Care and Use Committee of Sapporo Medical University School of Medicine, Japan. Twenty-four male mice (53 weeks of age) were divided into four groups: naive, sevoflurane exposure (Sevo), operation (Ope), and operation with Dex i.p. (Dex). Mice in the sevo group were exposured to 2.5% of sevoflurane for 1h. Mice in the ope group were anaesthetized with 2.5% of sevoflurane and a 10-mm longitudinal incision was made in the lower abdomen. Mice in the Dex group were injected with 10µg/kg of Dex 30 minutes before the surgical procedure. After 1h, the hippocampus of each mouse was punched out, and total RNAs were isolated from the hippocampus. cDNAs were generated by reverse transcription. Taqman probes specific for Rtn4rl2 and Syt1 were used for qRT-PCR. Target gene expression was analyzed using the ΔΔCT method with Gapdh. In gRT-PCR analysis, data were analyzed using one-way ANOVA with post-hoc Bonferroni correction

**Results and Discussion**: *Rtn4rl2* gene expression was increased in the Ope group and was reduced in the Dex group. In contrast, *Syt1* gene expression was not changed significantly in the Ope group but was increased in the Dex group.

(Figure1).



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Figure 1. Data are expressed as means  $\pm$  standard deviation (S.D.). p values are as follows: \*; p<0.05, †; p<0.01

**Conclusions**: The target genes associated with neuroinflammation were influenced by surgery and Dex intervention. These findings may be the key for elucidating the mechanism of POCD.

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### 06AP05-3

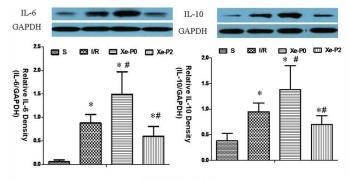
# Different microglia response after xenon-immediate or delayed postconditioning in a rabbit model of spinal cord ischemia reperfusion injury

Yanwei Y.1

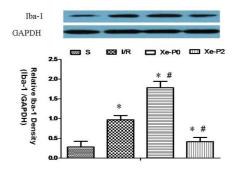
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Background and Goal of Study: Previous studies have shown that neuroprotective effect against spinal cord ischemia/reperfusion (I/R) injury in rats exerted by xenondelayed postconditioning was stronger than xenon-immediate postconditioning. However, the mechanisms underlying this process remain unclear. This study was designed to determine the roles of xenon- immediate/delayed postconditioning on the inflammatory response and microglia activation in spinal cord of rabbits after I/R. Materials and Methods: The rabbits were randomly assigned to the following four groups (n =  $6 \times 4$ ): 1) I/R+N2 group. 2) I/R+Xe-immediate group (I/R+Xe-P0). 2) I/ R+Xe-delayed group (I/R+Xe-P2), and 4) sham group (no spinal cord ischemia and no xenon). Spinal cord ischemia was induced for 22 min in male New Zealand White rabbits. Ideal clamping time of 22 minutes was identified from preceding clamping tests (15-40 minutes). Postoperative observation time was 72 hours. Spinal cord function Neurological function was assessed using the Jacobs's scales at 4, 8, 24, 48 and 72 h after reperfusion. Histological examination of the lumbar spinal cord was performed using HE staining at 72h after reperfusion. Western blotting was performed to evaluate Iba-1, IL-6 and IL-10 expression in the spinal cord.

Results and Discussion: Xenon delayed postconditioning significantly increased histologic scores after 72 h of reperfusion, as well as decreased expressions of Iba-1, IL-6 and IL-10. In contrast, lower limb movement or histology of rabbits in P0 group rabbits was no difference with rabbits in I/R group. Xenon delayed postconditioning, but not xenon immediate postconditioning, improves neuronal function via reducing microglia-regulated IL-6 in spinal cord of rabbits after I/R injury.



72 h after reperfusion



## 06AP05-5

# Interventional neuroradiology- the specific challenges for anesthesiologist

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**Background:** There is still no consensus about the best anesthesia strategy for interventional neuroradiology. Choice between general anesthesia (GA) and conscious sedation (CS) remains in the hands of (neuro) anesthesiologist.

Clinical case-series: Over the last four years our neurointerventional center in Croatia continuously has grown and developed from low to high-volume. We present single center experience with more than one hundred procedures every year. During the last year there were 60 thrombectomies and 60 other cases. General endotracheal anesthesia is preferred method that we use, with target controlled infusion (TCI) technique with propofol and remifentanil, and rocuronium for intubation. Low dose of esmolol is used for smooth intubation (avoiding BP and ICP increase). Short acting drugs allows rapid neurological examination after procedure. Using this strategy, we avoid BP variability, movements are decreased, patients airway is secured and optimal control of carbon dioxide levels are achieved. Monitoring includes: ECG, invasive and non-invasive BP, SpO2, RR, EtCO2, BIS and hourly urinary output.

**Discussion:** In anesthetic management exists large variability so interventional neuroradiology is challenging for anesthesiologist. Anesthetic management for this patients is much more than anesthetic plan of sedation or GA. Strategies include an individualized approach to hemodynamic and respiratory parameters, intravascular fluids, coagulation control and neuroprotection that can be essential for a favorable outcome. "Time is brain" and dedicated team members are time saving. Taking into account patients, technical and clinical factors we found GA the most suitable for our patients.

Learning points: Crucial steps in establishment of interventional neuroradiology is creation of a competent neuroanaesthesiologist, who are able to provide care for these patients. Drugs fine titration, accurate BP and respiratory function monitoring, good plan in dealing with possible complication and close collaboration with neuroradiologist are milestones of favourable outcome. In view of that, anaesthesiologists contribution to this procedure is essential and the best anesthesia management is in partnership with the neuroradiologist.

### 06AP05-6

# Familiar multiple paragangliomas - a case report

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**Background:** Paragangliomas represent one of the biggest challenges of anesthesia practice, particularly if they secrete catecholamines.

Case Report: ASA IV 38-year old male wih multiple paragangliomas -gene SDHD mutation- with hepatic and bone metastasis, under blood pressure control with phenoxybenzamine, amlodipine and bisoprolol.

He presented amaurosis and exoftalmy due to a periorbitary paraganglioma and was proposed for tumorectomy. Preoperatively, α and β blockers were maintained. The patient was induced with midazolam, remifentanil, propofol and rocuronium, along with lidocaine, labetalol and phentolamine to block hemodynamic response to intubation. He was maintained on a target-controlled total intravenous anesthesia with remifentanil and propofol. Blood pressure was controlled with labetalol and phentolamine infusions (SBP 120-220 mmHg, DBP 50-90 mmHg, HR 60/min). Surgical procedure was uneventfull. The patient was safelly extubated maintaining all infusions except propofol and transferred to the ICU.

Postoperatively, during transition from intravenous to oral antihypertensive medication, he developed an hypertensive spike which led to an epidural hematoma which was drained. At 6 months follow-up he remains free of neurological deficits. **Discussion:** Presentation of paraganglioma depends on the cathecolamine secreted by the tumor and the mass effect. On our patient, the later was the leading manifestation.

The clinical case was closely followed by the endocrinology team to control the blood pressure with  $\alpha$  and  $\beta$  blockade and to exclude long-term complications of hypertension.

Laryngoscopy and surgical manipulation represented our biggest challenges. Additionally, blood pressure control was essential to maintain a bloodless surgical field.

Usually a period of hypotension follows the excision of the tumor. However, as only one lesion was excised, the patient remained dependent on adrenergic blockade. The control of the blood pressure during recovery period is crucial, especially after neurosurgery and during transition to different routes or type of medications. If successfully performed it can avoid significant complications like epidural hematoma, as seen in our case.

## References:

1. Ramakrishna H. Pheochromocytoma resection: Current concepts in anesthetic management. J Anaesthesiol Clin Pharmacol 2015;31:317-23

**Learning points:** The anesthesiologist should excel in the manipulation of the autonomic nervous system during the whole perioperative period.

### 06AP05-7

# SmartPilot® view-guided target controlled infusion anesthesia can be promising for spinal surgery

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Background: SmartPilot® view (SPV) is a new monitor that takes into account hypnotic-opioid interactions and displays current and predicted anesthesia levels. This is the first report utilizing SPV in neuroanesthesia. We aimed to describe our SPV-guided target controlled infusion (TCI) anesthesia experience in two spinal surgery patients who were monitored with evoked potentials.

Case Report: Written informed consent was obtained from both patients. A 27-year old, ASA I female presented with cervical meningioma. Case 2, 52-year old, ASA II male presented with tethered cord syndrome. The anesthesia protocol consisted of TCI for propofol and manual infusion for remifentanil. Partial muscle relaxation was administered for intubation and further muscle relaxation was avoided. Maintenance of anesthesia was determined to achieve predefined isoboles on SPV. Patients were hemodynamically stable peroperatively. Extubation times were 1min, 3min, respectively.

Discussion: Intravenous anesthesia without muscle relaxants is usually utilized when neuromonitoring is used during spine surgery. However, avoiding muscle relaxants requires use of higher concentrations of propofol. Excessive propofol induces hypotension, which is independently associated with suppression of evoked responses, hemodynamic instability and prolonged recovery. So titration adequate amount of propofol gains importance (1). Although clinical validation of SPV is limited, recent evidence has shown SPV-guided anesthesia reduces anesthetic consumption (2). Thus, it was assumed that SPV would be relevant for patients undergoing spinal surgery. In the presented cases, quality of SPV-guided anesthesia was found superior to our previous practice in regards of perioperative hemodynamic stability, enhanced recovery with no significant impact on monitoring. The reproducibility and clinical reliability of SPV guided TCI anesthesia during neuromonitoring was evaluated in two patients undergone uneventful spinal surgery.

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2. Leblanc D, et al. SmartPilot® view-guided anaesthesia improves postoperative outcomes in hip fracture surgery: a randomized blinded controlled study. Br J Anaesth 2017:119:1022-9

**Learning points**: SPV can optimise adequate titration of propofol and improve outcomes during spinal surgery

### 06AP05-8

# Non-invasive intraoperative cerebral autoregulation: Monitoring and retrospective calculation of optimal arterial blood pressure in neurosurgical patients

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Background and Objectives: Cerebral autoregulation (CA) may be assessed with the cerebral oximetry index (COx) correlating a surrogate marker of the cerebral blood flow (regional saturation of oxygen, rSO2) with either cerebral perfusion pressure (CPP) or arterial blood pressure (ABP)¹. An automated curve fitting method with specific software (ICM+®) calculates the "optimal ABP" (ABP<sub>OPT</sub>), defined as the ABP level where COx reaches its lowest value in an individual patient².

Besides the technical challenges, we hypothesized that on-line monitoring of the COx index in patients undergoing long neurosurgical procedures allows a retrospective definition of their intraoperative ABP

retrospective definition of their intraoperative ABP<sub>OpT</sub>. **Measurements and Main Results:** Retrospective analysis of prospectively collected data in the neurosurgical theatre at Hospital Clinic de Barcelona. 66 patients with continuous (> 2 hours) intraoperative monitoring of invasive ABP and rSO2 with ICM+® software were included.

COx was calculated online as the correlation between 10-second averaged values of rSO2 and mABP over a 300 s period (30 values). CA was considered intact for COx <0.3 and impaired for COx  $\geq$  0.3. ABP $_{\text{OPT}}$  could be calculated in 49 (74%) of the 66 patients analyzed. The relationship between the baseline ABP value at admission (ABP $_{\text{BV}}$ ), ABP $_{\text{OPT}}$  and the average "real" intraoperative ABP (ABP $_{\text{R}}$ ) in these patients was also studied.

Ten patients (20.41%) kept their average ABP<sub>R</sub> below 20% of their ABP<sub>BV</sub>. In 30 patients (61.22%) the average ABP<sub>R</sub> was lower than the ABP<sub>OPT</sub>.

**Conclusion:** On-line CA monitoring with non-invasive COx index is feasible and allows a retrospective calculation of the ABP<sub>OPT</sub> values in most of the patients of the study. The fact that ABP<sub>R</sub> was below calculated ABP<sub>OPT</sub> in a significant number of patients deserves further analysis.

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### 06AP05-9

# Anesthesia for cerebral hemispherectomy in Rasmunssen Syndrome - Two clinical cases

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**Background**: Surgery represents a last resort therapy for epilepsy. Anesthesia perioperative care is essential to outcome.

Case Report: We report the clinical cases of two girls with refractary epilepsy associated with Rasmunssen syndrome (RS), proposed for functional cerebral hemisferectomy with neuronavigation due to rapid uncontrolled clinical progression. Anti-epileptic drug therapy was optimized and mainstained in the preoperative period

<u>CASE A:</u> 10-year old ASA II girl without additional comorbidities. Anesthesia was mainstained on a remifentanil/propofol target-controlled infusion total intravenous anesthesia along with a rocuronium infusion. Midazolam was administered on induction. Intraoperative convulsion profilaxis with Levetiracetam. An ultrasound-guided central venous catheter (CVC) was positioned on the internal jugular vein. Monitorization with ASA-standard (ASAs) parameters, invasive blood pressure and bispectral index. The procedure was uneventfull and the patient was transfered to the intensive care unit (ICU) under sedation and mechanical ventilation.

<u>CASE B:</u> 7-year old ASA III girl with personal history of early puberty, hemiparesis and obesity. Anesthesia was induced and maintained with a remifentanil/propofol infusions and rocuronium bolus. Valproic acid was chosen for intraopertive convulsion profilaxis. We opted for landmark-guided CVC. The patient was monitored with ASAs parameters, invasive blood pressure and bisepectral index. Surgery went on without mishappenings. The patient was transfered to the ICU under sedation and mechanical ventilation.

**Discussion:** RS is a progressive disease characterized by drug-resistant focal epilepsy associated with progressive cortical atrophy in more advanced cases, usually affecting one brain hemisphere. Despite its functional consequences, surgery is the most effective method to ensure complete disconnection of the affected hemisphere.

The anesthetic management of these patients includes concern about intraoperative blood loss, as the surgical approach is via a large craniotomy, duration of surgery and delayed recovery, often requiring postoperative ventilatory support and intensive care unit surveillance.

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**Learning points**: A multidisciplinary approach to these patients is essential to ensure safety and reduce the risk of complications.

# 06AP05-10

Anaesthetic considerations in a patient with kernicterus for stereotactic bilateral insertion of deep brain stimulation (DBS) electrodes into internal globus pallidus (GPi) nuclei

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**Background:** The case we report is about the anaesthetic management of a patient with kernicterus undergoing surgery of DBS of GPi. Kernicterus is a rare neurological complication of indirect hyperbilirubinemia caused by deposits in newborns in GPi that inhibits some important biochemical processes, causing: involuntary movements, asymmetric spasticity, rigidity and ataxia. **Case report:** 40 v.o. ASA II female scheduled for stereotactic bilateral placement of

electrodes in GPi, guided by computed tomography and under general anaesthesia (GA). Relevant history: generalized dystonia, cervical dystonia and chronic pain. Previous long anaesthetic awakenings. The patient was monitorised with invasive blood pressure, electrocardiogram, pulse oximetry, capnography and bispectral index (BIS). The anaesthesia was induced with 2mcgr/kg fentanyl; 1,5 mg/kg propofol and 0,6mg/kg rocuronium. Orotracheal intubation was performed next and patient was connected to mechanical ventilation. Maintenance was made with TIVA: Propofol infusion (<70mcgr/kg/min) with remifentanil (0.02 mcgr/kg/min). Anaesthetic concentration during microelectrode recordings was reduced by 10%. BIS was maintained between 50-60 during surgery. Surgery continued uneventful and the patient was transferred to the post anaesthesia care unit; and extubated 2 hours later without complications. One week later the patient's cervical dystonia had improved and also, she referred less disability related to pain.

**Discussion:** DBS is a treatment for patients with disorders of movement which are refractory to conventional therapies. The most common anaesthetic techniques used in these patients are local anaesthesia or conscious sedation; because they allow for awake patients for intraoperative neurophysiological monitoring and avoid the confounding factor of anaesthetic agents for GPi localization¹. In some cases, with severe uncontrolled dystonic or in children, GA is required for DBS insertion. Because the patient had severe dystonia it was believed that the best technique

was to use TIVA BIS-guided<sup>2</sup>, attempting to reduce the doses as much as possible. **Reference:** 

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- . Grant R. et al. Curr Opin Anaesthesiol. 2015;28 (5):505-10.
- 2. Venkatraghavan MD. et al. J Neurosurg Anesthesiol. 2016; 28 (3):256-61. Learning point: Thiss report demonstrates that TIVA BIS-guided anaesthetic depth can be an anaesthetic technique for a successful localization and insertion of DBS in the GPi in patients with dystonia in kernicterus.

### 06AP05-11

EEG predictors of cerebral ischemia as a criteria for the intensive care effectiveness.

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**Background and Goal of Study**: To identify the features of the EEG wavelet graphs and use them to assess the effectiveness of intensive management of acute and chronic brain ischemia (BI).

Materials and Methods: 198 patients with acute and chronic BI. The first group consisted of patients with severe craniocerebral trauma, the 2nd group with acute cerebrovascular accident, 3rd with apallic syndrome (AS), 4th group with chronic cerebral ischemia (CCI) 2nd degree (different genesis). The control group (CG) consisted of 20 healthy volunteers. The 8-channel EEG was recorded by NIHON KOHDEN EEG-1200 machine. Neurophysiological data were processed by spectral analysis method (Fourier transform, wavelet transform).

**Results and Discussion**: The minimum frequency and amplitude diversity, typical for wavelet graphs of "normal" EEG in CG, with pronounced stable dominance in a narrow band 9-11 Hz, was a sign of functional integrity and stability of the single central nervous system (CNS).

In patients with AS, a similar monotony of frequency representation was revealed, the stability of the dominant rhythm in the range of 5-6 Hz. Patients with CCl of 2nd degree also had a monotonic frequency and amplitude representation in the 4-8 Hz ranges. This we regarded as wavelet-signs of the already formed simplified pathological system. As response to the therapy with the inclusion of antioxidant agents and preparations with regenerative-reparative agents, minimal changes in the wavelet graphs of the EEG were recorded, with the expansion of the amplitude parameters of the dominant rhythm. We regarded this as predictors of the minimal, inefficient effect of therapy on a rigidly formed PS.

In response to the therapy, the maximum changes in the wavelet EEG graphs were recorded, with the expansion of the frequency and amplitude boundaries of the dominant rhythm (fig. 1,2). This we regarded as signs of effective therapy impact and destruction of the PS by early elimination of the patho determinant.

Conclusion: The amplitude-time representation of the non-stationary EEG signal and its result of continuous wavelet transformation quite effectively allows describing the character of the bioelectrical activity of the brain from the viewpoint of the theory of functional systems. The effectiveness of ongoing neurotropic intensive therapy in acute and chronic MI depends on the degree of formation of the PS.

# 06AP05-12

Is TCI sufentanil the optimal choice of opioid during general anesthesia for endoscopic surgery resection of pituitary adenomas?

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**Background**: During endoscopic resections of pituitary adenomas a steady and blood-free surgical field is required. This is ensured, among other factors, by maintaining systolic and mean blood pressure at a pre-specified and stable level. After surgery the patient must almost immediately regain full awareness in order to allow for early neurological assessment.

Opioids remain one of the elements of balanced anaesthesia. In this study we analysed the influence of TCI sufentanil on haemodynamic stability during endoscopic resections of pituitary adenomas.

Materials and Methods: 45 pts (25 F and 20 M); age: 26-84 yrs were anesthetized using TCI sufentanil as analgesic and sevoflurane as inhalational anesthetic. Rocuronium was used to obtain neuromuscular blockade.

23 (51%) of patients had a history of preoperative hypertension.

Results and Discussion: In 41 cases haemodynamic stability was maintained (systolic arterial pressure (SBP) in the resection stage in individual patients ranged from 85 to 110 mmHg, whereas mean arterial pressure (MAP) - from 67 to 80 mmHg). In two cases, due to the low values of SBP and MAP, ephedrine and noradrenaline were administered, respectively. Hypertension requiring the administration of urapidil occurred in two cases.

Two patients had to be administered naloxone in order to rapidly reverse the opioid effect during emergence the patient.

Mean duration of anesthesia was 111 minutes (range: 57.5 - 275 min) and the average total dose of sufentanil was 54.1 μg (range: 27.9 - 116 μg).

On average, the maximum applied concentration of sufentanil in the effector was 0.45 ng/ml (range: 0.4-0.7 ng/ml).

The mean time from the end of surgery to extubation of a fully conscious patient was 12 min (range: 2.5-30 min).

**Conclusion**: TCI sufentanil appears to be an optimal opioid for general anesthesia during endoscopic surgery of pituitary adenomas.

Sufentanil provides analgesia with stable systolic pressure, which ensures a bloodless surgical field operative and maintains stable brain-perfusion blood pressure. The pharmacokinetic profile of sufentanil allows for rapid neurological recovery and evaluation of the patient regardless of the duration of anesthesia. The postoperative analgesic effect of sufentanil prevents the need for opioid dministration during the postoperative period.

### 06AP06-1

The effect of a scalp block on surgical plethymography index (SPI) during a Mayfield head holder insertion for intracranial surgery: a randomized controlled trial

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**Background and Goal of Study**: SPI (Surgical plethymography index) is a value (0-100) derived from plethysmographic waveforms to determine a balance between noxious stimuli and antinociception.¹ It may be useful to assess the effect of a scalp block on responses to a head-holder pin insertion.² This study was aimed to test the hypothesis that the scalp block could reduce the response of SPI from the head-holder pin insertion.

Materials and Methods: Approved from the institute ethical research committee, 30 consecutive neurosurgical patients were randomized into two groups: Gr.1 receiving a scalp block with 0.5% bupivacaine and Gr.2 receiving no block at ten minutes before a Mayfield head holder insertion (HHI). Both groups received the same general anaesthetic technique to keep BIS between 40 and 60. The SPI values were measured at 5 minutes before the HHI and then every one minute after HHI. The repeated measure of ANOVA and two sample independent t-test were used to analyse the data by SPSS version 22. A p value of 0.05 was considered as statistically significant level.

Results and Discussion: From the analyses, there were a statistically significant increase of SPI from 36+/-6.72 (Gr.1) and 33.87+/-7.58 (Gr.2) to reach the peak levels of 55.67+/-15.03 and 67.6 +/-16.11 at two minutes after the HHI, respectively. The was statistically significant differences of the SPI at this time point between the two groups (p=0.045). Then, they decreased towards the baseline but reached to the baseline value at 10 minutes only in the scalp block group (39.5+/-14.18). After the skin incision, the value increased to 46.29+/-16.14 in the scalp block group but significantly rose to 65.6 +/-17.48 in those receiving no block.

**Conclusion**: The finding indicates that SPI could be used to determine the effect of scalp block on responses of a head holder pin insertion.

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general anaesthesia. BJA 2011;106:101-111
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### 06AP06-2

# Dexmedetomidine Vs Clonidine to prevent hemodynamic instability during emergence after craniotomy

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Background and Goal of Study: Stability of hemodynamics, absence of hypertension or increased ICP level are extremely important for neurosurgical patients in the early postoperative period. According several studies alpha 2-adrenergic agonist can be used for hemodynamic stabilization during awakening and extubation [1]. Goal of this study was to compare effectiveness of short infusion of dexmedetomidine and clonidine in this clinical setting.

Materials and Methods: In this prospective study we include 40 patients (from 18 y.o.) scheduled for elective craniotomy, ASA I-II. All patients were divided in two equal groups (D and C), 20 patients in each. During the dura mater dura mater group D infusion of dexmedetomidine was started at a dose of 0.5 μg/kg/h, in the C group we used clonidine in a dose of 1 μg/kg/h. By the end of surgery, infusion was stopped and the patients with continuous hemodynamic monitoring were transferred to the PACU, where they were extubated. Hemodynamic parameters are measured on all these stages, as well as time to extubation, evaluation of the quality of awakening on the RASS and Aldrete scales, the presence of agitation during awakening.

Results and Discussion: At the end of surgery before awakening we noted

lower levels of mean arterial pressure (MAP) and heart rate (HR) in D group (63±10,2mmHg MAP; 70bpm HR in D group and 80±9,2mmHg MAP; 70bpm HR in C group). Immediately after extubation episodes of hypertension were noted in 1 patient in D group and in 2 patients in C group. In general after extubation: in D group MAP was 82±14 mmHg, HR - 75±15 bpm; in C group MAP - 90±11 mmHg, HR 77±12 bpm. MAP and HR after 10 minutes after extubation were 80±10 mmHg and 75±16 bpm in D group and 90±10 mmHg and 77±13 bpm in C group. Recovery profile was positive in both groups (9,4±1 points in Aldrete scale in both groups), all patients are calm based on RASS scale (-0,1±1,3 points in D group).

Conclusion: Both dexmedetomidine and clonidine were equally effective for prevention of hemodynamic instability at the emergence after anesthesia and extubation, even in form of short infusion. We noted rather high variability in time of extubation in both group, but positive profile of awakening without agitation and cough

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### 06AP06-3

Investigation of awake craniotomy cases for elderly patients using dexmedetomidine: Case series

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**Background:** A high quality of awakening is required for awake craniotomy in order for patients to properly perform neurological tasks during the awake phase. In the guidelines for awake craniotomy in Japan, there is no particular restriction on age of the patient. However, in elderly patients (over 65 years of age), we sometimes experience poor quality of awakening and uncontrollable delirium due to anaesthetic agents. In this study, we investigated whether we could provide smooth awakening and comfortable anaesthetic management by using Dex concurrently in three elderly patients undergoing awake craniotomy.

Case report: Case 1: 82-year-old woman, Case 2: 82-year-old woman, Case 3: 77-year-old woman. Awake craniotomy for brain tumor resection was planned for all patients. Anaesthesia was induced with propofol, remifentanil and rocuronium, and then LMA supreme™ was used for airway management. A scalp nerve block was performed with 0.375% levobupivacaine by an anaesthesiologist, and local anaesthesia with the same drug was performed before head pinning. After induction, we gradually decreased the continuous doses of propofol and remifentanil and started Dex infusion, targeting the BIS Index for around 60. After surgeons cued to awake the patients, and we stopped infusing anaesthetic agents. After confirmation of spontaneous breathing and communication, we removed the LMA. Times to extubation were 1 min (case 1), 4 min (case 2), 5 min (case 3) [Table 1]. The quality of awakening was high in all cases, and the patients could perform neurological tasks faultlessly. Intraoperative complications caused by Dex such as hypotension, bradycardia, and changes in sensory evoked potential and motor evoked potential were not observed in any of the patients.

**Discussion:** In the elderly patients in whom Dex was used, the time to extubation was short and the quality of awakening was good. The combination of continuous Dex infusion enabled the intraoperative propofol and remifentanil doses to be reduced and might have provided proper sedation.

Learning points: Anaesthetic management using dexmedetomidine concurrently is useful for awake craniotomy in elderly patients.

	Case 1	Case 2	Case 3
Time to extubation (min)	1	4	5
Propofol (μg/ml) *	0.1	0.3	0.4
Remifentanil (ng/ml) †	0.023	0.386	0.027
Dexmedetomidine (ng/ml) ‡	0.44	0.08	0.14

Table 1. Time to extubation, effect-site concentration of propofol / remifentanil and plasma concentration of Dex just before extubation. \*; Marsh model, †; Minto model, ‡; Dyck model

### 06AP06-4

Can depth of anesthesia (DoA) monitors be used to predict intra-operative convulsions? Lessons learned from a case report using the Narcotrend® monitor

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**Background**: The Narcotrend ® (MonitorTechnik, Bad Bramstedt, Germany) is an EEG monitor designed to measure the DoA. Besides an arbitrary number of DoA it also displays raw and quantitative EEG for further clinical interpretation.

Case Report: We present the case of an ASA I, 30-year-old man undergoing craniotomy for glioblastoma resection under general anesthesia who suffered tonic-clonic seizures captured by intraoperative EEG (Narcotrend®). Eight to ten minutes before the seizure, this device recorded a progressive increase of relative power in the Beta-wave range, accompanied by a reduction of relative power in the Delta-wave range in a distinct pattern (Figure 1). These was no change in the propofol/remifentanil dosage before the seizure. This pattern was repeated before the second seizure, while on induction levels of Propofol and after the administration of Levetiracetam 1000mg IV. The patient had no previous history of seizures and following surgery no further seizures were recorded. Patient written consent was obtained.

**Discussion:** Intraoperative electroencephalographic seizures under general anesthesia are rare1,2 and our observation is the first to describe a "typical" EEG pattern on a DoA monitor. We also discuss the differential diagnosis for intraoperative seizures in patients undergoing large head tumour resection.

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Learning points: An attentive analysis of the EEG trends using the Narcotrend®

Learning points: An attentive analysis of the EEG trends using the Narcotrend® display may be useful in anticipating convulsive activity during head tumour resection

Figure 1: Evolution of the seizures (depicted in red arrows). Graph A shows the Power Spectrum analysis in time, while Graph B shows the Power Spectrogram, as depicted in the Narcotrend® monitor. We can see that before both seizures there is a progressive increase of relative power in the Beta-wave in a triangular shape pattern.

# 06AP06-5

# Anesthesia for transsphenoidal pituitary surgery in super morbidly obese patient

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**Background**: Pituitary tumors are common in clinical practise with radiologic and autopsy studies estimating that as many as one in seven people have pituitary tumor, however, only one in 1000 are clinically symptomatic.

Case Report: transsphenoidal pituitary surgery was planned for 51 years old, super obese man patient (weight=175kg and height=187cm. BMI: 50,04 kg/m²). On preoperative examination, patient had short thick neck and grade III Mallampatti class. He presented with history of Cushing's disease, hypertension, diabetes mellitus, insuffitientio renalis chronica gradus II and bronchitis chronica. He was labeled as ASA IV. All the necessary consultations have been carried out and laboratory findings were corrected. Intubation and an introduction to anesthesia have passed without complications. During the operation, the patient had mildly elevated blood pressure. The operation and early postoperative period have passed the orderly. The patient was transferred from the Intensive Care Unit to the fifth postoperative day at the Neurosurgery Clinic. The patient was hemodynamically stable. On the seventh postoperative day the condition of the patient worsened, he was reanimated, set on mechanical ventilation and given inotropic support. Myocardial infarction diagnosis (NSTEMI) was confirmed. The patient died of the ninth postoperative day.

**Discussion**: In this case we used short acting anesthetic agents were favored to facilitate intraoperative stability, rapid recovery and permit neurologic examination after surgery. Morbidly obese patients are at high risk with regards to aspiration and upper airway obstruction following tracheal extubation. Cushing's diseases, due to excess production of adrenocorticotropic hormone, is associated with increased risk of cardiovascular disease, hypertension, and ischemic heart disease, which is major cause of perioperative mortality.

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**Learning points**: Anesthesia for transsphenoidal pituitary surgery requires thorough preoperative assessment of patient condition and can provide optimal surgical conditions and hemodynamic stability, while used drugs with short half-life in super obese patient.

# 06AP06-6

Intraoperative cardiac arrest during posterior spinal fusion – a case report and serial review of 4 cases

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**Background**: Unexpected cardiac arrest during spinal surgery in the prone position is a devastating intraoperative event with unclear etiologies.

Case Report: The present case regards a 61-year-old male who underwent a lumbar spine revision operation due to recurrent back pain. The patient's history was unremarkable save for a previous stroke that lead to left hemiparesis. General anesthesia induction and maintenance were uneventful. The patient developed an abrupt drop in blood pressure and end-tidal CO2 levels during the later stages of subcutaneous suturing after implantation of fusion instrument, and electrocardiogram showed pulseless electrical activity shortly after. CPR was started on the patient after he was immediately put in a supine position. The patient regained spontaneous circulation after a brief cardiac massage and intravenous epinephrine. A transesophageal echocardiography was performed and blood samples were analyzed. The patient's ventricular performance was normal with no signs of wall motion defects or right heart failure. Serial levels of cardiac enzymes. D-dimer and tryptase (up to 12 hours after the event) were all within normal ranges. The patient recovered full consciousness and was extubated in the operating room, but required a low infusion dose of epinephrine during the transfer to the intensive care unit. The patient was discharged from the hospital 8 days later.

**Discussion**: Four similar cases where patients received elective posterior spinal surgery were reviewed from our clinical database (2012-2017). Analysis of the five patients showed: the majority of patients were female (3/5), the mean age was relatively high (70 years), there were moderate levels of comorbidities (ASA PS II-III), and no records of massive intraoperative blood loss. Postoperative cardiac examinations were performed, but no patients were diagnosed with newly developed myocardial injury. Differential diagnoses included pulmonary embolism, hypovolemic shock, and anaphylaxis were excluded in most of these patients.

Learning points: Cardiac arrest can happen with no apparent warning signs during lumbar spine surgery in the prone position. Although cases of intraoperative cardiac arrest during spine surgery have been repeatedly reported in the literature, the underling pathology remains unclear. Other potential causes such as neurologic shock, acute adrenal insufficiency, or transient air embolism should be taken into consideration.

### 06AP06-7

Retrospective Analysis of Difficulties in Airway Management in Patient with Acromegaly Undergoing Pituitary Tumor Surgery

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Background and Goal of Study: Changes in air way anatomy induced by growth hormone secretion in acromegaly make these patients a unique challenge. Past publications indicate that intubation was difficult in 33 out of 128 (25.7%) patients and that the predictive value of Mallampati score in predicting airway difficulty is low. The aim of the study was to assess the incidence of difficult intubation in patients with acromegaly undergoing pituitary surgery.

Materials and Methods: Medical records of patients undergoing pituitary surgery during the years 2014-2017 were explored for age, gender, hormonal diagnosis, Mallampati score, difficulty of intubation, and first end tidal carbon dioxide (EtCO2) value immediately following intubation.

Results and Discussion: From 148 patients who had undergone pituitary surgery, 31 (20.9%) suffered from acromegaly. During the preoperative evaluation, 7 out of 31 (22.6%) were suspected as difficult to intubate (SDI). From these in 1 awake fiber optic was performed, in 2 intubation was performed using a video-laryngoscope and in 4 direct laryngoscopy was performed. 2 were reported to be difficult to intubate, the 1 who had undergone awake fiber optic and 1 of those who had undergone video laryngoscopy.

From 24 non-SDI patients in 20 intubation was performed after direct laryngoscopy and in 4 using a video-laryngoscopy. Only 1 out of 24 (4.2%) was reported to have difficulty in intubation

The Mallampati score in the SDI group patients was 4 in 1 patient, 3 in 3, and 1 in 3. In the non-SDI group patients Mallampati score was 4 in 1 patients, 3 in 5, and

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2 in 9, with reminder having a score of 1. The Mallampati scores of the difficult to intubate patients where 3 in the patients from the SDI group and 3 in the non SDI. The first EtCO2 measurement following intubation was <40 mmHg in 3 patients from the SDI group (42.8%) and 15 from the non-SDI group (48.4%), 40-45 mmHg in 1 from the SDI group (14.3%) and 5 from the non-SDI group (16.1%), and  ${\ge}46$  in 3 from the SDI group (42.8%) and 4 from the non-SDI group (12.9%).

Conclusion(s): According to this sample the incidence of suspected difficult intubation was 22.6% and incidence of reported difficult intubation was 9.7%. If EtCO2 values ≥46 are considered as indicatior for difficulties in airway management the incidence is 22.6%. Clinical evaluation or Mallampati score were not good predictors for airway difficulties.

### 06AP06-8

# Comparison of normal saline and balanced crystalloid intravenous therapy during neurosurgery

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Background and Goal of Study: Normal saline or 0.9% NaCl solution is the most commonly used intravenous fluid worldwide and it contains 154 mmol/L Na+ and 154 mmol Cl-/L with osmolarity of 308 mOsmol/L. But plasma contains sodium 137-146 mmol/L and chloride 98-106 mmol/L, with osmolality of 280-295 mOsmol/kg. There are detrimental effects of chloride rich fluids on renal blood flow and glomerular filtration rate, diuresis and acute kidney injury. An alternative is a buffered, balanced, crystalloid solution with an electrolyte composition similar to plasma and osmolarity between 286-295 mOsmol/L. Someone could indicate that such balanced solutions are not suitable for neurosurgical patients because of a possible impact on the brain oedema development.

Materials and Methods: We analyzed thirty patients who underwent neurosurgical procedure because of brain tumor. Patients were divided into two groups according to the type of intraoperative intravenous fluid therapy, normal saline vs. balanced crystalloid solution, which were administered by attending anaesthesiologist. Acid base and electrolyte parameters were obtained after anesthesia induction. Ventilation, hemodymanic parameters and diuresis were recorded, too. After each 500 ml of intravenous fluid the acid base and electrolyte status were repeated.

Results and Discussion: There were no differences in patient preoperative electrolyte values and kidney function parameters. There were no differences between groups of patients in acid base balance, arterial lactate, potassium and sodium. The significant differences in chloride plasma concentration were found in normal saline group of patients during operation, and between groups (Table 1.). Table 1. Differences between groups

	Normal saline group	Plasma-Lyte 148 group	p
Diuresis	500.0±178.0	1677.7±1103.4	<0.05
Plasma osmo- lality	285.8±6.6	286.3±6.7	0.90
Plasma Cl-	113.2±4.6	104.3±1.4	<0.05

**Conclusion**: The balanced crystalloid intravenous therapy during neurosurgery provides better chloride level balance as well as diuresis. There were no changes in plasma osmolality and sodium concentration; therefore the balanced crystalloid fluids are safe to use in intraoperative fluid maintenance during neurosurgery.

## 06AP06-9

# Implementation of robot-assisted stereoelectroencephalography for resective epilepsy surgery

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Background and Goal of Study: Robotic surgery is a field in continuous progression at European hospitals and it could bring several advantages including accuracy, potential reduction of surgical time and reduction of complications. Robotic stereoelectroencephalography (SEEG) is a method that allows getting precise information from deep cortical areas through the implantation of deep electrodes, avoiding the need of craniotomies. It has a clear application in patients with drug-resistant focal epilepsy, as it defines anatomically the epileptogenic zone. Objective: to analyse the current perioperative management and the incidence of complications during this procedure.

Materials and Methods: We collected retrospectively 30 cases of patients with medically refractory focal epilepsy who underwent robotic stereotactic placement of deep electrodes between January 2013 and March 2016.

**Results and Discussion**: The mean age was 37,9. Nineteen patients had no other pathologies but epilepsy. The average surgical time was 163 minutes and the average number of electrodes placed was 10,5. Twenty-three cases were maintained with balanced general anaesthesia with sevoflurane, while the remaining

seven were anesthetized with total intravenous anaesthesia. We used standard monitorization for all cases, and in fourteen of them invasive blood pressure was measured too. There were no severe complications during the surgery, just two to remark: arterial bleeding with the placement of an electrode and short delay on awakening. Both cases were solved without consequences. The average time in recovery area was 203 minutes. As soon as it was possible the patients were discharged in order to record seizures and functional brain mapping. Recent meta-analysis estimates a 1-4% incidence of complications during SEEG. We registered three severe complications: an acute subdural hematoma that required craniotomy, an intraparenchymal hematoma that cursed with mild aphasia and a brain abscess that required drainage.

**Conclusion**: SEEG is an accurate technique and useful to delimit the epileptogenic zone with a promising future. However, we must not underestimate the possible complications. Establishing protocols can help us in the handling of these patients. In our particular experience, after observing these results we changed our protocol in two main factors: decreasing the number of electrodes and performing a brain CT before awakening the patient.

### 06AP06-10

The recovery time of muscle relaxation from rocuronium using sugammadex was significantly prolonged in the most severe CKD group of hypoalbuminemia under 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, serum albumin, renal dysfunction and during of sevoflurane (SEV) anaesthesia. Therefore, based on the chronic kidney disease (CKD) severity classification by eGFR, we examined the influence of albumin to effect of the SGDX towards the rocuronium under SEV anaesthesia. We evaluated the recovery time in two groups of albumin value between Post tetanic count (PTC)1 and Train of four (TOF) ratio 100% using TOF monitoring.

Materials and Methods: We got the approval on the ethical review board of our hospital and the written consent of patients. Twenty-four adults severe CKD haemodialysis patients of eGFR<15 who underwent surgery under general anaesthesia at our hospital were included in this study. We divided the patients into two groups: the L group, serum albumin≦3. 0g/dl(n=13):and the N group, serum albumin >3. 0g/dl (n=11). Anaesthesia was induced in both groups with 2mg/kg propofol and 0. 8mg/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 4mg/kg SGDX was then intravenously injected over 5 seconds. The time interval between PTC1 and TOF ratio 100% was measured. We used the TOF- watch (T. X) SX (Organon Ltd., Ireland). The results were expressed as mean(±SD). Data were analysed 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 795±448s in the L group compared with 390±250s in the N group; this difference was statistically significant (p=0.012)

Conclusion: The muscle relaxation recovery time from PTC1 to TOF ratio 100% was prolonged in hypoalbuminemia CKD patients. We recommend that more careful muscle relaxation monitoring management is necessary for CKD patients with hypoalbuminemia.

# 06AP06-11

Prevention of bite injuries with novel mouthpiece during intraoperative transcranial electric motor-evoked potential monitoring in spinal surgery

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Background and Goal of Study: Transcranial motor-evoked potential monitoring (Tc-MEP) causes bite injuries to the oral cavity including the endotracheal tube. We developed a mouthpiece to prevent these injuries, and reported its efficacy and safety [1]. After a pilot study, we started to use the mouthpiece routinely for elective cases. The purpose of this study was to examine the efficacy of the mouthpiece in clinical setting.

Materials and Methods: After obtaining approval from our institutional review board, patients undergoing spinal surgery under Tc-MEP in our institute during 2013-2016 were enrolled. Patients were fitted with a bespoke vinyl-silicone

mouthpieces by dentists before surgery. On induction of general anesthesia, the mouthpiece was attached to the upper and lower dental arches. A lateral cervical X-ray was taken at the end of surgery to examine the condition of the endotracheal tube. Deformation of endotracheal tube was defined as the ratio of inside diameters of the most stenosed and normal part of endotracheal tube less than 90%. The incidence of endotracheal tube deformation was compared with the patients in whom a conventional gauze bite block were used.

**Results and Discussion**: Of the 279 patients, 108 were excluded due to the X-ray imaging failure. Of the remaining 171 patients, 140 patients used the mouthpiece while 31 patients used a conventional gauze bite block. The incidence of tube deformation in the patients with the mouthpiece (2 of 140 patients, 1.4 %) was significantly lower than in those with the gauze bite block (6 of 31 patients, 45.0 %; p < 0.001). Conventional gauze bite block were used in toothless cases and emergency cases. According to the present results, we should prepare the mouthpieces for those cases.

**Conclusion(s)**: The incidence of damage to the endotracheal tube caused by intraoperative transcranial motor-evoked potential monitoring was reduced by a novel mouthpiece.

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### 06AP06-12

# Evaluation of dexmedetomidine sedation for implantation of deep brain stimulators in parkinson's desease

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Background and Goal of Study: The potential role of dexmedetomidine can be postulated on the basis of awake craniotomies since the sedative drug should provide adequate sedation and analgesia with minimal interference in patient cooperation and neuronal electrical discharge. The purpose of this study is to summarize our experience with dexmedetomidine sedation and to compare it with other drugs used for the same procedures.

Materials and Methods: Descriptive cross-sectional study,24 patients suffering from Parkinson's disease that underwent deep brain stimulator implantation. Two groups to compare, depending on the drug used for sedation during the surgery: a group that received only dexmedetomidine (5patients) and the other group(19patients) that received midazolam or propofol plus an opioid in some cases.

Results and Discussion: There is no difference in the anthropometric or hemodynamic variables between groups. The unique intraoperative complication was bradycardia in both groups, 20% in DG and 5.3% in Non-DG. No hypotensive treatment was needed in the DG, while 36% of the patients of Non-DG received hypotensive drugs but there were not significant differences. ICU stay time was 4 hours and the total days of admission was between 6-8 days. Statistical differences were found when comparing surgery legth, 150 minutes less in the dexmedetomidine group. No difference was found when comparing the degree of satisfaction in patients between groups. Safety is an important concern when choosing sedation for neurosurgery; systemic hypertension is a risk factor for intracraneal hemorrhage. No differences were found regarding complications or hemodynamic tendencies, the use of dexmedetomidine in these surgeries seems reliable. The duration of surgery in DG was shorter. An increase of surgery length in any procedure may result in complications during the perioperative period-Dexmedetomidine is at the same satisfaction patient level as traditional drugs for sedations.

Conclusion: Current evidence and our study results suggest that the use of dexmedetomidine for patients undergoing Deep Brain Stimulators can provide patient comfort and hemodynamic stability with minimal adverse effects as bradycardia. Nevertheless, the randomized trials we found at the bibliography have small sample size since it is difficult to collect surgeries of this type.

# Cardiac, Thoracic and Vascular Anaesthesiology

### 07AP01-1

# A Simple Prediction Model of Hypoxemia During One-Lung Ventilation

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**Background:** One-lung ventilation (OLV) is widely utilized in thoracic surgeries performed under general anesthesia. However, transpulmonary shunting can potentially cause severe hypoxemia during OLV. Although several predictors of hypoxemia during OLV have been proposed, no single factor can independently predict hypoxemia accurately. Therefore, we made a simple prediction model of hypoxemia during OLV with multiple predictors.

**Methods:** A single-center retrospective review was performed of consecutive patients who underwent lung resection surgery between January 2014 and December 2016. We defined hypoxemia during OLV as a SpO<sub>2</sub> lower than 91% with a FiO<sub>2</sub> of 1.0, as when either lung oxygen insufflation or continuous positive airway pressure were required to a non-dependent lung, or as when intermittent two lung ventilation was required. Patients were randomized into a derivation group (75% of patients) and a validation group (25% of patients). A prediction model for hypoxemia during OLV was developed by using a regression coefficient-based scoring method. The discriminatory power of the resulting score was assessed by calculating the cross-validated C statistic.

Results: A total of 763 patients underwent lung resection surgery for lung cancer during the study period. Among them, 256 patients were excluded because of missing data and 27 patients were excluded because of tube malposition during OLV. In the derivation group, backward multivariable logistic regression analysis identified three covariates that were significant independent predictors, and we used for our hypoxemia prediction score. (Table) The discriminatory power of this model was fair, with a cross-validated C statistic of 0.81 in the derivation group and 0.87 in the validation group.

**Conclusion:** This simple prediction model identifies the preoperative risk of hypoxemia during OLV. This score has the potential to easily identify patients who may need a more intensive ventilation strategy for OLV.

Table: Prediction score for hypoxemia druing OLV  Attribute	Points
Preoperative PaO <sub>2</sub> at room air	_
< 75mmHg	2
< 90mmHg	1
Previous lung resection to dependent lung	2
Right-side operative side	2

# 07AP01-2

# The application of a new rapid method of ion mobility spectrometry to measure blood propofol concentrations in video assisted thoracic surgery

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**Background and Goal of Study**: Monitoring of the intravenous anesthetics is complicated, time consuming and strenuous. Ion mobility spectrometry (IMS) is a widely known apparatus for analysis of gas phase ions, and it has been proved to be an effective method for measuring propofol in blood (measurement within 1 minute without any pre-treatment)<sup>1</sup>. we aimed to measure blood propofol concentrations by IMS in video assisted thoracic surgery.

Materials and Methods: Fourteen patients scheduled for video assisted thoracic surgery (VATS) under total intravenous anesthesia were enrolled in our study. Propofol and remifentanil were infused to achieve target effect compartment concentrations of 6 μg ml<sup>-1</sup> (Schnider model) and 5 ng ml<sup>-1</sup> (Minto model) respectively. General anesthesia was maintained with propofol and remifentanil at 3.5 μg ml<sup>-1</sup> and 3.5 ng ml<sup>-1</sup> respectively. 0.5 ml of artery blood was collected from nondominant arm with the patient positioned in 1,3,5 minutes after infusion started; 15,30,60 minutes after commencing one-lung ventilation; 5,10,15 minutes after discontinuation of the infusion of propofol. Plasma propofol concentrations were

analysed by IMS and compared with concentrations predicted by the TCI system (Diprifusor).

Results and Discussion: The measured concentrations tended to be higher than predicted concentrations. The predicted concentrations were calculated by pharmacokinetics, while the measured concentrations were the true concentrations. BIS were negative correlated with measured concentrations.

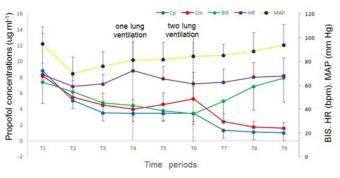


Figure 1. measured concentrations (red dots), predicted concentrations (blue dots), Bispectral Idex (green dots), heart rate (purple dots) and mean arterial pressure (yellow dotes) at different time periods. T1: 1 minute after infusion start; T2: 3 minutes after infusion start; T3: 5 minutes after infusion start; T4: 15 minutes after commencing one-lung ventilation; T5: 30 minutes after commencing one-lung ventilation; T6: 60 minutes after commencing one-lung ventilation; T7: 5 minutes after discontinuation of the infusion; T8: 10 minutes after discontinuation of the infusion.

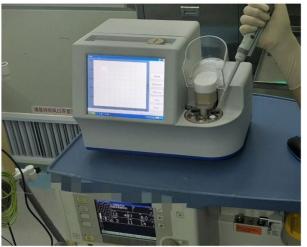


Figure 2 The new ion mobility spectrum applied in this experiment

**Conclusion**: IMS provides a rapid and simple method for point-of-care monitoring blood propofol concentrations in VATS. **Reference**:

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### 07AP01-3

Hypoxemia in sequential one lung ventilation: oxygen saturation tends to decrease in the second half rather than in the first half of ventilation

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Background and Goal of Study: Sequential OLV is uncommon, and there are few reports of it to date. At our institution, we perform atrial fibrillation treatment surgery with sequential OLV. We have experienced hundreds of cases of sequential OLV and hypothesized that maintaining oxygenation is more difficult in the second half of the procedure than in the first half.

The goal of this study was to examine hypoxemia in sequential OLV retrospectively. **Materials and Methods**: Data were retrospectively collected from the electronic medical records between March 1, 2012 and March 31, 2017. The sequential OLV procedure in these operations is shown Fig.1.

Hypoxemia time, defined as the period with  ${\rm SpO}_2$  less than 90%, 93%, and 96% in each half of the procedure, was calculated. This study was approved by the Tokyo Metropolitan Tama Medical Center's Institutional Review Board 29-65.

Results and Discussion: One hundred and ninety-nine patients were included. The mean duration of the first and second halves was 56 and 39 minutes, respectively. Hypoxemia time is shown Fig. 2. Hypoxemia time in the second OLV was significantly longer than in the first OLV (p<0.001) for all thresholds. Although

the duration of the OLV in the first half was longer than in the second half, hypoxemia time in the second half was longer than in the first half, suggesting that hypoxemia may have been higher in the second half than in the first half.

There are three possible reasons for these results. First, right lung capacity is usually larger. Second, the left lung may not have been expanded fully in the interval. Third, hypoxic pulmonary vasoconstriction of the left lung occurring in the first half may have remained in the second half, making the shunt flow larger in the second half. Conclusion: In sequential OLV, hypoxemia tends to occur in the second half rather than in the first half.

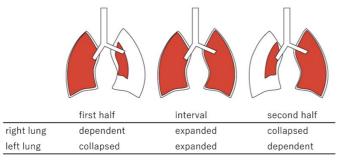


Fig.1 Sequential OLV procedure in atrial fibrillation surgery at our institution. Patient position was supine. The interval is approximate five minutes.

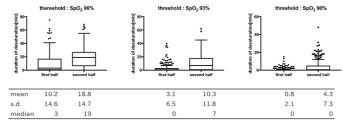


Fig.2 Tukey boxplot of hypoxemia time in the first and second OLV.

### 07AP01-4

Video double lumen endobronchial tubes can forewarn dislodgement, thereby enhance patient safety in robotic thoracic surgery

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Background and Goal of Study: Over the last decade, robotically assisted thoracic operations have increased. However, providing one lung ventilation can be challenging not only due to size of equipment, but also the unique positioning and limited airway access. Usage of the fiberoptic bronchoscope (FOB) has addressed some of these challenges by providing improved visualization of tracheobronchial anatomy, however, multiple studies have still shown a high incidence of DLT malposition (35-48%) requiring subsequent repositioning even with experienced providers.¹ Hence, we conducted a randomized controlled trial that compared usage of both video double lumen tubes (VDLT) and conventional double lumen tubes (DLT) in thoracic surgery patients.

Materials and Methods: The study was approved by the MD Anderson Cancer Center IRB. All patients gave written consent to participate in the study. The study was a single center prospective randomized controlled trial. The study comprised of 80 patients who were 18 years or older requiring lung isolation for thoracic surgery. Of the 80 patients, 23 patients had surgery performed robotically. All 80 patients were randomized into either VDLT or DLT usage for their surgery.

**Results and Discussion**: Results showed dislodgement requiring correction intervention occurred (7/23, 30.4%), of which (4/7, 57.1%) were in VDLT group and (3/7, 42.9%) were in the DLT group. The provider was able to forewarn dislodgement occurrence (2/4, 50%) in the VDLT group and 0/3, 0% in the DLT group. The prevalence of dislodgment was same in VDLT and DLT groups.

Conclusion: Although the study demonstrated that usage of VDLT can forewarn dislodgement during robotic thoracic surgery given the real-time continuous visualization compared with the intermittent view provided by the FOB, further larger studies are needed to better evaluate both devices in robotic surgery. However, clinically the positioning of the robot, hinders airway as patient may be in the lateral, prone position and the head may be turned 90-180 degrees, making FOB utilization awkward and challenging. The continuous real-time view cannot only facilitate rapid diagnosis, but also potentially allow quicker therapeutic intervention without interrupting ventilation. Therefore, this novel technology may enhance patient safety as continuous visualization can reduce complications from adverse airway events but larger, more comprehensive studies are needed.

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## 07AP01-5

# Use of Dexmedetomidine in Non-intubated Thoracoscopic Surgery

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Background and Goal of Study: Optimal level of sedation and respiratory pattern both play important roles in non-intubated thoracoscopic surgery.¹ Common intravenous anesthetics, fentanyl and propofol, cause respiratory depression. Dexmedetomidine, as a highly selective alpha, adrenergic agonist, exhibits anxiolytic, sedative, and analgesic properties. It is devoid of respiratory depression, and had been approved for non-intubated procedural sedation. The aim of this study was to evaluate its feasibility and safety in non-intubated thoracoscopic surgery. Materials and Methods: We evaluated 33 patients with lung tumors who underwent non-intubated thoracoscopic surgery using a combination of dexmedetomidine and propofol between February 2016 and September 2017. During anesthetic induction, dexmedetomidine infusion was provided at a constant rate of 0.5 µg/kg/hr through the whole procedure. Target-controlled infusion with propofol was administered to achieve a bispectral index value between 40 and 60.

**Results and Discussion**: There was no conversion to tracheal intubation. Intraoperative consumption of fentanyl was 69.7  $\pm$  33.5 µg, and 14 patients (42%) did not require an incremental dose. Eighteen patients (55%) experienced bradycardia during the procedure and required inotropic agents. There were 4 patients (22%) experienced lower oxygen saturation (SpO $_2$  < 90%) and did not sustain for more than 5 min. During surgery, the mean PaCO $_2$  was 43.1  $\pm$  7.4 mmHg, which was generally lower that patients who were maintained without dexmedetomidine.¹ After surgery, dizziness developed in 5 patients, urinary retention in 1, nausea in 7, and 2 patients experienced vomiting requiring medication. During the perioperative period, 15 patients (45%) did not require morphine, including 4 patients underwent lobectomy and 2 segmentectomy.

**Conclusion**: Our study demonstrated that nonintubated thoracoscopic using a combination of dexmedetomidine and propofol is feasible and safe. The analgesic property of demedetomidine may extend into the postoperative period with morphine-sparing effect. It may be provided as an intraoperative adjuvant to reduce opioid related adverse effects and improve postoperative outcomes in nonintubated thoracic surgery.

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## 07AP01-6

Non-intubated video-assisted left cardiac sympathetic denervation with high-flow nasal oxygen for the treatment of hereditary ventricular arrhythmias

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**Background**: Left cardiac sympathetic denervation (LCSD) is an effective second-line therapy for hereditary ventricular arrhythmias. And non-intubated video-assisted thoracic surgery is growing in popularity owing to sparing from side effects of general anesthesia and mechanical ventilation. Here, we reported two cases of non-intubated video-assisted LCSD with high-flow nasal cannula (HFNC; Optiflow, Fisher & Paykel Healthcare).

Case Report: The first case is a 20-year-old man, and the second case is a 34-year-old man. Both patients were diagnosed with catecholaminergic polymorphic ventricular tachycardia (CPVT) and suffered from frequent shocks from implanted cardioverter-defibrillators. Arriving our operating room, the patients were sedated with intravenous midazolam and alfentanil. Thoracic epidural catheter was placed and tested for efficacy. Single bolus injection with bupivacaine and fentanyl was given intraepidurally. After placing the patients in decubitus position, we gave propofol by target controlled infusion. Bispectral index was kept at 60-80. Oxygen flow was increased to 50 L/min after the patients were unresponsive.

No episodes of apnea or desaturation were observed during the procedures. Both patients' vital signs remained stable. There were no intra-operative episodes of ventricular arrhythmias. The operations were performed smoothly.

**Discussion**: Anesthetic management for patients undergoing LCSD could be challenging. In our experience, the combination of thoracic epidural anesthesia and target controlled propofol infusion offered reliable analgesia and unconsciousness with minimal changes on patients' hemodynamic states. The patients reserved spontaneous respiration during the whole surgeries, and excellent oxygenation was provided by HFNC, which is a promising new oxygenation technique. It is nowadays applied in anesthesia for improving safety in awake craniotomy¹, eyes or dental procedures, and in non-intubated video-assisted thoracic surgery.

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Learning points: We demonstrated the safe and successful anesthesia using HFNC in non-intubated video-assisted LCSD for treatment of CPVT. The non-intubated technique avoids abrupt changes in hemodynamic status and allows faster recovery. And the HFNC ensures oxygenation during the operations.

## 07AP01-7

# Retrospective cohort study of postoperative pneumonia comparing volatile versus total intravenous anaesthesia in thoracic surgery

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**Background and Goal of Study**: Postoperative pneumonia is a frequent and severe complication after thoracotomy for pulmonary resection. Several studies have shown contradictory results with regard to a reduction of inflammation and respiratory complications depending on the hypnotic administered. The goal of this study was to compare the incidence of postoperative pneumonia after thoracic surgery when volatile or total intravenous anaesthesia was administered.

Materials and Methods: Medical records of 229 adult patients undergoing elective thoracotomy from January 2011 to May 2017 were retrospectively reviewed. Patients were classified depending on the type of hypnotic: sevoflurane vs propofol. Postoperative pneumonia (POP) and need of mechanical ventilation, length of stay in surgical intensive care unit (LOS-SICU) and overall mortality were analysed. Chi² and Mann-Whitney tests were used to analyse dependent variables by type of hypnotic. Multivariate analysis was performed adjusting by potential confounders. Results and Discussion: Patient characteristics were similar between both groups (Table). Incidence of POP was higher in sevoflurane group (29.5% vs 24.5%, OR 1.13[95% CI, 0.56-2.31]). Likewise, LOS-SICU (4.0 ±11.8 vs 5.1 ± 8.9 days, HR 0.85 [95% CI, 0.63-1.13]), mechanical ventilation (14,3% vs 5.3%, OR 2.47[95% CI, 0.83-7.34]), and overall mortality (10.2% vs 3.3%, OR 3.02[95% CI,0.84-10.85]) showed a higher risk when using sevoflurane.

	Sevoflurane (n=78)	Propofol (n=151)
Age (years)	64±10	64±10
Sex (men/women) (%)	72/28	72/28
FEV <sub>1</sub> (%)	73±20	69±20
ASA physical status (2/3/4) (%)	31/67/3	34/60/5
ARISCAT¹ score	27±19	25±19
RFMDR <sup>2</sup> (%)	42	40

<sup>1</sup>ARISCAT: Assess Respiratory Risk in Surgical Patients in Catalonia risk index. <sup>2</sup>RFMDR: Risk factors for Multi-Drug Resistant Pathogens.

**Conclusions:** Sevoflurane, as compared to propofol, was associated with more incidence of POP in patients undergoing pulmonary resection. An association was also found between sevoflurane and need of mechanical ventilation, LOS-SICU and overall mortality. However, not statistical differences were found in any of them, probably due to the sample size.

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### 07AP01-8

## Predictors of long-term survival after lung cancer surgery

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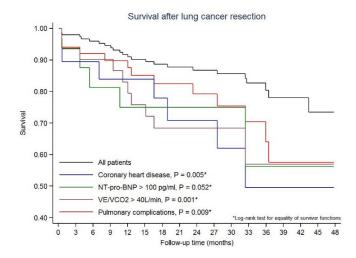
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Background and Goal of Study: Surgery is a key component to any curative plan for non-small cell lung carcinoma but is still associated with high cardio-pulmonary morbidity. In this study, we analyze the impact of patient and procedure related factors on long-term survival after lung resection.

Materials and Methods: Consecutive patients scheduled for lung cancer resection underwent cardiopulmonary exercise testing (CPET) with measurement of peak oxygen uptake (peakVO2) and ventilation-to-carbon dioxide output (VE/VCO2) as markers of aerobic fitness and ventilatory efficiency, respectively. In addition to clinical factors, the cardiac biomarker, - NT-proBNP-, was screened before surgery. Intraoperative interventions were reported and postoperative major cardiopulmonary complications were identified using a modified version of the thoracic mortality and morbidity classification system. A multivariate Cox regression survival analysis was performed to identify the independent predictive factors for long-term survival after surgery.

Results and Discussion: Within 30-days after surgery, 4 of 151 patients died (2.6%), 23 (10%) presented cardiovascular complications and 66 (44%) had pulmonary complications. Median follow-up time was 28.1 months (interquartile range, 15.7 to 35.7). Independent factors associated with lower survival included (Figure 1): 1) ratio of VE/VCO2 > 40L/min (Hazard ratio [HR] 8.3 and 95% confidence interval [95%CI] from 3.4 to 20.2), 2) preexisting coronary artery disease (HR of 3.3 and 95%CI from 3.4 to 8.4), 3) NT-pro-BNP > 100 pg/ml (HR 3.4 and 95% CI from 1.2 to 9.5), 4) the occurrence of postoperative pulmonary complications (HR 2.7 and CI from 1.2 to 6.3). Low preoperative peakVO2, the extent of resection, mechanical ventilation settings and postoperative cardiovascular complications were not associated with decreased survival.

**Conclusion**: The presence of cardiac disease and impaired ventilatory efficiency before surgery as well as pulmonary complications after surgery are predictors of poor survival after lung cancer surgery. Interventions should be designed to target these potentially modifiable risk factors.



## 07AP01-9

# Less Is More: Local Anaesthesia And Musical Sedation In Young High Risk Patient With Anterior Mediastinal Mass In Non-Emergent Surgery

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**Background:** Anterior mediastinal masses involve unique problems when facing general anaesthesia. Extrinsic compression of the airway and cardiovascular structures could involve catastrophic consequences. The presence of previous conditions can associate a higher risk of severe complications, such as cardiac vessel, cardiovascular compression, tracheal compression over 50% and bronchial structure compression.

Case report: 27 year old woman diagnosed with anterior mediastinal mass with paratracheal and subcarinal bilateral extension, in contact with both pleura and infiltrating the main pulmonary artery, ascendant aorta and the cava vein, with important pericardic vessel due to tumour infiltration. She was scheduled for mass biopsy. In a past broncoscopy, sedation with midazolam 1mg carried important desaturation with difficults in recovery.

She was considered a high risk patient, so general anaesthesia was discarded due to the important risk of cardiac arrest and difficult airway management. Before the surgery she obtained 25 points over 26 in anxiety Beck inventory. We explained

the patient the risks of sedative options, and finally she accepted local anaesthesia and musical sedation. During the surgery, anxiety score was 3 over 26. The surgery underwent without incidences. She was discharged from hospital 3 weeks after.

Discussion: All the risk factors make this case a hard challenge for the anaesthesiologist: general anaesthesia should be the last option. When these fatal complications appear in non critical procedures, the anaesthesiologist also has to deal with the existence of a potential disproportionate damage when the surgery is not an emergency. Less is more: in our case, the need of an extracorporeal circulation in case of cardiac tamponade was a plausible consequence, together with the real possibility of impossible intubation. The iatrogenic consequences are not acceptable in terms of risk/benefits in the current surgery.

**Learning points:** - The detection of risk factors in an accurate preoperative evaluation is essential to plan an adequate anaesthetic approach.

- Patients with high risk of complications must be informed of the complications and, if possible, general anaesthesia must be avoided.
- Even though autonomy principle is respected, in case of fatal complications liability of the anaesthesiologist is still controversial.

## 07AP01-10

Association between expression of inflammatory biomarkers induced by surgical stress in diabetic and nondiabetic individuals who undergo lung resection surgery

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Background and Goal of Study: Lung resection surgery (LRS) produces

an inflammatory response which is related to postoperative prognosis. It is hypothesised that diabetes mellitus (DM) is associated with a chronic inflammatory state that is not observed in nondiabetic (NDM) healthy individuals. The goal of the study was to investigate the differences in expression of cytokines induced by surgical stress between DM patients (DMP) and NDM patients (NDMP) in LRS. Materials and Methods: 165 patients who were scheduled for LRS were analysed retrospectly. We classified patients as DMP or NMDP based on the criteria approved by the American Diabetes Asociation<sup>1</sup>. All of them were managed with the same anesthetic protocol. Arterial blood was drawn for measurement of cytokines (IL1, IL6, IL10 and TNFα) at five time-points: baseline, 30 min after initiating one lung ventilation (OLV), at the end of OLV and 6 and 18h after surgery. Concentrations of markers were analysed using Western blot. The correlation between proinflammatory and anti-inflammatory markers was measured using the ratios II -6/ IL-10 and TNF-α/IL-10. Statistical Analysis: Mann-Whitney test and chi-square test. Results and Discussion: Of the 165 patients who were included in the study, 24 patients (14.5%) were preoperatively diagnosed with DM and 141 did not meet DM criteria. No difference was found between markers at baseline, however, DM patients showed higher pro-inflammatory response 30 min after iniciating OLV (IL6 in DMP 3.90 (3.37-4.15)\*, NDMP 3.61 (3.17-3.99)\*) and weaker anti-inflammatory response 18 hours after surgery (IL10 in DMP 0.09 (0.08-0.10)\*, NDMP 0.1 (0.09-0.11)\* / TNF/IL10 ratio in DMP 99.87 (87.24-112.70)\*, NDMP 90.78 (76.96-104.76)\* / IL6/IL10 ratio in DMP 44.76 (33.18-50.23)\*, NDMP 39.96 (31.64-46.58)\*).\*p<0.05 Conclusion: Although patients had the same pro/anti-inflammatory state before surgery, diabetic patients developed more intense pro-inflammatory and weaker anti-inflammatory response after surgery. This could help to explain why diabetic patients have an increased risk of developing serious postoperative complications

## References:

and higher morbidity and mortality2.

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### 07AP01-11

# Anaesthetic management of intrathoracic wire migration: study of a case

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**Background**: Percutaneous fixation of proximal humeral fractures (PHF) can lead to rare complications such as intrathoracic wire migration (IWM). Although debatable, its cause involves bone resorption, respiratory motion and negative intrathoracic pressure [1].

Case Report: An asymptomatic 55-year-old man presented to follow-up consultation two weeks after osteosynthesis of PHF due to trauma. Patient was classified as American Society of Anaesthesia Physical Status class II due to his smoking habits. Past medical history was irrelevant. Study image showed IWM through right second intercostal space, traversing right upper lobe and causing discrete contusion of

lung parenchyma. Haemothorax, pneumothorax or injury of major vessels were not identified. Multidisciplinary evaluation established that it was safe to remove the wire without the need of open thoracic or guided thoracoscopic surgery.

After adequate monitoring, general anaesthesia was induced. Endotracheal intubation was uneventful and anaesthesia maintained with desflurane. Deltopectoral dissection exposed the wire that was grasped and slowly withdrawn. Ventilatory and haemodynamic parameters were adequate throughout the procedure. Chest X-ray confirmed bilateral lung expansion after surgery. Upon awakening, he was asymptomatic and soon transferred to the ward. On the following day, chest X-ray remained unaltered and patient was discharged.

Discussion: IWM is a known surgical complication, particularly with fixation wires or pins around the shoulder. Pain, dyspnea and hemoptysis may be present but more frequently patients are asymptomatic. Pneumothorax, pericardial tamponade, visceral and great vessel lacerations and intraspinal migration are reported complications following percutaneous PHF fixation. IWM can be reduced by bending the free end of the wire and by removing the material as soon as possible. Surgery to remove intrathoracic wire depends on its location and patient clinical condition. Open thoracic surgery is reserved for instable patients and those with heart or pericardial injury. Anaesthetic management may implicate single lung ventilation, drainage of hypertensive pneumothorax and massive transfusion. References:

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**Learning points:** IWM may cause life threatening complications on presentation and during removal surgery. Clinical and radiological follow-up is needed.

### 07AP02-1

# Is there an association between early cognitive decline after cardiac surgery and postoperatively elevated cortisol?: A prospective cohort study

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Background and Goal of Study: Cognition is impaired by the sustained elevation of cortisol levels; therefore, the prolonged and pronounced stress response to a surgical procedure may play an important role in the development of postoperative cognitive decline (POCD). A recent study reported that patients with higher cortisol levels on the 1st postoperative morning after cardiac surgery exhibited an increased risk of early POCD. To gain further insight into the stress response to a surgical procedure as a potential risk factor for early POCD, we measured the perioperative cortisol levels at multiple time points. We hypothesized that higher postoperative cortisol levels are related to the occurrence of early POCD.

cortisol levels are related to the occurrence of early POCD after cardiac surgery.

Materials and Methods: This prospective cohort study enrolled 125 patients undergoing elective cardiac surgery with or without cardiopulmonary bypass (CPB). Patient serum cortisol levels were determined one day before surgery (at 08:00) and on the 1st (at 08:00, 16:00 and 24:00), 3rd (at 08:00) and 5th (at 08:00) postoperative days. A battery of six neuropsychological tests was used to assess the participants two days before the surgical procedure and on the 6th postoperative day. POCD was defined as a decrease in performance of 1 SD or greater between the postoperative and preoperative z scores on at least one neuropsychological test. A mixed-design ANOVA was used to determine the correlations of the perioperative cortisol levels with the occurrence of POCD and with the surgical technique performed.

**Results and Discussion:** Mixed-design ANOVA showed no statistically significant differences in the cortisol levels between non-POCD and POCD patients (F = 0.52, P = 0.690, Fig. 1) or between patients with and without CPB (F = 2.02, P = 0.103, Fig. 2) at the six perioperative time points. Therefore, this study shed new light, revealing that the high postoperative cortisol levels merely reflect the stress response to the surgical procedure, while the real cause of POCD after cardiac surgery involves another mechanism. Additionally, we showed that cardiac manipulation during beating-heart surgery may lead to significant haemodynamic impairment reflected by a pronounced cortisol response, which therefore negates the benefits of avoiding CPB in terms of the stress hormone response.

**Conclusion:** The occurrence of early POCD and the use of CPB were not associated with significantly higher cortisol levels in the repeated measurement design.

### 07AP02-2

# Impact of diabetes on outcomes of cardiac surgery in southeast asian patients

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Background and Goal of Study: Although diabetes is rapidly increasing in Asia and has been shown to be associated with worse cardiac surgery outcomes, no research has been done to study the impact of diabetes on cardiac surgery outcomes in a Southeast Asian cohort [1]. Hence, this study aims to delineate the impact of diabetes in a multi-ethnic Southeast Asian cohort undergoing cardiac surgery.

Materials and Methods: We analysed data from 2831 adult patients undergoing elective cardiac surgery, from 2008 to 2010 at the two main heart centres in Singapore. Perioperative variables and outcomes of diabetics and nondiabetics were compared.

Results and Discussion: Patients with diabetes tended to be older, more obese, Indian, hypertensive and have renal impairment. Compared to nondiabetics, diabetics had a higher relative higher risk for postoperative hyperglycemia (RR 1.575,Cl 1.500–1.654), AKI (RR 1.419, Cl 1.269–1.587), new need for dialysis (RR 2.397, 1.573–3.653), postoperative infection (RR 2.110, Cl 1.231–3.617) and ICU readmission (RR 1.768, Cl 1.253–2.495) (Table 1).

Outcome	Absolute risk/ 1000 diabetics	Relative Risk (95% CI)	Relative Risk (95% CI) in Western Cohort Study	Reference
Postoperative Hyperglycemia	412	1.575 (1.500–1.654)	-	-
Acute Kidney Injury	169	1.419 (1.269–1.587)	1.43(1.26–1.61)	[1]
New Dialysis	23	2.397 (1.573–3.653)	-	-
Postoperative Infection	13	2.110 (1.231–3.617)	2.03(1.13–4.05)	[2]
ICU readmission	28	1.768 (1.253–2.495)	1.39(1.17–1.66)	[3]

**Conclusion**: In conclusion, diabetes is associated with increased risk for renal dysfunction, hyperglycemia and infection after cardiac surgery as compared to nondiabetics, similar to the relative risks of diabetics observed in Western populations. As such, diabetic patients undergoing cardiac surgical interventions should receive special attention during the perioperative period to prevent the identified adverse effects, thereby improving postoperative outcomes of diabetic patients.

### References

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# 07AP02-3

# Role of ethnicity in poorer outcomes after cardiac surgery in southeast asian diabetics

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Background and Goal of Study: Diabetes mellitus is a major health problem worldwide today with the majority of diabetics in Asia. Although diabetes has been shown to be associated with ethnicity and worse cardiac surgery outcomes, no research has been done to study the impact of both diabetes and ethnicity on cardiac surgery outcomes in a multi-ethnic Southeast Asian cohort. Hence, this study aims to delineate the impact of ethnicity on outcomes after cardiac surgery among diabetics in a multi-ethnic Southeast Asian population.

Materials and Methods: We analysed data from 1231 diabetic patients undergoing elective cardiac surgery, from 2008 to 2010 at the two main heart centres in Singapore. Perioperative variables and outcomes of were compared between Chinese. Malay and Indian diabetics.

**Results and Discussion**: Indian diabetics tended to be heavier  $(70.1 \pm 14.3 \text{kg}, \text{p} < 0.001)$ , while Malay diabetics tended to have a higher BMI  $(26.5 \pm 4.5, \text{p} < 0.001)$  and preoperative renal impairment (20.9%, p = 0.022) and Chinese diabetics tended to be older  $(62 \pm 9 \text{years})$ .

Among diabetics, atrial fibrillation (p<0.001) and postoperative infection (p=0.035) were associated with Indian ethnicity, while acute renal failure (p=0.050), new need

	Chinese	Malay	Indian	
Perioperative variables	(n=866)	(n=225)	(n=228)	p-value
Atrial fibrillation %(n)	73.5 (637)	75.6 (170)	89.1 (204)	<0.001
Acute renal failure %(n)	1.6 (14)	4.0 (9)	3.5 (8)	0.050
New need for dialysis %(n)	3.8 (33)	8.9 (20)	5.2 (12)	0.028
Postoperative infection %(n)	2.1 (18)	3.1 (7)	5.2 (12)	0.035
Mortality in 30 days %(n)	0.6 (5)	2.8 (6)	0.0 (0)	0.003

To our knowledge, this is the first such study linking different ethnicities to different adverse outcomes after cardiac surgery in the local Southeast Asian population. Conclusion: Our study identified Indian and Malay ethnicities being associated with poorer outcomes after cardiac surgery likely due to genetic factors and other comorbidities present in each ethnic group.

## 07AP02-4

# Upper gastrointestinal bleeding after cardiac surgery. A case report

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**Background and Goal of Study**: Upper gastrointestinal bleeding is a rare complication that can be observed after cardiac surgery and intraoperative transesophageal echocardiography, but may have serious consequences.

Case report: 73-year old female, scheduled for aortic valve replacement with bioprosthesis due to valve stenosis. Among her pathological background only hypertension, diabetes mellitus and dislypidemia to be mentioned. Surgery took place without further complication. Monitoring was performed by means of transesophageal echocardiography (TEE). After surgery the patient was delivered intubated to the ICU. She remained stable hemodynamically during the first hours with low doses of noradrenaline. Arterial blood sample, ECG and chest ray were normal, and therefore weaning was decided. During the process of weaning we observed important hematemesis. An important clot was seen in gastric fundus as well as traces of fresh blood with no further injuries. The injury was sclerosed with adrenaline without direct vision. Due to persisting of bleeding and hemodinamic instability, the clot could be removed the following day and an important subcardial bleeding injury was clipped, achieving a bleeding stop. The patient remained stable, without further bleeding during the following hours and could be satisfactorily extubated. One week later the patient was discharged with no further incidence.

Results and Discussion: The location of the gastric lesion led us to suspect a lesion secondary to intraoperative TEE as the main cause, given the absence of digestive pathological background. There have been several reports about TEE associated gastroesophageal injury, with an incidence range between 0,03 and 1%. Although TEE is a useful diagnostic tool during open heart surgery, considered relatively safe and noninvasive, the TEE probe is associated with complications such as gastroesophageal injury. Repeated trauma, mucosal hypoperfusion, heparin use and digestive background are the major risk factors. A careful use of the probe, the insert before heparinization, keeping hemodynamic stability and considering EGD before TEE in those patients with background of digestive symptoms could help us to reduce the incidence of this rare but potentially serious complication.

**Conclusion**: Although being a safe technique, we believe that it is essential to take measures that reduce the incidence of gastrointestinal bleeding, due to its potentially fatal consequences.

### 07AP02-5

# Oxygen reserve index predicts early postoperative cognitive dysfunction in off-pump coronary artery bypass grafting

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**Background and Goal of Study**: Postoperative cognitive dysfunction (POCD) is a multifactorial event frequently complicating cardiac surgery. The development of POCD may be associated with perioperative abnormalities of gas exchange, including hyperoxia. Recently, Oxygen Reserve Index (ORI) has been introduced into the clinical practice for non-invasive oxygenation monitoring. The ORI values varying from 0 to 1 correspond to PaO2 of 100–200 mm Hg. The goal of our study was to evaluate whether hyperoxia during cardiac surgery detected by ORI is associated with POCD.

Materials and Methods: Twenty patients who underwent elective off-pump coronary artery bypass grafting (OPCAB) were enrolled into a prospective observational study. Intraoperatively, we measured ORI, hemodynamics and gas exchange at different stages. The cognitive function was assessed using Montreal Cognitive Assessment (MoCA) score at 12 hrs before surgery, and at Days 1 and 5 postoperatively. The decrease in MoCA exceeding 2 points was interpreted as a cognitive decline. The statistical analysis was performed using Mann-Whitney U-test, Spearman's rho correlation and ROC analysis. Data are presented as median (25th–75th percentiles). A p value < 0.05 was regarded as statistically significant.

**Results and Discussion**: Preoperative MoCA score was 24 (22–27) points with a transient postoperative decrease (p < 0.001) at Day 1 after surgery. We found a correlation of ORI after the recruitment maneuver with MoCA score at Day 1 (rho = -0.60, n = 19, p < 0.007). We observed correlation between ORI and PaO2 (rho = 0.41, p=0.002). The ROC-analysis has revealed the cut-off value of ORI exceeding 0.21 as a predictor of early postoperative cognitive decline (AUC 0.80, p = 0.01, sensitivity 83 %, specificity 67%). No such a prognostic value for PaO2 198 mm Hg corresponding to ORI 0.21 was found (AUC 0.60, p = 0.2).

**Conclusion**: The value of ORI > 0.21 during OPCAB may be a sensitive but non-specific predictor of early POCD. Further studies of the role of hyperoxia in development of cognitive dysfunction after cardiac surgery are warranted.

### 07AP02-6

# Acute and catastrophic reactivation of chronic lymphatic leukemia after cardiac surgery

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**Background**: Chronic lymphatic leukemia (CLL) is a common disease among elderly individuals with proliferation of incompetent lymphocytes and accumulation in the bone marrow,liver,spleen and lymph nodes. The estimated survival is 10 – 12.5 years for low-risk patients (stage Binet A);7 – 8 years for intermediate risk (Binet B) and 2.5 – 3.5 years for high risk patients (Binet C).

Cardiopulmonary bypass (CBP) and surgical trauma cause activation of the inflammatory response. This results in changes in counts and properties of lymphocytes that can cause an unpredictable course.

Case Report: A-78-years-old woman was referred for mitral and aortic valve replacement for increase of her dyspnea and NYHA class. Medical history included aortic valve replacement 10 years before for rheumatic degeneration, hypertension, dyslipidemia, chronic atrial fibrillation and CLL-B (stage Binet C) treated with chlorambucyl until 6 months before. Preoperative investigations revealed: 70% of infiltration of the bone marrow (biopsy) and 90% infiltration in myelogram. Laboratory: Hb 11.4 g/L, platelet count 88.000/L and WBC 21x109/L (lymphocytes 18X109/L).

Double valve replacement was performed with mechanical prosthesis. The patient came off CPB easily but early in postoperative time had a major bleeding requering massive transfusion, with low output state, acute renal injury and lower respiratory tract infection. Stability was achieved by fourth day postoperative and she was returned to the ward on anticoagulation with UFH. By fifth day, WBC achieved a total count of 56.940x109/L (lymphocytes 43.720x109/L) and no treatment was ordered because of lack of symptoms.

Late on the eleventh postoperative day, her condition deteriorated to acute pulmonary oedema. Echocardiogram showed an acute right ventricular failure and a severe increase of median transmitral gradient (25mmHg). Pulmonary catheter revealed C.I 1.4 L/min/m2 and a pulmonary capillary wedge pressure of 40mmHg. Laboratory investigation showed 185x109/L of lymphocytes. An acute reactivation of CLL was diagnosed with early thrombosis of the mitral prosthesis and the patient died some hours later.

**Discussion**: Good postoperative outcomes in CLL patients have been reported. Main complications are coagulation disorders and infection. Inflammatory stress of surgery and response to CPB are unpredictable. A good preoperative analysis of the CLL status and carefully monitoring of WBC are required to avoid catastrophic results

### 07AP02-7

# Anesthetic case of cardiac tumor resection associated with post-operative superior vena cava syndrome and stroke

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**Background**: In case of cardio-pulmonary bypass (CPB) assisted cardiac surgery, decision making of CPB separation despite significantly higher central venous pressure (CVP) than pre-CPB CVP, is challenging. Superior vena cava (SVC) syndrome associated with benign cardiac tumor is rare

Case Report: Patient was 65 year-old male (162 cm, 57kg). His chief complaint was respiratory discomfort and close examination of diagnosed COPD revealed lipomatous cardiac tumor, existed extracardiac cavity. The possibility of malignant tumor and patient's wish for operative therapy mandated elective surgery of cardiac tumor. The tumor was located between both atrial wall, inflitrated toward posterior superior vena cava (SVC). Because tumor dissection from RA, LA, SVC was difficult, both atrium and posterior SVC was injured intraoperatively therfore surgically repaired respectively. Post-CPB mean value of CVF was 27mmHg (Pré CVP 7mmHg), which suggested stenosis of SVC. Doppler measurement of SVC flow did not show significant increment. Surgeon did not perform SVC repair due to the absence of edema of upper extremity and face. Post-operative course was successful, but supra-ventricular tachycardia and facial edema developed at Postoperative-day (POD)4. Thereafter SVC syndrome deteriolated and TEE examination detected thrombus from RA to left internal juglar vein. MRI examination detected multiple cerebral and left cerebellar infarction at POD7. Left bracheocephalic vein-RA bypass surgery was performed at POD7, but died at POD9.

**Discussion**: Post-operative pathological examination of cardiac tumor was lipoma with pericardial infiltration and no evidence of malignancy. Separation from CPB was uneventful despite high CVP values. Reoperation finging was about 40 percent stenosis of SVC and the surgeon revealed that SVC should be repaired during second CPB run of first surgery. There are few articles about predictability of SVC syndrome associated with high CVP values at CPB weaning. Therefore we try to focus critical decision making of CPB separation despite high CVP values.

Learning points: In case of high CVP and allowable range of SVC flow during CPB separation, we recommend return to second CPB run and SVC repair should be performed.

## 07AP02-8

# Anesthetic management of a patient with Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA)

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### Background:

Anomalous left coronary artery from the pulmonary artery (ALCAPA) is a rare congenital coronary anomaly that results in altered myocardial perfusion and a left to right shunt. It represents 0.24% to 0.46% of all congenital diseases(1).

In this rare congenital heart defect, the left coronary artery arises from pulmonary artery, instead of branching from the aorta, and extensive collaterization must occur between the right and left coronary system, that drains in a retrograde fashion from the left main coronay artery to the pulmonary artery.

## Case Report:

We present a asymptomatic 35-year-old man scheduled for corrective surgical repair with bypass graft in combination with closure of the origin of the left main coronary artery via the transpulmonary artery.

The anesthetic goals were to ensure adequate right coronary artery perfusion, maintaining optimum preload to ensure an adequate cardiac output, preventing tachycardia for preserving the diastolic period, and to avoid increases in coronary steal by preserving the pulmonary vascular resistance with avoidance of hypocarbia, hiperoxia and alkalosis, for this setting high end-tidal carbon dioxide was provided with controlled fraction of inspired oxygen.

The presence of echocardiography is mandatory for monitoring these cases with special attention to systolic and diastolic function. The presence of diastolic dysfunction, systolic wall motion abnormalities or electrocardiographic changes like ventricular extrasystole should inmediately raise the suspicion of ischemia. The typical echocardiographic findings were present in our patient with mildly reduced ejection fraction, mild left ventricular dilatation, marked dilated intraseptal and epicardial colateral vessels, dilated and tortuous right coronary artery.

### Discussion:

Understanding the ALCAPA physiopathology is important for the anesthetic management in this cardiac repair surgery and for all the surgical procedures in these patients, special attention must be paid to guarantee the myocardial oxygen supply. The anesthesiologist should know the typical echocardiographic findings in these patients and be able to recognizing the early warning signs of ischemia.

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Coronary Artery From the Pulmonary Artery in Adults:A Comprehensive Review of 151 Adult Cases and A New Diagnosis in a 53-Year-Old Woman. Clin Cardiol. 2011 Apr: 34(4):204–10

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### 07AP02-9

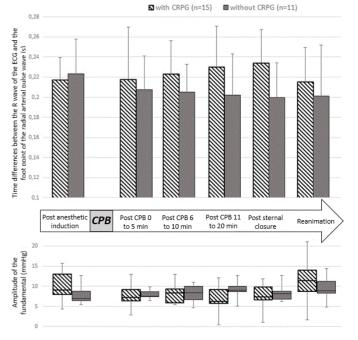
# Detection of central-to-radial arterial pressure gradient (CRPG) after cardiac surgery with cardiopulmonary bypass

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**Background**: Cardiac surgery with cardiopulmonary bypass (CPB) is responsible for CRPG in nearly 30 to 45% of patient [1]. The current study aimed at identifying the occurrence of CRPG by using the pulse wave analysis (PWA) of radial arterial processing.

**Methods**: After approval by IRB, 39 adult patients undergoing elective cardiac surgery with an expected CPB duration of at least 90 min were prospectively included in the study. Arterial pressure by means of a radial artery catheter and ECG were recorded in all patients. A sub-group of 12 patients was selected on a clinical basis for an additional direct measurement of intraoperative aortic pressure. All data were registered and digitized. PWA of radial arterial pressure recordings included calculation of pulse wave velocity and the variability of the amplitude spectrum of the first harmonic. We looked for a correlation between CRPG and PWA by using statistical analysis of variance (ANOVA, p < 0.05).

Results: In the sub-group of 12 patients with direct aortic pressure measurement, 6 patients presented a systolic CRPG greater than 10 mmHg. In this sub-group, both radial propagation time (218.8±35.5 ms vs. 202.3±13.3 ms, p=0.047) and harmonic analysis variability (3.17±0.88mmHg vs. 1.65±0.53mmHg, p=0.006) were correlated with an elevated CRPG. An elevated CRPG could not be adequately predicted by one of these criteria alone, but by the merging of the two criteria. Using this method in the 27 remaining patients without direct measurement of aortic pressure, we were able to identify 15 patients at risk (Fig. 1). We observed that Euroscore was significantly higher (p = 0.035) in these 15 patients.



Evolution of radial propagation time (M ±SD) and Amplitude of the fundamental (Median ±max and min) during CPB for the 2 groups "with" or "without" CRPG (n=26)

**Conclusions**: Using calculation of pulse wave velocity in addition to harmonic analysis variability can help to identify patients at risk of elevated CRPG. Such measurements could avoid the use of inappropriate vasopressors and/or inotropic agents in the early postoperative period. **References**:

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### 07AP02-10

The correlation between intraoperative changes in cerebral tissue oxygenation and the development of postoperative delirium after cardiac surgery

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Background and Goal of Study: Patients undergoing cardiac surgery are at risk to develop postoperative delirium (POD). As POD is associated with prolonged hospital stay, long-term neurocognitive deterioration and mortality, preventive strategies could be valuable. Previous studies showed an association between low regional cerebral oxygen saturation (SctO<sub>2</sub>) during cardiac surgery and postoperative cognitive dysfunction. This study aimed to specifically investigate the association between intraoperative SctO<sub>2</sub> and the development of POD after cardiac surgery.

Materials and Methods: A prospective, observational study was performed in patients (age≥70 years) undergoing on-pump cardiac surgery. During surgical procedure, SctO₂ was measured continuously in a blinded manner using FORE-SIGHT ELITE™ (CAS Medical systems, Branford, CT, USA). Left and right SctO₂ were averaged. Baseline SctO₂ was defined during a 2min period before induction of anaesthesia while breathing room air. At ICU, the presence of POD was assessed using CAM-ICU. The following SctO₂ parameters were calculated for patients with and without POD: lowest SctO₂, absolute and relative decrease in SctO₂ and frequency of cerebral desaturation events (CDE) defined as decrease below 60% and 55% for at least 60sec. Student t-tests and Chi-square tests were executed as appropriate.

Results and Discussion: Ninety-six out of 103 included patients were used for data analysis and 29 (30%) developed POD. The lowest intraoperative SctO<sub>2</sub> was 59±5% in patients with POD and 58±5% in patients without POD (p=0.568). There was no difference in absolute and relative SctO<sub>2</sub> decrease in patients with and without POD (decreasebsolute: 9±5% vs. 10±5%; p=0.478 and decreaserelative: 13±7% vs 14±7%; p=0.436, respectively). The incidence in CDE below 60% and 55% did not differ between patients with and without POD (CDE 60%: 28% vs 39%; p=0.291 and CDE 55%: 7% vs 18%; p=0.160).

Conclusion: No association was observed between low intraoperative SctO<sub>2</sub> and the development of POD after cardiac surgery, suggesting that other strategies than only maintaining intraoperative SctO<sub>2</sub> levels above critical desaturation thresholds could influence the incidence of POD.

# 07AP02-11

Role of peroperative haemodynamic parameters in the development of postoperative delirium after cardiac surgery

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Background and Goal of Study: Postoperative delirium (POD) is common after cardiac surgery where intraoperative cerebral hypoperfusion has been commonly suggested as a potential contributing factor. This study assessed the association between baseline characteristics, parameters indicative for intraoperative hypoperfusion and the development of POD.

Materials and Methods: Patients (age≥70 years) undergoing on-pump cardiac surgery were enrolled in this prospective observational study. POD was determined using CAM-ICU or clinical assessments. Univariate logistic regression was performed to investigate the association between POD development and age, preoperative Mini-Mental State Examination (MMSE), Euroscore II, highest intraoperative noradrenaline dose (μg/kg/h), lowest intraoperative haemoglobin, mean intraoperative mean arterial pressure (MAP) and intraoperative transfusion need. Significant parameters in the univariate analysis (p<0.1) entered the backward multiple regression analysis.

Results and Discussion: Out of the 103 included patients, 96 were used for data analysis. Twenty-nine (30%) patients developed POD. Univariate logistic regression showed an association between development of POD and higher age (OR:1.17 95%CI:1.05-1.30; p=0.003), higher Euroscore (OR:1.23 95%CI:1.02-1.48; p=0.028), lower preoperative MMSE (OR:0.73 95%CI:0.61-0.89; p=0.001) and higher intraoperative noradrenaline dose (OR:1.22 95%CI:1.04-1.43; p=0.014). No association was observed between the development of POD and mean intraoperative MAP (OR:0.93 95%CI:0.84-1.04; p=0.185), lowest intraoperative haemoglobin (OR:0.74 95%CI:0.51-1.08; p=0.116) and the administration of packed cells (OR:2.24 95%CI:0.91-5.50; p=0.066). Independent predictors for POD were age (OR:1.13 95%CI:1.00-1.27; p=0.048), MMSE (OR:0.80 95%CI:0.65-0.98; p=0.031) and highest intraoperative dose of noradrenaline (OR:1.20 95%CI:1.01-1.43; p=0.036).

**Conclusion**: This study demonstrated that the development of POD after cardiac surgery is independently associated with an increased age, a worse preoperative cognitive status and a higher intraoperative need for vasopressors.

## 07AP03-1

Which measurements calculated by rotation thromboelastometry were more accurate for platelet counts, Extem-Fibtem or Clotting elasticity?

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Background and Goal of Study: Extem minus Fibtem calculated by rotation thromboelastmetry (ROTEM™) was reported to reflect the platelet count¹. In contrast, Solomon et. al.² reported that Extem-Fibtem did not provide the accurate platelet counts or indicate their function. They suggested a new parameter-clotting elasticity (CE) via ROTEM™ value - which provides the accurate platelet count and their aggregation. Herein, we describe measurements that provide more accurate for platelet counts and determine the normal range of CE caluculated by A10 (CE A10)

Materials and methods: Patients scheduled cardiac surgery with cardiopulmonary bypass (CPB) were assessed for eligibility. The criteria for transfusion were hemoglobin >9~10mg/dl, fibrinogen > 150~200g/dl, platelet count > 5~10×10⁴/μL. The heparin dose during CPB was administered 300~400U/kg to target activated clotting time (ACT)>450sec. The hemostatic therapy was such as concentrated red cells, fresh frozen plasma, and platelet concentration. We collected the samples in four points, after anesthesia introduction (baseline), just after CPB starting, weaning time from CPB, and the end of surgery.

Results and Discussion: In all, 64 patients were enrolled. We collected 256 points

**Results and Discussion:** In all, 64 patients were enrolled. We collected 256 points of blood samples to compare the relations between platelet counts and Extem-Fibtem A10 or CE. Figure A and B show the correlation graph. Correlation coefficient were 0.68 and 0.82, respectively. Thus. CE was more accurate than Extem-Fibtem A10 with 75, and 50 of CE A10 referring to 10 and  $5\times10^4/\mu$ L, respectively. CE was a new criterion² and can reflect platelet aggregation precisely. CE is calculated as follows: CE =  $(100\times A_{\text{EXTEM}})/(100-A_{\text{EXTEM}})/(100-A_{\text{FIBTEM}})$ . To date, no normal range of CE A10 has been established.

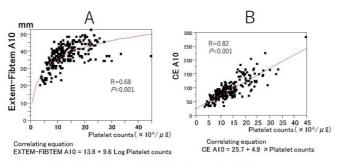


Figure: Correlation between ROTEM™values and platelet counts

A. Effective platelet counts (EXTEM A10- FIBTEM A10) and platelet counts.

B. Clotting elasticity (CE A10) and platelet counts.

**Conclusions:** CE A10 was more accurate than Extem-Fibtem A10 and measured faster than Maximum CE<sup>2</sup>. We also detected the borderline values of CE A10:  $75\sim50$  corresponded approximately were to platelet count  $10\sim5\times10^4/\mu$ L. **References:** 

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### 07AP03-2

Effects of withdrawal of antithrombotic agents on the risk of thrombosis and bleeding in patients undergoing cardiac surgery

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Background and Goal of Study: In patients undergoing cardiac surgery, the withdrawal of antithrombotic agents may prevent bleeding preoperatively, but may also increase the risk of cardiac complications. In a meta-analysis involving six studies, a three-fold increase in the incidence of major cardiac side-effects was observed in patients who quit daily aspirin therapy. Our aim in this retrospective cohort study is to determine the incidence of thrombotic complications that may be associated with discontinuation of preoperative anticoagulants in patients undergoing open heart surgery.

Materials and Methods: Following the Ethics Committee approval, the data of 512 adult patients undergoing elective open hearth surgery with cardiopulmonary bypass between 2013 and 2016 were valuated. Patients treated with dual antiplatelet therapy were included. Clopidogrel and new generation of oral direct anticoagulants were discontinued at least 5 days and prasugrel at least 7 days before surgery according to the American College of Cardiology/American Heart

Association guidelines. Patients were divided into two groups. Group 1 patients (n=255) have suspended their aspirin therapy prior to surgery. Group 2 patients (n=257) have not suspended their aspirin therapy. Heart transplantation, left ventricular assist device implantation and repair of congenital heart malformations were excluded. Demographics, cardiac reserves, preoperative and postoperative Htc levels, the types of anticoagulants, the transfusion of blood products, possible complications and mortality rates were recorded.

**Results and Discussion**: The demographics, the duration of surgery, hospital and ICU stay, CPB time, mortality rate, reexploration rate, the need for RBC, cryopresipitate or FFP did not differ between groups (p>0.05, Table 1). The amount of platelet suspension in the antithrombotic group was significantly higher than in the group without antithrombotic agent (p < 0.05).

Conclusions: Neither reexploration nor transfusion rates were different for cardiac patients on aspirin therapy. Therefore, aspirin didnot increase the incidence of postoperative complications even for cardiac surgery, where heparinization and extra corporeal circulation are necessary. In conclusion, we are in the opinion that aspirin hasnot a negative effect on patient outcomes and should not be discontinued in patients undergoing major surgery.

### 07AP03-3

Lower activated clotting time values in patients undergoing cardiac surgery with retrograde autologous priming of the bypass machine and avoidance of hypothermia

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Background and Goal of Study: Hypothermia and haemodilution increase the Activated Clotting Time (ACT) during hypothermic (<34°) cardiopulmonary bypass (CPB). However, little data is available regarding ACT values when such conditions are avoided during CPB. Recently, a shift in surgical practice has occurred in our Institution towards non-hypothermic (>34°) CPB associated with retrograde autologous priming (RAP) of the CPB circuit. RAP consists in using the patient's own blood as part of the priming volume, thus reducing the extent of haemodilution during CPB. We therefore decided to test the hypothesis that minimizing the effect of hypothermia and haemodilution during CPB would be associated with lower average values of ACT after systemic heparinization.

Materials and Methods: We conducted a retrospective audit of data from 312 patients undergoing cardiac surgery with CPB at Oxford University Hospitals during January to March 2013 (n=144) and January to March 2016 (n=168). We did this in order to compare the 2016 cohort with a similar cohort of patients undergoing CPB before the introduction of RAP into clinical practice. Data analyzed were demographics, temperature, haemoglobin and ACT values during CPB, total amount of heparin administered, type of surgery, surgeons and anaesthetists, total bypass time.

Results and Discussion: None of the 144 patients from the 2013 cohort had RAP (no-RAP). Of 168 patients from the 2016 cohort, 133 had RAP (RAP) and 35 did not (no-RAP). Out of the whole 312 patient group, 87 (27.9%) had hypothermic (<34°) CPB (COLD group) and 225 (72.1%) had non-hypothermic (>34°) CPB (WARM group). Patients in the WARM group were significantly heavier (83.7 vs 78.5 kg, P=0.008) and received more Heparin (27652 vs 25260 Units, P=0.02) but had significantly lower ACT values (499 vs 549 sec, P=0.01) than patients in the COLD group. ACT values were also significantly lower in RAP patients both within the COLD (RAP 495 sec, vs no-RAP 586 sec, P=0.0005) and WARM (RAP 486 sec vs no-RAP 510 sec, P=0.01) groups.

Conclusion: Avoidance of hypothermia coupled with retrograde autologous priming of the CPB pump is associated with significantly lower ACT levels during cardiopulmonary bypass. When the biasing effect of hypothermia and haemodilution is minimized, we suggest that ACT more accurately reflects the degree of anticoagulation produced by systemic heparinization for cardiac surgery.

### 07AP03-4

Thromboelastrometry as a guide for blood management in thoracoabdominal aneurysm surgery

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Background and Goal of Study: Thromboelastometry (ROTEM®) is a viscoelastometric method that tests coagulation in a fast and dynamic way analysing a whole blood sample. The aim of this study was to assess the results of using thromboelastometry as guidance for haemoderivates management in thoracoabdominal aneurysms open repair. The classic transfusion protocols recommend the administration of fresh frozen plasma (PFC) in situations of significant intraoperative bleeding. This non-selective administration has been associated with an increase of postoperative complications, especially pulmonary.

**Materials and Methods**: A prospective cohort study was performed with nonrandomized sampling and using a retrospective control group. We analyzed 29 patients undergoing thoracoabdominal aneurysms open repair, with a

homogeneous distribution between two groups. In 14 patients blood products were transfused according to classic protocols (Group A), while in the remaining 15, thromboelastometric based transfusion algorithms were used (Group B).

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Our main variables were fresh frozen plasma administration, fibrinogen supply and platelet transfusion. Secondary variables were: postoperative adverse events, ICU and hospital stay.

Results and Discussion: For data analysis, Student's T and Man Whitney U tests were used for the quantitative variables. However, for main variables analysis we categorized the data and applied the Chi square test. There was a decreamental transfusion of fresh frozen plasma in group B respect group A (p = 0.017), with 13.4% and 78.5% patients transfused respectively. Fibrinogen was administered in 86.7% of patients in group B, respect 35.7% of patients in group A (p=0.009). There was a rise in the use of platelets in group A 92.8%, respect group B 73.3% (p=0.038). Also 35.7% of patients in group A had postoperative respiratory complications, respect group B with 6.7%, although these differences were not statistically significant (p=0.08). No differences were found in prothrombin complex administration, homologous blood transfusion, UCI or hospital stay.

Conclusion: Based on our experience, the use of a viscoelastic tests such as thromboelastometry, allows a substantial change in the management of blood products, with a decrease in the use of fresh frozen plasma and increase in the administration of fibrinogen. Regarding postoperative respiratory complications it seems that increasing our sample could yield to statistically significant results.

### 07AP03-5

# Perioperative aspirin and coronary artery bypass graft: A cohort study on long-term survival

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Background and Goal of Study: Cardiac surgery frequently provokes an extreme and complex stress and hypercoagulable state, with an increased predisposition to long-term vascular morbidity and mortality. Perioperative aspirin may attenuate the adverse response, provide cardiovascular protection with potential short- and long-term benefits for survival. This study aims to examine the effect of perioperative use of aspirin on long-term mortality in patients undergoing coronary artery bypass graft (CABG).

Materials and Methods: A retrospective cohort study was performed in 9,584 consecutive patients receiving cardiac surgery from three tertiary hospitals. Of all the patients, 4,132 patients undergoing CABG met inclusion criteria and were divided into four groups: with or without preoperative or postoperative aspirin respectively. Long-term mortality were compared with the use of propensity scores and inverse probability weighting adjustment to reduce the treatment-selection bias. Results and Discussion: Among 4132 included patients, 76.5% received preoperative aspirin (PreASA), 23.5% did not (no-PreASA), 92.3% received postoperative aspirin (PostASA) and 7.7% did not (no-PostASA) respectively. The patients taking preoperative aspirin presented significantly more with comorbidities including smoking, diabetes, peripheral vascular disease, angina, hypertension and previous MI. However, the results of long-term mortality showed that the patients taking preoperative aspirin and postoperative aspirin (vs. not taking) were associated with significantly reduced the risk of 4-year mortality (14.8% vs. 18.1%, RR: 0.82, 95% CI: 0.75-0.89, P = 0.0048: 10.7% vs. 16.2%, RR: 0.66, 95% CI: 0.50-0.82, P=0.0029). The results of the present study revealed that the treatment effect with preoperative aspirin regarding the long term survival (15% - 20% improvement) was similar to that observed in other proven medical treatments, indicating that aspirin is an effective drug in improving long-term survival of patients with CABG. (Fig.1. Rates of Survival in patients with preoperative aspirin (PreASA) or nopreoperative aspirin (no-PreASA).

Conclusion(s): This cohort study showed that perioperative use of aspirin was associated with significant improvement in long-term survival in patients undergoing CABG

## 07AP03-6

Different methods to detect incomplete heparin reversal are not interchangeable in children undergoing congenital cardiac surgery

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Background and Goal of Study: The detection of incomplete heparin reversal is an important part of coagulation management because it can lead to major bleeding. A protamine overdose itself can lead to a thrombocyte associated coagulation disorder. This study aimed to compare different parameters to detect incomplete heparin reversal in infants undergoing congenital cardiac surgery that were managed with patient-specific heparin and protamine doses.

Materials and Methods: After approval by the local IEC a total of 36 children undergoing cardiac surgery (STS classes 1-5) between 02/2017 - 06/2017 were

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retrospectively enrolled. Besides the results of the HMS Plus system (Hepcon), pre- and postoperative values of a PTT and ACT and the ratios of the post- to preoperative (PPR) values were analyzed. The ratios of the time to clot initiation (TTC) of the intrinsic pathway assays to heparinase based assays by the TEG®6s and the ROTEM® delta system were also calculated. Ratios above 1 were considered as a sign for incomplete heparin reversal.

**Results and Discussion**: The median age was 196days (39.5-573), the median bypass time was 93min (63-138). Median heparin dose was 455IE/kg (368-646) and median protamine dose was 428E/kg (311-599). 8 patients received a second protamine dose (median 450E/kg).

The heparin-protamine-titration assay (Hepcon) showed incomplete heparin reversal in none of the patients. The PPR for aPTT detected 28/36 (77.7%) and the PPR for ACT detected 10/23 (43.5%). The TTC (R-time ratio TEG®6s) detected 33/36 (92%) patients. There was no correlation between the TTC of TEG®6s and the ROTEM® delta (r=0.089, p=0.72), the PPR of the aPTT ratio (r=-0.04, p=0.81) or the PPR of the ACT ratio (r=-0.26, p=0.21).

In a subset of 18 patients the TTC (CK-time ratio ROTEM®) detected 7/18 (39.9%) whereas the TTC (R-time ratio TEG®6s) detected 17/18 (94.4%). In this subset the level of agreement between the TEG®6s and ROTEM® based assays (complete reversal yes or no) revealed a phi coefficient of 0.193.

Conclusion: Our study shows that the studied tests, including the TEG®6s and the ROTEM® systems, are not interchangeable. The new TEG®6s systems seems to be very "sensitive" in detecting incomplete heparin reversal. Further studies are warranted to analyze if this truly reflects incomplete heparin neutralization. Test results should always be correlated with clinical signs of bleeding prior to therapy.

### 07AP03-8

# How would platelet counts have changed during cardiac surgery with cardiopulmonary bypass, if their postoperative platelet counts were ≥10×10⁴/µL?

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Background and Goal of Study: Blood products are usually ordered preoperatively by cardiac surgeons in our hospital. Platelet Concentrate (PC) costs 158,938 Yen (€1.195) per 20 units in Japan¹ (One unit of blood product is made from 200mL of human blood). Ten to 20 units of PC are minimally transfused for aortic surgery with deep hypothermic circulatory arrest (DHCA). Additionally, PC is expired within four days. So, once we ordered it, PC could not be cancelled and had to be transfused even if the patients' platelet counts were ≥10×10⁴/µL during operation. The aim of this study is seeking to reduce unnecessary PC products ordering. Therefore, we investigated changes of the platelet counts, and figured out the percentage of patients during cardiac surgery if their platelet counts were ≥10×10⁴/uL in the ICU. Materials and Methods: Fifty-four patients scheduled cardiac surgeries without PC transfusion scheduled during operations were recruited and withdrawn blood samples for four times which were at induction of general anaesthesia (GA), beginning of cardio-pulmonary bypass (CPB), end of CPB and admitting to the ICU. We recorded changes of the platelet counts for four points and plotted the percentage of patients whose platelet counts were ≥ 10×10<sup>4</sup>/µL in the ICU.

Results and Discussion: Patients were 69±9 (mean ±SD) years old. The figure showed the trends of platelet counts by bar graphs and percentage of patients whose platelet counts were ≥10×10⁴/µL in the ICU by grey bars. We figured out if their platelet counts were ≥30×10⁴/µL at the time of GA induction or ≥15×10⁴/µL during CPB, 100% of patients were ≥10×10⁴/µL (borderline for PC transfusion in Japan¹) in the ICU.

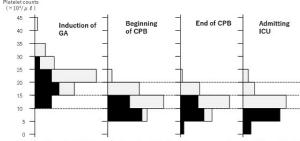


Figure: Distribution of platelet counts at each point of cardiac surgery. A vertical line: platelet counts, A horizontal axis: number of patients (N=54). Black zone: patients whose platelet counts <  $10\times10^4$  µL at the time of admitting ICU, Gray zone: the others. It shows that platelet counts are always  $\cong 10\times10^4$  µL at the time of admitting ICU, if their platelet counts  $\cong 30\times10^4$  µL at the time of GA induction or  $\cong 15\times10^4$  µL at beginning or end of CPB.

**Conclusion:** Cardiac surgeons generally prepare PC based on the operative methods such as aortic replacement with DHAC or redo operation without considering preoperative platelet counts. Our research might suggest unnecessary PC ordering if the patients' platelet counts  $\geq 30 \times 10^4 / \mu L$ , because 66% of Japanese usually have  $\geq 20 \times 10^4 / \mu L$  of platelet counts<sup>2</sup>.

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## 07AP03-9

# Reoperation for bleeding in cardiac surgery: surgical bleeding or coagulopathy?

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**Introduction:** Reoperation is a risk factor that increases the postoperative mortality, morbidity of cardiac surgery patients. Our aim in this study is to investigate the rates of bleeding-induced reoperation, preoperative and intraoperative risk factors for bleeding, and identify causes of bleeding.

**Methods:** Perioperative patient data were collected from hospital electronic system and patient's files between jan-oct2017.We included all cases of adult open heart surgery using cardiopulmonary bypass, except for cases of heart failure surgeries.1200 patients found, 77patient have undergone operation within 24h due to bleeding (%6,4). Patients' information were investigated. We classified the

bleeding as surgical and coagulopathic. Haematoma without ongoing bleeding and/ or oozing was defined as coagulopathic bleeding, and specific bleeding requiring suture or clips was defined as surgical bleeding.

Results: 55were available in the data of patients. 24(43.6%) patients had surgical bleeding, and 31(56.4) patients had coagulopathic bleeding. When the variables (comorbidites, BMI, age, gender, emergency surgery, ASA-coumadin-clopidogrel use, tranexamic asit infusion, initial Hct and creatinin, nadir hypothermia, cross clamp and cardiopulmonary bypass durations, procedures, 30 days mortality) that might be a risk factor in terms of type of bleeding in preoperative and intraoperative period were examined. no related factors were found.

**Discussion:** Our aim was to find factors with significant influence on the risk for reoperation due to bleeding after cardiac surgery and evaluate the consequence of the reoperation. The bleeding was differentiated in coagulopathic and surgical. In total,43,6% of the patients had surgical bleeding. Other series in literature, found 56.4% surgical bleeding ratio (1). It is not possible to distinguish the risk factors because of the low number of patients. However, we can say that the rate of surgical bleeding is lower in our center.

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### 07AP03-10

# Postoperative Thrombotic Effects of Tranexamic Acid in Open Heart Surgery

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Background and Goal of Study: Following the administration of tranexamic acid, the occurance of thromboembolic events is a controversial issue. Controlled clinical trials and meta-analyzes indicate that the incidence of tranexamic acid-associated thromboembolic complications is low. However, when it develops, it may cause catastrophic consequences and increase the postoperative mortality rate. Management of severe perioperative bleeding guidelines from the European Society of Anaesthesiology recently recommended the prophylactic administration of tranexamic acid before Cardiopulmonary Bypass in patients undergoing coronary artery bypass grafting (CABG) surgery. In this retrospective cohort study, we aimed to determine the possible thromboembolic complications due to tranexamic acid as

a prophylactic method in patients undergoing open heart surgery.

Materials and Methods: Following the approval of the Ethics Committee, we analyzed the data of 172 adult patients undergoing open heart surgery with cardiopulmonary bypass between 2013 and 2016. All patients received tranexamic acid at a dose of 30 mg/kg. The patients were divided into 3 groups as multiple-valve surgery (Group 1), coronary bypass alone (Group 2), and coronary bypass with valve surgery (Group 3). The amount of blood transfusion, bleeding in intra-and postoperative period, and the presence of thromboembolic events including myocardial infarction, stroke, pulmonary embolism, deep vein thrombosic were investigated. The hospital stay time and mortality rates were also evaluated.

Results and Discussion: Patient demographics and duration of surgery were not significantly different in groups (p> 0.05, Table 1). Hb, Htc, INR and platelet levels of all groups did not differ significantly (p> 0.05). In total, 7 patients underwent reexploration. Postoperative DVT, stroke and seizure were not seen at all. There was no statistically significant difference between the groups in terms of the amount of blood transfusion, drainage or peritoneal hematoma. The length of hospital stay and the mortality rate did not differ (p> 0.05, Table 2).

**Conclusion**: In patients receiving tranexamic acid infusion at 30 mg/kg dose, reexploration rates remained at 4.1% even after major cardiac surgeries. No thrombosis, stroke or seizure were reported. Our findings support that tranexamic acid is a safe drug which has positive effect on reducing perioperative bleeding.

### 07AP04-1

Myocardium protection against ischemic-reperfusion injury by nitric oxide supply to the extracorporeal circulation line during cardiopulmonary bypass (experimental study)

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**Background and Goal of Study**: The aim of the study was to access the efficiency of exogenous nitric oxide supply to the extracorporeal circulation line for myocardial protection against ischemic-reperfusion injury in acute myocardial infarction simulation during cardiopulmonary bypass (CPB) in the experiment.

Materials and Methods: Acute ischemia was simulated in rabbits (n=20) with subsequent myocardial reperfusion. All animals were anesthetized and mechanically ventilated through nasotracheal tube. The experiment included occlusion of the left coronary artery by its clamping with a ligature for 45 min with subsequent reperfusion for 120 min during CPB. All animals were divided into 2 equal groups: 10 rabbits received nitric oxide supply to the extracorporeal circulation line in a dose of 40 ppm throughout the entire CPB period (the main group); 10 rabbits made up the control group. The ratio of the infarction area to the risk area was determined, and the quantity and nature of ventricular arrhythmias were accessed.

Results and Discussion: NO participates in the implementation of various protective effects of adaptation through a change in the mitochondria functional state. The mechanisms of NO organoprotective effect include the activation of intracellular transmitters and KATP channels with the inhibition of mitochondrial conducting pores as final effectors of preconditioning and mitigation of mitochondrial damage in hypoxia/anoxia. It was established that nitric oxide supply through the extracorporeal circulation line during CPB has a pronounced infarct-limiting effect, the infarct area to the risk area ratio decreased by 15% compared to the control group, p=0,0002. There was also a significant antiarrhythmic effect. A Polytopic and polymorphic ventricular extrasystoles were observed fewer in the main group during periods of ischemia and reperfusion (p = 0.003 and p = 0.012).

Conclusion(s): The data obtained during the experiment indicate the presence of cardioprotective properties of nitric oxide, when it is supplied to the extracorporeal circulation line in the simulation of myocardial ischemic-reperfusion injury, antiarrhythmic effect and the improvement of tissue perfusion during CPB. Intraoperative myocardial protection by nitric oxide in patients operated with CPB should be the object of further clinical research.

### 07AP04-3

# Effect of Vasopressin in Pulmonary Hypertensive crisis model in Rats

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Background and Goal of Study: Pulmonary hypertensive crisis (PHC) is lifethreatening situation in perioperative period of cardiovascular surgery in patients with pulmonary hypertension (PH). Managements of PHC are complex because of limited treatment options and lack of firm strategy. Although vasopressors such as norepinephrine (NE) and vasopressin (AVP) has been used for the management, data to justify the uses are limited. Furthermore, there is no animal model of PHC. In this study, we established reproducible PHC model by exposing monocrotaline (MCT)-induced PH rats to acute hypoxia. Then, we investigated effects of AVP, phenylephrine (PE). NE on the PHC.

Material and Methods: SD rats were given 60 mg/kg of MCT. 4 weeks after, right ventricular systolic pressure (RVSP), systemic blood pressure (SBP) and cardiac index (CI) were measured under mechanical ventilation at FiO2 1.0. Then, PHC was induced with FiO2 0.1 and was defined as RVSP over SBP. Changes of SBP, RVSP and CI in response to administration of AVP (0.5, 1.5µg/kg/h), PE (0.3, 2mg/kg/h), and NE (12µg/kg/h) in PHC were measured. Echocardiography, blood gas, and survival period were also investigated. Isometric tension of femoral (FA) and pulmonary arteries (PA) from PH rats was measured. ANOVA and log-rank test was used to assess all values. Statistical significance was set at p < 0.05.

Results and Discussion: RVSP was increased in MCT-induced PH rats compared to control. PHC induction with FiO2 0.1 was confirmed by RVSP surpassing SBP. PHC also showed RV dilatation and paradoxical septal motion on echocardiography. AVP increased SBP and CI significantly, while decreased RVSP in PHC. Contrary, PE increased both SBP and RVSP, and did not improve CI. NE caused lethal arrhythmia in all animals. Similarly, AVP improved RV dilatation and paradoxical septal motion, oxygenation and survival period in PHC, while PE further worsened. The PHC state was recovered when FiO2 was returned to 1.0. AVP contracted FA but not PA rings from PH rats, while PE did both rings. However, AVP did not relax PA rings pre-contracted with NE from PH rats. Collectively, AVP but not PE and NE improved hemodynamics, cardiac motion, oxygenation and survival period in PHC in rats. The beneficial effects of AVP on PHC might be due to selective increase in SBP but not pulmonary artery dilatation.

**Conclusions:** We reproduced PHC model for the first time using PH rats. AVP but not NE and PE may be useful for PHC managements.

### 07AP04-4

Dronedarone associated with alterations in oxidative status. Experimental study on hypertensive rats

Cardiac Thoracic and Vascular Anaesthesiology

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**Background and Goal of Study**: Our group previously demonstrated that dronedarone has the potential to reverse the left ventricular hypertrophy (LVH) induced by arterial hypertension.1 We hypothesized that one mechanism could be a reduction in the oxidative stress. In order to prove it, we developed a global oxidative stress index (Oxy-Score) in an experimental model of arterial hypertension.

Materials and Methods: adult male spontaneously hypertensive (SHR) rats were randomly divided into therapy group with dronedarone (SHR-D, n=9) and placebo group (SHR, n=9). Wistar Kyoto rats were used as normotensive controls (WKY, n=9). After 14 days of treatment we assessed the following plasma biomarkers of oxidative status: protein carbonyls, thiols, total antioxidant capacity, superoxide anion scavenging activity and reduced glutathione. We calculated a global score

from them using the statistical methodology previously described 2 (Analysis of the normality through the Kolmogorov-Smirnov test, Normalization of required parameters, Standarization of parameters and Calculation of Oxy-Score: □ antioxidants - oxidative damage). Groups were compared using single-factor analysis of variance and post hoc Bonferroni correction. All data were expressed as mean ±SEM, P< 0.05 was considered significant.

Results and Discussion: Regarding individual parameters, there were no significant statistical differences among the three groups. Nevertheless, while analizing the Oxy-Score, we saw interesting differences between SHR and SHR-D group. The SHR Oxy-Score was negative, meaning a predominance of the oxidative damage. Whereas the SHR-D Oxy-Score resulted positive, indicating a predominance of the antioxidant capacity versus the oxidative damage (p<0.001). Conclusion: The better global antioxidant status developed by SHR treated with dronedarone could contribute to their protection in the regression of LVH. References:

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# 07AP04-5 Does dronedarone improve thiol-specific oxidative stress? Experimental study on hypertensive rats

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Background and Goal of Study: Plasma protein thiolation index (PTI) has been studied as a biomarker of thiol-specific oxidative stress in haemodyalized patients (1). On the other hand, dronedarone is an antiarrhythmic agent who acts on multiple on channels. We hypothesized that PTI could also be an oxidative stress biomarker for left ventricular hypertrophy (LVH) and that dronedarone could improve thiolspecific oxidative stress in an experimental model of arterial hypertension and LVH. Materials and Methods: Adult male spontaneously hypertensive (SHR) rats were randomly divided into therapy group (SHR-D, n=9) and placebo group (SHR, n=9). Wistar Kyoto rats were used as normotensive controls (WKY, n=9). After 14 days of treatment, blood samples were obtained by intracardiac puncture. After centrifuging them, we used the plasma to analyse the concentration of thiols and thiolated proteins. PTI was calculated as follows (1): [thiolated proteins] / [thiols]. The parameters were compared using single-factor analysis of variance and a post hoc Bonferroni correction was applied. All data were expressed as mean ±SEM. P<0.05 was considered significant. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain. Results and Discussion: Hypertensive controls showed an increase in PTI compared to normotensive controls. Interestingly, after treatment with dronedarone there was a decrease in PTI in the SHR-D group compared to control group SHR

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**Conclusion:** treatment with dronedarone improves thiol-specific oxidative stress in an experimental model of arterial hypertension and LVH.

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### 07AP04-6

Preconditioning with netrin-1 in Acute myocardial infarction model of rat improves systolic and diastolic left ventricular dysfunction

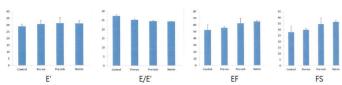
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Background and Goal of Study: Left ventricular (LV) diastolic function does not recover from ischemia/reperfusion(IR) injury like acute myocardial infarction(MI) compared with systolic function and is important to surgical outcome under any type of anesthesia. Netrin-1 is known to improve IR injury at acute MI rat model. To evaluate the improvement of diastolic LV dysfunction as well as systolic function by preconditioning with netrin-1 after acute MI rat model, we examined the changes of echocardiographic parameters and compared with them before and after MI using netin-1.

Materials and Methods: Male, 8-to 9-week-old, Spraque-Dawley rats with a mean body weight of 277.40 ±9.48 g were anesthesized with pentobarbital (65 mg/kg IP) under intubation and positive pressure ventilation. The acute MI model had the ligation of left coronary artery under heart exposure through 4-5th intercostal space then closed. Another group of rat under went sham ligation without tightening the suture around the coronary artery. After 30 minutes of ischemia, netrin-1(5mcg/kg) was slowly injected into MI group but vehicle(normal saline) into another MI group via tail vein. Using Vevo2100, Echocardiographic studies were performed before surgery and After 120 minutes of reperfusion. Echocardiographic parameters matched systolic function with fractional shortening(FS) and ejection fraction(EF), but diastolic function with E' and E/E' ratio.

**Results and Discussion**: MI-vehicle group had significantly attenuated FS, EF and E' compared with sham, while MI-netrin group had significant reduction in attenuation of them compared with MI-vehicle group. MI-vehicle group had significantly increased E/E' ratio compared with MI-vehicle group, while MI-netrin group had significant reduction in increase of it.



**Conclusion**: Preconditioning with netrin-1 makes meaningful improvemet of systolic dysfunction with significant increase with FS and EF after acute MI. Also it helps E' recovery for LV diastolic function and E/E' ratio for left atrial pressure which means diastolic functional recovery.

### 07AP04-7

Short-term treatment with a beta-blocker improves cardiac remodeling in arterial hypertension via inhibition of Akt/NF-kB and NFATc4

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Background and Goal of Study: Our group has previously demonstrated that short-term treatment with esmolol reduces left ventricular hypertrophy (LVH) in spontaneously hypertensive rats (SHRs).1 However, molecular mechanisms of this effect have not been analyzed to date. The present study is aimed to assess whether short-term treatment with esmolol reverses LVH in aged SHR by down-regulation of Akt/NF-xB and NFATC4 activity.

Materials and Methods: Fourteen-month-old male SHRs were treated intravenously with saline as vehicle (SHR) or esmolol (SHR-E) (300 mg/kg/min). Age-matched vehicle-treated male Wistar-Kyoto (WKY) rats served as controls. After 48 hours of treatment, the hearts were harvested and left ventricular tissue separated and processed for Western blot analysis to determine the levels of Akt, NF-kB, NFATc4, Creb1, Serca2a, Erk1/2, Sapk/Jnk. The parameters were compared using single-factor analysis of variance and a post hoc Bonferroni correction was applied.

All data were expressed as mean ±SEM, P< 0.05 was considered significant. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.

Results and Discussion: Esmolol had the following effects on LVH: a) It reversed the levels of p-NFATc4 in SHR rats to the control WKY levels, but did not modify the expression of p-Creb1 and Serca2a in SHR rats; b) It also reversed the levels of p-Akt and p-NF-kB in SHR rats to the phospho-levels of these proteins in WKY rats without modifying p-Erk1/2 or p-SapkJnk.

Conclusion: Short-term treatment with esmolol reverses LVH in aged SHR rat by down-regulation of Akt/NF-κB and NFATc4 activity.

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## 07AP04-8

Esmolol increases nitric oxide availability and e-NOS expression in a porcine model of lung resesction surgery

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Background and Goal of Study: Lung resection and one lung ventilation (OLV) promote inflammatory response and secondary endothelial dysfunction partially due to a decrease in NO levels. Several beta blockers, as nebivolol, have shown to play a role in NO metabolism. However, there is little evidence regarding esmolol, the most widely used betablocker in the surgical setting. Our goal was to study the effects of esmolol on NO metabolism in a lung resection porcine model.

Materials and Methods: 24 mini-pigs were randomly assigned to 3 different groups: CONTROL (C), ESMOLOL (E), or SHAM (S). C and E groups underwent lung resection surgery (LRS). S group underwent a left thoraccotorny without being exposed to LRS or OLV. E group received an intravenous esmolol bolus (0.5 mg/kg) after induction, and then a continuous perfusion of 0.05 mg/kg/min during the whole procedure. Blood samples (BS) and bronchoalveolar lavages (BAL) were collected before surgery, after 2 hours of OLV, after 60 min of two lung ventilation (2LV) and 24h after surgery. At the end of LRS the animals were awakened and after 24 hours, lung and liver biopsies were obtained under general anesthesia. BAL, BS and tissue biopsies were analyzed. NO concentrations were measured by means of Griess test, eNOS and iNOS mRNA levels by PCR and protein expression by Western Blot. ANOVA test was used to determine differences between 3 groups. Values of p<0.05 were considered significant.

Results and Discussion: Esmolol significantly increased NO levels in BS after OLV (p<0.001), 2LV (p<0.001) and 24h postop. (p<0.001) and after 2LV (p<0.039) and 24h postop in BAL (p<0.001). In liver biopsies esmolol augmented eNOS (p<0.012), decreased iNOS (p<0.001) and iNOS/eNOS ratio (p<0.012). In lung biopsies esmolol significantly decreased iNOS expression (p<0.014) and iNOS/eNOS ratio (p<0.002) in mediastinal lobe (not collapsed during OLV) but not in superior left lung samples (collapsed during OLV).

Conclusion: Our results suggest that E could play an important role in NO metabolism upregulating eNOS and increasing NO availability. It may therefore prevent endothelial dysfunction associated with inflammatory responses by LRS and OLV.

## 07AP04-10

Computed tomography in predicting skin-epidural space distance for thoracic epidural catheterization

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Background and Goal of Study: Thoracic epidural analgesia is a choice of analgesic method in thoracic surgery. Thoracic epidural catheter insertion is a technically challenging procedure and has serious neurologic complications. To know skin-epidural distance before the procedure may be helpful to identify epidural space with Tuohy needle. We aimed to compare the distance of skin to epidural space measured by CT scan and Tuohy needle.

Materials and Methods: This prospective study enrolled 25 patients who underwent elective major thoracic surgery and required high thoracic epidural catheterization for postoperative pain management. By using INFINITT PACS software, the maximum and minimum distance of skin to epidural space were measured from the axial slice of the thoracic CT images (Figure 1). With patients placed in sitting position epidural catheterization was performed from the midline of the T4-T5 or T5-T6 intervertebral space. The actual distance was measured from the needle when the epidural space was entered.

Results and Discussion: There was no statistically significant difference between minimum skin-epidural space distance measured from the CT images and actual measurements. However, the maximum distance measured from the CT images was significantly different from actual measurements (p<0.0001). Bland-Altman

analysis for actual distance and minimum skin-epidural space distance obtained from CT images revealed that these two methods could be used interchangeably. Conclusion(s): Preoperative thorax CT images could be used to predict skin to epidural space distance for high thoracic epidural catheterization done from midline approach.

### 07AP04-11

Characterization of the angiogenic potential of human monocytes and programmable cells of monocytic origin (PCMO) under hypoxic conditions

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Background and Goal of Study: Programmable cells of monocytic origin (PCMOs) hold great promise in diseases in which damaged or non-functional cells need to be replaced¹. A pilot study of our group showed that PCMO release proteins involved in angiogenesis and suggested that PCMO inoculation may present a treatment strategy for ischemia-associated illnesses. As reprogramming monocytes to PCMO requires prolonged in-vitro cultivation and stimulation with growth factors, the aim of the present study was to investigate whether hypoxia-stimulated naïve human monocytes are also able to release angiogenic factors.

**Materials and Methods**: Monocytes and PCMO were obtained from peripheral blood as described earlier¹. Enzymatic hypoxia²³ was applied on monocytes or PCMO for 3h (pO₂ <10 mmHg) and 24h after the end of hypoxia the respective conditioned culture medium (CCM) was collected. Assays for lactate dehydrogenase (LDH) release and angiogenesis proteome profiling arrays were used to characterize the cells.

Results and Discussion: 3h of hypoxia reduced the release of LDH in cultures of human naïve monocytes (n=11; p<0.001), while no significant differences in LDH release were observed in PCMO (n=5; p>0.05). 24h after the end of hypoxia period, 28 of 55 (51%) angiogenic proteins were detectable in monocyte-CCM. Of these, 17/28 (61%) were up regulated, 3/28 (11%) were down-regulated and 8/28 (28%) did not show any regulation. In PCMO-CCM, 26 of 55 angiogenesis proteins (47%) were detectable. 12/26 (46%) proteins were up regulated, 6/26 (23%) were down-regulated, while 8/26 (31%) proteins did not reveal regulation by hypoxia (Fig. 1). Proteins with the strongest up regulation by hypoxia were: MCP-1 (92-fold in monocyte-CCM and 53-fold in PCMO-CCM), MIP-1α (35-fold in monocyte-CCM and 15-fold in PCMO-CCM, Fig. 2).

**Conclusion**: Monocytes and PCMO show similarities in the release of several hypoxia-induced angiogenic factors. However, we also detected cell type specific responses to the hypoxic stimulus (e.g. LDH release; protein secretion, Fig. 2), which might determine the suitability of both cell types in the clinic.

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# 07AP05-2

Case Scenario about General Anesthesia Management of Patient with Pulmonary Vein Stenosis underwenCase Scenario about General Anesthesia Management of Patient with Pulmonary Vein Stenosis underwent Balloon Dilatation and Stent Implantationt Balloon Dilatation and Stent Implantation

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**Background**: Pulmonary vein stenosis (PVS) is a rare cardiovascular deformity with quite high mortality. Patients are frequently combined with multiple complications, including hemoptysis, pulmonary hypertension, bronchial venous rupture and cardiac insufficiency.

Case Report: A 58-year-old male patient was diagosed pulmonary vein stenosis (bilateral inferior and left superior pulmonary veins), pulmonary hypertension (moderate-severe,PG=71mmHg) after circumferential pulmonary vein isolation due to atrial fibrillation 2 years ago and underwent pulmonary vein stenosis and stent implantation under general anesthesia. ABP, CVP was monitored, the body surface defibrillation electrodes were stuck, and ECMO was standby. Noradrenaline (0.03ug/kg min-1) was injected during induction for preventing the peripheral vascular dilation induced by general anesthetics. Before balloon dilatation, epinephrine(0.05ug/kg/min) was added and noradrenaline was reduced. Left superior pulmonary vein with most stenosis was selected as the first intervention one. The furosemide(5mg) was administrated twice respectively before procedures of left superior and left inferior pulmonary vein for preventing the preload of left heart with disuse atrophy increasing dramatically after pulmonary vein blood flow recovery. Three metal stents were implanted after each balloon dilatation and the surgery lasted for 4 hours. The patient was fully awake and extubated in OR.

**Discussion**: During surgery normal PCO2 should be maintained to avoid further increase of PAP. Enhancement of myocardial contractility and low preload should be considerated to prevent acute heart failure. ECMO should be immediately constructed once pulmonary vein rupture and cardiac tamponade occur, and the patient should be transferred to open surgery.

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**Learning points:** 1. PVS induced by circumferential pulmonary vein isolation is a rare cardiovascular deformity with quite high mortality. 2. Multidisciplinary cooperation under general anesthesia will certainly benefit such patients. 3. The key points in the anesthesia management for such patients lie in the perioperative airway and circulatory management, risk evaluation, and timely and effective management of all potential complications intraoperatively.

### 07AP05-3

Incidence of intraoperative hypoglycemia during aortic arch replacement using cardioplegic solution with a low glucose concentration: effect of circulatory arrest

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Background and Goal of Study: Cardioplegic (CP) solution with no glucose or a low glucose concentration such as del Nido cardioplegia has recently been used for cardiovascular surgery including aortic arch replacement (AAR). Since glucogenolysis would not occur due to a lack of hepatic blood flow during circulatory arrest in AAR, we hypothesized that the risk of hypoglycemia may increase in AAR using CP solution with a low glucose concentration. We therefore investigated the incidence of hypoglycemia in patients who underwent AAR in comparison with the incidence in patients who underwent a valve operation.

Materials and Methods: This study was a single-center retrospective observational study. We included adult patients in whom AAR or valve surgery was performed during the period from January 2014 to February 2015. The same priming and CP solutions were used in those patients (priming solution and first CP solution: 0% glucose, second and subsequent CP solutions: 0.61% glucose). We obtained data for blood glucose levels that were measured intraoperatively by using arterial blood gas analyzers. We defined hypoglycemia as a glucose level < 81 mg/dl, and we compared the incidence of hypoglycemia in patients who underwent AAR and valve surgery. To assess the timing of hypoglycemia, we divided the duration of anesthesia into 3 periods: 1) before cardiopulmonary bypass (CPB), 2) during CPB, and 3) after CPB.

Results and Discussion: We analyzed data for 237 patients including 84 patients who underwent AAR and 153 patients who underwent valve surgery. The incidence of intraoperative hypoglycemia in patients who underwent AAR was 27%, which was significantly higher than the incidence of 9% in patients who underwent valve surgery (p<0.001). There was a significant difference between the two groups in the risk of hypoglycemia during CPB (p<0.001) but not before CPB (p=0.66) or after CPB (p=0.46). In patients who underwent AAR, hypoglycemia during CPB occurred in circulatory arrest in all cases.

Conclusion: When CP solution with no glucose or a low glucose concentration was used, patients who underwent AAR had a significantly higher risk of intraoperative hypoglycemia than did patients who underwent valve surgery. Hypoglycemia occurred during circulatory arrest in most cases. Our results indicate the need for caution when using CP solution with no glucose or a low glucose concentration for patients undergoing AAR.

## 07AP05-4

Effects of Chronic Statin Use on 30-day Major Adverse Cardiac and Cerebrovascular Events after Thoracic Endovascular Aortic Repair

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Background and Goal of Study: Cardiac and cerebrovascular complications are major causes of morbidity and mortality following thoracic endovascular aortic repair (TEVAR). The benefits of statins have been established, but little is known about their impact on patients undergoing TEVAR. We investigated whether chronic statin use protected against early postoperative major adverse cardiac and cerebrovascular events (MACCEs) after TEVAR.

Materials and Methods: We retrospectively reviewed 211 patients who underwent TEVAR between February 2013 and March 2017 classified into two groups, those with acute aortic syndrome (AAS, n = 79) and those without (non-AAS, n = 132). Patients were subdivided according to preoperative statin therapy for ≥3 months or not. The primary endpoint was 30-day MACCE, defined as new myocardial infarction, stroke, arrhythmia, cardiovascular death, or cerebrovascular death. Acute kidney injury (AKI) occurrence within 48 hours after TEVAR was also evaluated. Multivariate logistic regression analysis was performed to identify independent risk

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factors for adverse outcomes such as MACCEs and AKI.

**Results and Discussion**: Incidence of stroke (0% vs. 7%, p = 0.026) and MACCEs (1% vs. 13%, p = 0.008) was significantly lower in the statin group than in the no-statin group in non-AAS patients, whereas in AAS patients, these values were comparable between groups. Multivariate logistic regression analysis revealed statin use (odds ratio 0.52, 95% confidence interval 0.10-0.62, p = 0.019) and chronic kidney disease (odds ratio 9.82, 95% confidence interval 1.29-75.00, p = 0.028) as independent predictors for MACCE in non-AAS patients. The AKI incidence was significantly higher in the statin group than in the no-statin group in AAS patients (44% vs. 15%, p = 0.018), whereas it was comparable in non-AAS patients.

Conclusion(s): In patients undergoing TEVAR, chronic statin use may protect against 30-day MACCEs in non-AAS patients, but not in AAS patients. It might be rather associated with increased risk of AKI in AAS patients, which warrants further study.

### 07AP05-5

# Risk factors for coagulopathy after Stanford type A acute aortic dissection repair

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Background and Goal of Study: The Stanford type A acute aortic dissection (AAD) carries a high risk of mortality and morbidity, and patients undergoing AAD surgery often bleed excessively and require blood products and transfusions. The goal of this study was to identify the risk factors for coagulopathy after ATAAD repair.

Materials and Methods: This trial was retrospective analysis, and 95 subjects undergoing Stanford type A AAD repair in Beijing Anzhen hospital from January 2013 to December 2014 were enrolled. Patients with TEG-Cl ≤-3 after surgery were allocated to coagulopathy group, whereas patients with TEG-Cl >-3 after surgery were allocated to control group. Multivariate analysis was used to identify risk factors for coagulopathy after surgery.

Results and Discussion:17 (17/95) patients were suffered from coagulopathy after surgery. Patients in coagulopathy group had larger amount of fluid drainage than that in control group. Risk factors for postoperative coagulopathy were activated partial thromboplastin time (APTT) (s) at the end of surgery (odds ratio, OR 0.011; 95% confidence interval CI 0.001 0.021; P = 0.0355), fibrinogen degradation products (FDP) (mg/L) at the end of surgery (odds ratio, OR 0.004; 95% confidence interval CI 0.001 0.007; P = 0.0220) and platelet count (10\*109/L) at the end of surgery (OR -0.02; 95% CI -0.04 0.00; P = 0.0459). The lower risk of postoperative coagulopathy was related to the platelet count at the end of surgery up to 137 (109/L).

Conclusion: Postoperative coagulopathy could be related to the clinical and experimental variables. In a representative sample of Chinese adults undergoing Stanford type-A AAD surgery, the incidence of postoperative coagulopathy was 18% (17/95) and APTT, FDP and platelet count at the end of surgery were independent factors associated with postoperative coagulopathy. Adding haemostatic, such as fibrinogen and prothrombinase complex, is good for improving the recovery of coagulation function to reduce bleeding and postoperative blood transfusion, as well as adding platelet, plasma and other coagulation factors after AAD surgery.

## 07AP05-6

# Association between pulse pressure and acute kidney injury after transcatheter aortic valve implantation

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Background and Goal of Study: Acute kidney injury (AKI), a complication after transcatheter aortic valve implantation (TAVI), has been found to be independently associated with short-term and long-term mortality. Arterial stiffness is reported to be a strong predictor of cardiovascular events and renal dysfunction. As arterial stiffness increases, a pulse wave is transmitted and reflected more rapidly, resulting in higher pulse pressure (PP). PP can be therefore used as an index of arterial stiffness. In this study, we aimed to identify the predictors of AKI after TAVI and clarify the association between PP and AKI after TAVI.

Materials and Methods: This was a retrospective observational study approved by the Institutional Review Board. We investigated consecutive patients undergoing TAVI for aortic stenosis in our institution between October 2013 and August 2017. All procedures were performed under general anesthesia. We used perioperative indirect peripheral brachial PP (pPP) at rest as an index of arterial stiffness. The exclusion criteria were patients in whom pPP was not measured, those with atrial fibrillation, those with severe aortic regurgitation, and those requiring cardiopulmonary bypass as a rescue device or reoperation because of bleeding complications. AKI was defined according to the Valve Academic Research Consortium (VARC)-2 criteria. Univariate and multivariate logistic regression analyses were performed to identify the independent preoperative and intraoperative predictors of AKI. Data are presented as mean ± standard deviation (SD). A two-sided p value of <0.05 was considered statistically significant.

Results: Seventy-four patients were included in this study (mean age, 85.6±5 years; men, 32.4%; transapical [TA] approach, 36.5%). AKI after TAVI occurred in 44.6% (33 patients). In a multivariate analysis, the incidence of AKI was independently

associated with pPP (odds ratio [OR], 1.09; 95% confidence interval [CI], 1.04-1.13; p<0.001) and the TA approach (OR, 9.39; 95% CI, 2.28-38.7; p<0.01, as compared with the transfemoral approach).

Conclusion: High pPP and the TA approach can be predictors of AKI after TAVI.

### 07AP05-9

# Carotid endarterectomy surgery with deep cervical plexus

## Our experience with 800 cases

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Background and goal of study: Carotid endarterectomy (CED) surgery under regional anesthesia offers a series of advantages over general anesthesia. Some of them would be observing neurological symptoms owed to cerebral perfusion deficit, avoiding the expensive cerebral monitoring or reducing the use of intraluminal derivation (ILD). In addition, it brings off more hemodynamic stability and less need of vasoactive drugs. The goal of our study is to describe the efficacy and security of deep cervical plexus block (CPB) in the CED. Furthermore, to analyze the incidence of neurological (NC) and cardiac complications (CC), as well as the reconversion to general anesthesia's rate (GAR).

Materials and methods: A descriptive analysis was conducted among a series of 797 patients (652 men and 245 women), that were operated from CED between 1994 and 2016 in our hospital. 3 cases were excluded due to lack of collaboration or presence of contralateral phrenic paralysis. Under CPB (always executed by the same physician) and sedation with Midazolam and Remifentanil, using clinical monitoring, intraoperative events while carotid clamping were observed. Furthermore, early postoperative complications were taken into account. We analyzed preoperative morbility, GAR's rate, CPB complications, NC, CC and mortality.

Results and discussion: the main morbility factor was arterial hypertension, which was present in 70.1%. The 61.1% smoked, 14.2% suffered from ischemic cardiopathy, 10.4% were diabetic and 10.1% of them were over 80 years. Around 90% tolerated the clamping with CPB without any neurological symptoms; only in 9.2% ILD was necessary. In 0.75% of the CPB some complications were observed (0.25% for respiratory insufficiency, 0.5% for toxicity of local anesthetic). Only 1.6% had RAG (0.6% for pain, 0.8% for neurological symptoms in spite of ILD, 0.3% for respiratory insufficiency). During postoperative recovery, NC were observed in 3.6% cases and CC in 4.1%. Mortality rate was 1.1%.+.

Conclusions: Our experience with 800 cases demonstrates that DEC surgery could be performed with CPB and sedation exclusively due to its low complication rate. Constant clinical evaluation during the procedure benefits from observing any neurological symptoms secondary to cerebral perfusion deficit. Moreover, ILD could be carried out in selected patients. RAG rate is low in our study. Nevertheless, the morbimortality is similar than other bigger case series.

## 07AP05-10

Anesthetic management during open surgery of thoracoabdominal aneurysm repair with extracorporeal membrane oxygenation. Our experience in 13 cases

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**Background and Goal of Study**: Open repair of thoracoabdominal aortic aneurysms (ORTAAA) is one of the most demanding interventions due to the compromise of the visceral and renal blood flow.

Classical approaches to reduce complications derived from ischemia times are simple aortic clamping technique or the left cavities bypass. Extracorporeal membrane oxygenation (ECMO) offers advantages in addition to the reduction ischemia times: intervention on patient's temperature, oxygenation of the patient without ventilating the lungs, or decrease in surgical exposure.

The aim of our study is to describe the anesthetic management of 13 patients undergoing ORTAAA using ECMO, as well as to identify a potential decrease in perioperative complications and predictors of them.

Materials and Methods: A series of cases of 13 patients, collected from 2015 to 2017, submitted to ORTAAA through ECMO. We analyze the predictors of paraplegia and acute renal failure (ARF) using the Pearson Chi-square test.

They were performed through balanced general anesthesia with univent bronchial blocker, invasive monitoring (radial artery, femoral artery, pulmonary artery catheter and central vein catheter), epidural catheter and cerebrospinal fluid drainage system. Vein and femoral artery were dissected and cannulated for circulation by FCMO

The surgical approach was performed by thoracofrenolaparotomy, repairing the aneurysm and installing the prosthesis usually from the thoracic aorta, although it depends on the type of aneurysm (usually type 3), to abdominal aorta, iliac or femoral bifuration.

Results and Discussion: Ischemia time was less than 30 minutes in 6 cases; In 6 cases between 30-60 minutes; and in 1 case above 60 minutes.

Postoperative complications were 2 cases of paraplegia, 11 ARF (2 renal replacement therapy); 3 atrial fibrillation; 3 prolonged mechanical ventilation (2

required tracheostomy), 2 patients died.

ECMO times greater than 90 minutes make 1.2 times (OR 8.33) more likely to suffer RF. 100% of patients with a time greater than 60 minutes had paraplegia, and 16.7% with time less than 30 minutes. These results are not significant (P> 0.04). Conclusion: In our experience, although it would be necessary to increase the sample size in order to establish a statistical significance, we could conclude that performing this surgery by ECMO seems to reduce perioperative complications due to the decrease in ischemia times, what could improve the patient prognosis.

### 07AP05-11

# The prediction of ventricular fibrillation after release of aortic cross-clamping in cardiovascular surgery patients

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Background and Goal of Study: Ventricular Fibrillation (VF) after release of the aortic cross-clamping (ACC) in patients undergoing cardiac surgery is reported to occur in 74% to 96% of cases, and defibrillation by direct current countershocks results in myocardial injury [1]. However, few studies have focused on the risk of VF after release of ACC in cardiac surgery patients. We conducted a retrospective study to clarify the prediction of VF after release of ACC in cardiovascular surgery patients.

Materials and Methods: The ethics committee from our hospital approved this retrospective study. Two hundreds forty consecutive patients undergoing cardiovascular surgery from Jury 2011 to November 2017 were included in this study. Patients who were <18 years of age, emergency surgery, surgery without ACC and patients with cardiac pacemaker were excluded. We divided them into two groups; VF group and NonVF group. We compared ages, sex, heart rate (HR) and duration of QTc in preoperative electrocardiogram (ECG), interventricular septum thickness (IVST), left ventricular posterior wall thickness (LVPWth) and ejection fraction (EF) by preoperative ultrasound examination, preoperative electrolytes (potassium, calcium, magnesium), preoperative beta-blocker usage, CPB duration, catecholamine index (CAI) after release of ACC. For statistical analysis, we used the chi-squared test and unpaired t-test, the receiver operating characteristic curve (ROC) analysis, and p <0.05 was considered statistically significant.

Results and Discussion: VF after release of ACC occurred in 47 patients (19.6%). Duration of QTc in VF group is significantly longer than that in NonVF group (436±32 vs 450±36 msec, p=0.02), and CAI after release of ACC in VF group is significantly higher than that in NonVF group (5.1±3.0 vs 6.3±4.2, p=0.02) (Table1). In multivariate analysis, QTc and CAI are independent factors of VF after release of ACC. In the receiver operating characteristic curve (ROC) analysis, the cut-off value of QTc is 477 msec (Specificity 0.684, Sensitivity 0.574, Area under ROC 0.60). Conclusion: The preoperative QTc and CAI after release of ACC was associated with VF after release of ACC in cardiovascular surgery patients.

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### 07AP06-2

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# Ultrasound-based monitoring of cardiac output after offpump coronary artery bypass grafting

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Background and Goal of Study: Recently, USCOM technique (Ultrasound Cardiac Output Monitor), using advanced Doppler method to assess cardiac output (CO), has become clinically available. However, this technique requires validation in different categories of patients. The aim of our study was to evaluate the accuracy of USCOM compared to prepulmonary thermodilution in patients after off-pump coronary artery bypass grafting (OPCAB).

**Materials and Methods:** We enrolled 14 patients who underwent elective OPCAB into an ongoing prospective observational study. The measurements of cardiac index (CI) based on USCOM ( $\text{CI}_{\text{USCOM}}$ ) and CI determined by thermodilution using pulmonary artery catheter ( $\text{CI}_{\text{TD}}$ ) were performed at seven stages during postoperative period. We calculated Spearman's rho coefficient to assess the correlation between  $\text{CI}_{\text{USCOM}}$  and  $\text{CI}_{\text{TD}}$ . The agreement between methods was evaluated using Bland-Altman analysis with percentage error calculation using overall pairs of data and separately during mechanical ventilation (4 stages) and after tracheal extubation (3 stages).

**Results and Discussion:** Totally, 98 pairs of data were collected. We found significant correlation between Cl<sub>USCOM</sub> and Cl<sub>TD</sub> in overall data (rho = 0.524, p < 0.01) and during mechanical ventilation (rho = 0.683, p < 0.01), but there was no correlation during spontaneous breathing (rho = 0.043, p = 0.79). Bland–Altman analysis revealed bias between ClUSCOM and CITD of -1.09 L/min/ $m^2$  with limits of agreement of  $\pm 1.18$  L/min/ $m^2$  and percentage error of 63%. In a subgroup of stages during mechanical ventilation the intermethod bias was -1.16 L/min/ $m^2$  with limits of agreement of  $\pm 1.15$  L/min/ $m^2$  and percentage error of 67%, in a subgroup after tracheal extubation the bias was -1.00 L/min/ $m^2$  with limits of agreement of  $\pm 1.23$  L/min/ $m^2$  and percentage error of 59%.

Conclusion: Despite significant correlation between Cl<sub>uscom</sub> and Cl<sub>td</sub> during mechanical ventilation after off-pump coronary surgery, USCOM demonstrates poor accuracy with underestimation of CO compared to thermodilution technique both before and after tracheal extubation.

### 07AP06-3

Effects of cardiopulmonary bypass on microvascular reactivity monitored with near-infrared spectroscopy: is there a difference between smokers and non-smokers?

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**Background and goal of the study:** Both cardiopulmonary bypass (CPB) and smoking have been linked with a disturbance of vascular microcirculation. The aim of the present study is to evaluate whether the effect of CPB on microvascular reactivity differs between smokers and non-smokers.

Materials and methods: After approval by the local ethics committee and written informed consent, adult patients scheduled for elective coronary artery bypass grafting surgery were recruited prospectively. Twelve actually smoking patients were included. The control group consisted of 18 case-control matched non-smoking patients. Matched variables were gender, age, weight, haemoglobin and PaO2. Microvascular reactivity was assessed by the vascular occlusion test (VOT), measured by near-infrared spectroscopy (NIRS) (NIRO 200-NX). VOT was performed before the start of CPB and 10 minutes after weaning from CPB. Baseline, minimum and maximum NIRS values, desaturation rate and resaturation rate were recorded. Data were compared using the Wilcoxon and Mann Whitney U test for within and between group differences, respectively.

Results and discussion: Before CPB, there were no significant differences in NIRS values between smokers and non-smokers. After CPB, baseline and minimum values were significantly lower in the smokers group (66 vs 73%, p=0.01 and 35 vs 48%, p=0.03 for baseline and minimum value, respectively). Desaturation rate increased significantly in the smokers group from 12.8%/min to 15.3%/min (p=0.008), whereas no significant change was observed in the non-smokers group (11.8 and 11.6%/min pre- and post-CPB, respectively). Resaturation rates did not change significantly (p=0.09 and p=0.16 for the smokers and non-smokers group, respectively). The use of CPB may cause alterations in the microvascular perfusion and this can lead to impaired tissue oxygenation and organ dysfunction. The results of this study show that these alterations are more pronounced in the smoking population.

**Conclusion:** Given the lower NIRS values and the higher desaturation rate in the smoking group after CPB, we demonstrated that the effect of CPB on microvascular reactivity is more pronounced in smokers that in non-smokers.

### 07AP06-4

# Accuracy and trending ability of the fourth-generation FloTrac/Vigileo system in patients with severe aortic valve stenosis before and after surgical valve replacement

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Background and Goal of Study: Patients with severe aortic valve stenosis (AS) show reduced hemodynamic stability during general anaesthesia and surgery. Continuous monitoring of cardiac output (CCO) may guide appropriate treatment and outcome in this patient group. The fourth-generation FloTrac/Vigileo system (Edwards Lifesciences, Irvine, CA) is a promising, and when compared to pulmonary artery catheter (PAC), less invasive device to measure CCO by pulse contour analysis. The goal of this study was to determine the level of agreement and trending ability of CCO values in patients with severe AS when FloTrac/Vigileo values (CCO-FT) were compared with continuous thermodilution PAC measurements (CCO-PAC) during general anaesthesia before and after surgical valve replacement with a bioprothesis.

Materials and Methods: After ERB approval and written informed consent, 20 patients (59-82 yrs) with AS and scheduled for elective surgical valve replacement with cardiopulmonary bypass (CPB), were enrolled in this study. CCO-FT and CCO-PAC values were recorded every 30 seconds after induction of general anaesthesia before and after CPB until end of surgery. If hemodynamic stability was given, value pairs were selected every 5 to 15 minutes for further analyses. Data were analysed separately before and after CPB. Bland-Altman analyses, and trending analyses (4-quadrant plot, half circle polar plot) were performed. The limit for clinical acceptance was set to a percentage error < 30%. Good trending ability was defined as concordance rates and angular concordance rates > 90%.

**Results and Discussion**: Recording time before cardiopulmonary bypass (CPB) was  $62 \pm 36$  minutes (mean  $\pm$  SD) and  $48 \pm 17$  minutes after CPB. Bland-Altman analyses (fig. 1A) provided the following results (before and after CBP, resp.): Percentage errors 70.2% and 59.8%, bias 0.69 l/min and -0.09 l/min, limits of agreement (-2.5, 3.8) and (-3.6, 3.4). The trending analyses (half circle polar plot: fig. 1B) revealed concordance rates of 50.9% and 57.1%, and angular concordance rates of 48.7% and 61.9%.

**Conclusion**: This study revealed poor accuracy and trending ability of the FloTrac/ Vigileo system compared to CCO-PAC in patients with severe aortic stenosis. Although there was a slight improvement after surgical valve replacement, the results were far behind acceptable limits for clinical application.

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### 07AP06-5

# Intraoperative Doppler echocardiography of pulmonary venous flow is useful in predicting reoperation in pulmonary artery banding

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Background and Goal of Study: Bilateral pulmonary artery banding (PAB) is used to treat congenital heart disease in some high-risk neonates. Until recently, the appropriate PAB size depended on pulmonary artery pressures, partial pressure of oxygen in the arterial blood (PaO<sub>a</sub>), and stable hemodynamics. However, high reoperation rates exist due to insufficient or excessive restriction of pulmonary blood flow. Doppler echocardiography is effective in quantitatively evaluating pulmonary blood flow. We hypothesized that the pulmonary venous velocity time integral (PV-VTI) in transesophageal echocardiography (TEE) during bilateral PAB surgery can predict the need for reoperation.

Materials and Methods: From January 2011 to September 2016, 22 patients with congenital heart diseases underwent bilateral PAB at our hospital. We investigated PV-VTI before PAB (pre-VTI) and after PAB (post-VTI) from the intraoperative TEE record. The primary outcome was reoperation within 3 months after the initial PAB surgery. Patients who underwent reoperation due to excessive pulmonary blood flow restriction were in the debanding group. Patients who underwent reoperation due to insufficient pulmonary blood flow restriction were in the rebanding group. We compared the two groups to a no-reoperation group. We retrospectively examined the association between the PV-VTI ratio (post VTI / pre VTI) and incidence of reoperation. Continuous variables were evaluated using the Student's t-test, and categorical variables were evaluated using Fisher's exact test for statistical analysis. P < 0.05 was considered statistically significant.

**Results and Discussion**: In the no-reoperation group, the pre-VTI was  $64.7 \pm 22.3$ cm, and the post-VTI was  $36.5 \pm 10.7$  cm. In the debanding group, the pre-VTI was  $70.0 \pm 20.4$  cm, and the post-VTI was  $29.7 \pm 10.7$  cm. In the rebanding group, the pre-VTI was  $60.5 \pm 23.9$  cm, and the post-VTI was  $46.1 \pm 12.5$  cm. In the debanding group, the PV-VTI ratio was significantly reduced (debanding [0.41 ± 0.07] vs. no-reoperation [0.57  $\pm$  0.12], p = 0.01). In the rebanding group, the PV-VTI ratio showed a tendency to increase (rebanding [0.78 ± 0.10] vs. no-reoperation  $[0.57 \pm 0.12]$ , p = 0.05). This study suggests that the PV-VTI ratio may be useful to determine the optimal PAB size in bilateral PAB surgery.

Conclusion(s): Intraoperative Doppler echocardiographic PV-VTI ratios using TEE

during bilateral PAB surgery, is effective in predicting the need for reoperation.

## 07AP06-6

## Perioperative cerebral oxygen saturation complexity in predicting cardiac surgical outcomes

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Background and Goal of Study: By using brain as a vital organ, cerebral nearinfrared spectroscopy (NIRS) is widely studied for its association with major organ morbidity and mortality. The complexity of biosignals, such as heart rate or intracranial pressure, was applied to predict poor clinical outcomes. The cerebral NIRS signals complexity is proved to correlate with mortality in critically ill preterm infants. However, we had little information about the prognostic effect of cerebral oxygen saturation complexity. The aim of this study is to determine whether the complexity of the cerebral NIRS signals can better predict the clinical outcomes in cardiac surgery

Materials and Methods: Total 80 patients scheduled for cardiac surgery were reviewed retrospectively. Cerebral NIRS monitor was applied routinely to measure perioperative cerebral oxygenation in cardiac surgical patients. We used multiscale entropy (MSE) analysis to evaluate the complexity of cerebral oximetry values. Baseline and mean values of intraoperative cerebral oxygenation were also recorded. Independent t test, ROC analysis, and logistic regression were applied to exam the correlation to major organ morbidity and mortality

Results: Among major organ morbidity and mortality, the complexity of cerebral saturation was only correlated with adverse neurological outcomes. The patients with postoperative neurological complications had significant higher cerebral oximetry complexity (p < 0.001), lower perioperative mean oximetry value (p = 0.04), but had no difference in baseline cerebral saturation (p = 0.08). Besides cerebral oximetry complexity was an independent predictor of adverse neurological outcomes (n < 0.001)

Conclusion: Complexity of perioperaitve cerebral saturation can be applied to predict the clinical neurological outcomes better than baseline or average intraoperative cerebral oximetry values can in cardiac surgical patients.

### 07AP06-7

Comparison between CO measurement methods on cardiac bypass grafting surgery: uncalibrated pulse wave analysis vs aortic Doppler

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Background and Goal of Study: High-risk patients undergoing major surgery may benefit from accurate measurement of cardiac output (CO) during the perioperative period. The goal of this study was to compare CO measurements by FloTrac/ Vigileo (COFT) and PRAM/Mostcare (COMC) versus aortic Doppler flow (COAD) using transesophageal echocardiography (TEE) in patients undergoing coronary artery

Materials and Methods: After approval of ethical review board, all consecutive patients scheduled for coronary artery bypass grafting were included. Exclusion criteria were: cardiac rhythm disturbances, aortic valve disease, significant subclavian artery stenosis and contraindication for TEE use. Simultaneous CO measurements were performed after induction of anesthesia (T1), before cardiopulmonary bypass (CPB) (T2), after CPB (T3) and at end of surgery (T4). For each time, more than one set of measurements was carried out. For the comparison of CO measurements Bland-Altman method was applied (1). The percentage of error (PE) was calculated as described by Critchley and Critchley. We considered a PE of 30% limit as acceptable

Results and Discussion: A total of 189 pairs of measures of 27 patients were analyzed (6,96+/-1,3; 3 to 8 per patient). For COFT vs COAD, the bias was -0,524 litre min-1 (IC 95% -2,88 to 1,83), precision 1±0,84 litre min-1 and PE 54,89%. For COMC vs COAD the bias was -0,015 litre min-1 (IC 95% -2,993 to 2,963), precision 1,16±0,98 litre min-1 and PE 73,94%.

Conclusion: COFT and COMC measurements showed a percentage of error out of the acceptable range compared with COAD in patients undergoing coronary artery bypass grafting.

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Minimally invasive hemodynamic monitoring and BIS/burst suppression monitoring during endovascular treatment of descending thoracic aortic dissection

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Background: Traumatic aortic dissection is associated with high rates of morbidity and mortality, but rates are lower for endovascular treatment. Hemodynamically, it can be challenging to maintain arterial hypotension during prosthesis placement without compromising noble organ perfusion. The combination of minimally invasive hemodynamic monitoring (MIHM) and monitoring for BIS and burst suppression (BS) allows to maintain adequate cardiac output and brain perfusion during missive hypotension

Case Report: A 68-year old male patient reported a bicycle fall 10 days previously Dissection of the descending thoracic aorta (Crawford I) was detected on chest CT Admitted for endovascular correction, the patient was monitored with MIHM, BIS, SpO, and cardioscopy (HR 59 bpm; IAP 184 x 99 mmHg). General anesthesia was formed with fentanil, etomidate, cisatracurium and sevoflurane (CO ~2.5 L.min m2-1; BIS ~40; BS 0). Targeted hydration was guided by the systolic volume variation (SVV). After prosthesis placement: CO 1.7 L.min-1.m2-1; VVS 7%. Dobutamine was nitiated (2.7 g.kg-1.min-1) and CO increased to 2.5 L.min-1.m2-1. To prevent stent dislodgement, the patient was started on sodium nitroprusside, yielding a MAP of 47-58 mmHg and CO of 1.8L.min<sup>-1</sup>.m<sup>2-1</sup>. The dobutamine dosage was increased (5 g.kg<sup>-1</sup>.min<sup>-1</sup>), yielding a CO of 3.1 L.min<sup>-1</sup>.m<sup>2-1</sup>, with BIS 37-43 and BS 0. After prosthesis placement, nitroprusside was stopped, vielding a CO of ~5.0 L.min<sup>-1</sup> m2-1 and a mean AP of 116 mmHg. ABG test findings after the procedure were normal. After emergence, displaying no strength deficit in the limbs, nor cognitive dysfunction, the patient was transferred to the ICU.

Discussion: In addition to depth of anesthesia, BIS assesses brain perfusion through BS. In the present case, MIHM guided the maintenance of adequate cardiac output during permissive hypotension

Learning points: The combination of MIHM and BIS monitoring helped ensure adequate brain perfusion in a hemodynamically unfavorable scenario.

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### 07AP06-9

## Right ventricular strain as a predictor of vascular filling responsiveness in cardiac surgery

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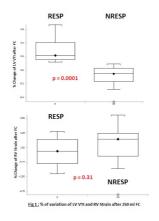
Background and Goal of Study: Fluid infusion to optimize cardiac output (CO) is a challenge during cardiac surgery (CS). There are no accurate indices to determine fluid responsiveness in this setting (1). No study has examined the accuracy of intra-operative right ventricular longitudinal strain (RVLS) (2, 3) in determining preload dependence during a fluid challenge (FC). We hypothesized that changes in RVLS could predict preload dependence during a FC in CS patients.

Materials and Methods: We conducted an observational, prospective study in CS patients. Measurements were conducted using TEE after general anesthesia and before sternotomy (GE Vivid S7). We recorded LVEF, RV indices (pulsed tissue Doppler S rate (S'), PASP, RV isovolumic acceleration (IVA)) and TVI. Measures were performed before and after a 250ml FC. Responders (RESP) were defined as an increase of 10% of TVI. RESP and nonresponders (NRESP) were compared by Student-t and Chi<sup>2</sup> tests (p<0.05 significant).

Results and Discussion: 37 patients (M/F:28/9) were included. Mean age was 66 +/-9.6 years old. Mean LVEF was 61.6%, 26 patients (74.3%) were NRESP. Mean RVLS values were: -18.12 +/-2.31% (CI95 [-20.05; -16.19]) in RESP vs -18.5 +/-4.92% [CI95 -20.58; -16.42] in NRESP before FC (p=0.38), and of -16.37 +/- 4.9% (Cl95 [-12.26; -20.48]) in RESP vs -17.7 +/- 4.02% (Cl95 [-16; -19]) in NRESP after FC (p=0.22) (fig 1). There were no differences in S' values in RESP (8.47, Cl95 [6.98; 9.97]) vs NRESP (8.05, Cl95 [7.18; 8.93], p=0.29). There was a significant difference in IVA values in RESP (2.68 Cl95 [2.1; 3.27]) vs NRESP (3.45, Cl95 [2.69; 4.21], p=0.04). This study is the first to examine strain values as a dynamic index using a FC. Increasing preload using a 250ml FC did not modify RVLS in cardiac surgery patients under general anesthesia and mechanical ventilation However, we observed a non-significant increase (deterioration) of RVLS in NRESP

Conclusion: Considering the limits of this study, RVLS cannot be used as a dynamic index of fluid responsiveness.

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### 07AP06-10

## Deficits in nonlinear EEG synchronisation during open heart surgery: A pilot exploratory work

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Background and Goal of Study: Postoperative cognitive dysfunction has been reported in 50% of patients after cardiac surgery. Dysfunction in nonlinear interactions between brain network regions have been previously shown in patients with cognitive deficits. The aim of this study was to explore whether such changes in nonlinear interactions can be detected during cardiopulmonary bypass (CPB). Materials and Methods: After approval by local ethics comity & informed consent.

5 similar patients (2M-3F,age:53-81,ASAIII-IV)were included.Anesthesia was provided using propofol-remifentanil in TCI mode and standard neuroprotection technics (hypothermia & MAP>60mmHg).We have analysed frontopolar homologous EEG recordings (using 10-20 system of electrode placement). We used the NeuroSENSE monitor, recording at 256Hz with the WAVcns function to help maintain the depth of anaesthesia throughout surgery at the recommended level (between 40-60). We have selected two one minute epochs of EEG data, one several minutes before cannulation and a second after beginning of CPB.

Results and Discussion: The Morlet wavelets power spectrum and the magnitude of the wavelet cross spectra, between the homologous frontopolar recordings, show no significant differences on the results produced for the EEG epoch before and after CPB. However, 4 of 5 cases show a drop in the magnitude of the Crossbispectrum (a technique assessing nonlinear interactions) that ranged between 54-93% (p<0.04) in the post CPB EEG epoch. The significant drop in the magnitude of the Cross-bispectrum revealed in the post-CPB EEG epochs, in comparison to the pre-cannulation EEG findings, suggests a selective relative attenuation in the intensity of nonlinear brain interactions. These findings were not reflected in the wavelet spectral and cross-spectral analysis, in keeping with a consistent depth of anesthesia throughout surgery. No changes in the magnitude of the crossbispectrum interactions were seen in one of the 5 cases, militating against the differences found in the remaining patients being a reflection of the cooling effect on brain function.

Conclusion: We show evidence of dampening of nonlinear interactions between homologous frontopolar areas on EEG recordings during CPB. None of the remaining linear quantitative estimates show significant changes. This finding needs further confirmation on a larger cohort of patients while exploring if this technique correlates with negative cognitive outcomes

## 07AP06-11

## Differences between mixed venous oxygen saturation and regional cerebral oxygenation in diabetes mellitus

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Background and Goal of Study: The cerebral tissue oxygen-saturation (ScO<sub>2</sub>) is normally about 10% lower than the central venous oxygen saturation (SvO<sub>2</sub>) due to the notably high oxygen extraction of the brain. The micro and macroangiopathies in diabetes mellitus may increase the physiological saturation gap between SvO. and ScO2 (gSO<sub>a</sub>). Our aim was to evaluate how diabetes mellitus affects ScO<sub>a</sub> and gSO<sub>2</sub> during the different phases of a cardiac surgery.

Materials and Methods: In a prospective consecutive descriptive manner, two groups of patients less than 80 years of age with no history of smoking were involved. Patients with type 2 diabetes mellitus (n=52) and control patients without T2DM (n=107) were studied with or without applying cardiopulmonary bypass (CPB), ScO, was measured by using near-infrared spectroscopy and SvO, was determined by analysing of central venous blood gas samples. ScO<sub>2</sub> was registered before and after the anaesthesia induction, at the beginning and at the end of the CPB procedures, or during the OPCAB procedure, and following sternal closure. SvO<sub>2</sub> data were also obtained simultaneously under each condition following the anaesthesia induction. Normocapnia was maintained during the whole procedure by ventilation and by using pH-stat management during CPB.

Results and Discussion: SvO. did not differ between the T2DM and control patients at any stage of the surgery. Conversely, the ScO2 values were lower in patients with T2DM before anaesthesia induction than those obtained in the controls (60.4±8.1%[SD] vs. 67.2±7.9%, p<0.05) and this difference endured in all stages of the surgery. After anaesthesia induction, the gSO<sub>2</sub> was significantly higher in patients with T2DM than in the control population (23.42±1.5% vs. 15.79±1%, p<0.05). The gSO<sub>2</sub> increased at the beginning of the CPB both in the T2DM and control patients. However, no significant change was observed in gSO<sub>2</sub> during the OPCAB surgery, with uniformly lower values maintained in the Group T2DM. The lower ScO<sub>2</sub> in patients with T2DM indicates impaired microcirculation consequently increasing gSO<sub>2</sub>. Although the SvO<sub>2</sub> is a gold standard parameter to assess global oxygen balance, this increased gap precludes the estimation the regional oxygen

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demand and thereby diminishing the diagnostic value of  $SvO_2$  in T2DM patients. **Conclusion**:  $SvO_2$  is not suitable to detect cerebral tissue oxygen balance in the presence of T2DM, particularly when cardiac output is high or oxygen consumption is low

# 07AP06-12

## Noninvasive cardiac output monitoring: pulse wave transit time (PWTT) versus pulse waveform analysis during elective cardiac surgery

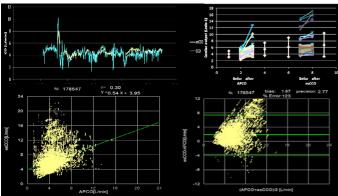
Lorsomradee S.1, Lorsomradee S.1

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Background and Goal of Study: The newest noninvasive method for estimated continuous cardiac output (esCCO) measurement uses a technique based on the relationship between pulse wave transit time (PWTT) and stroke volume. The noninvasive device provides esCCO measurements using the routine electrocardiogram (ECG), pulse oximeter wave, and arterial blood pressure. This study evaluated the overall efficacy of noninvasive esCCO using PWTT compared with the arterial pressure contour analysis (APCO) during cardiac surgery

Materials and Methods: Twenty elective cardiac surgery patients were received routine monitoring. The radial arterial blood pressure were attached to a sensor (FloTrac, Edwards Lifesciences, Irvine,CA) has a bifurcated cable with one going to the BSM-9101 (Nihon Kohden, Tokyo, Japan) bedside monitor to display routine arterial blood pressures and esCCO, and the other going to the Vigileo monitor to analyze for the APCO and SVV. All hemodynamic data including bedside monitor, vigileo and esCCO will be automatically recorded simultaneously into the attached computer during the entire cardiac operation.

Results and Discussion: The esCCO data was frequently interfered with intermittent electrocauterization and cardiac surgical manipulation which resulting the ECG-oxygen saturation signal interferance. A total of 178,547 pairs of simultaneous cardiac output measurements were recorded. The esCCO showed a poor correlation with the APCO (R = 0.3; esCCO = [0.54\*APCO] + 3.95). Bland-Altman analysis showed poor overall agreement between the two methods. Bias (limits of agreement) was 1.87, precision was 2.77, and % Error was 123. However, fluid challenge test increase APCO 34.1% ± 18%, whereas it increase esCCO by 13.3% + 11%



**Conclusion**: The esCCO showed a poor correlation with the APCO during perioperative hemodynamic instability of cardiac operation. However, the trend changes after fluid challenge test were in the same direction. **References**:

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### 07AP07-

Treatment of vasoplegic syndrome during cardiopulmonary bypass with methylene blue restores hemodynamic function and affects the overall survival: a 10-years retrospective large-volume cohort study

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**Objective:** Vasoplegic syndrome during cardiopulmonary bypass is associated with increased morbidity and mortality after cardiac surgery. The aim of this retrospective large-volume cohort study was to evaluate the effect of methylene blue administration on hemodynamic function during cardiopulmonary bypass. **Methods:** In a total cohort of 9356 patients undergoing cardiac surgery with

cardiopulmonary bypass between 2006 and 2016, 1172 adult patients developed a vasoplegic syndrome. The Vasoplegic syndrome was defined as: MAP < 50 mmHg, Norepinephrine > 0.3  $\mu g/kg/min$  and Vasopressin > 1 IU/h simultaneous. The methylene blue group with 221 patients received 1,88 mg/kg (1.61-2.14 interquartile range) methylene blue solution as single short infusion of 20 minutes. The authors collected data on preoperative and intraoperative variables as well as postoperative outcomes. For comparisons between the MB and non MB-groups, chi-square or Fisher's exact tests were used for categorical variables and Student t tests or Wilcoxon rank sum tests were used for continuous variables, as appropriate. Survival times were analyzed with the Kaplan-Meier method.

Results: Patients of the methylene blue and non-methylene blue groups did not differ regarding basic characteristics such as age, gender, BMI, type of surgery and emergency status. Overall cardiopulmonary bypass time was 155 minutes (112;210). Methylene blue application resulted in a continuous increase of mean arterial pressure and decrease of vasopressor need. In contrast, a continuous increase for non-methylene blue patients was not observed. Regarding secondary organ function, no significant increase of inflammatory markers and lactate levels was observed. Liver enzymes, creatinine levels and Horowitz indices remained within normal postoperative ranges and did not differ between groups. Overall survival was significantly higher in the methylenblue-group (114 versus 107 days; 0.33;1.8).

Conclusion: For the first time we show in a large patient collective that methylene blue restores hemodynamic function during cardiopulmonary bypass in case of vasoplegic syndrome. It significantly increases mean arterial pressure while vasopressor support decreases, apparently without deterioration of secondary organ dysfunction. Moreover, hospital survival was significantly higher in methylenblue-group. Therefore the intraoperative application of methylene blue is warranted in therapy refractory vasoplegic syndrome.

### 07AP07-2

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## Postoperative patency of right internal jugular vein after neck cannula insertion in patients undergoing minimally invasive cardiac surgery

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Background and Goal of Study: The number of patients undergoing Minimally

Invasive Cardiac Surgery (MICS) is increasing each year. MICS procedures on atrioventricular valves are usually performed with approach from right anterolateral minithoracotomy. This surgical approach has essential impact both on anesthesia techniques and cardiopulmonary bypass (CPB) settings. Neck venous cannula of CPB is inserted through the right internal jugular vein (RIJV) into the superior vena cava both for partial and total bypass. The investigators hypothesize, there is no significant difference in postoperative patency of RIJV assessed by ultrasound in patient undergoing cardiac surgery with or without neck cannula insertion for CPB. Materials and Methods: Adult patients undergoing cardiac surgery both from conventional sternotomy without neck cannula and from right minithoracothomy reguiring neck cannula insertion into the RIJV were enrolled into the prospective observational study during selected study period. Patients in both groups (Neck cannula group - NC group and Central venous catheter only group - CVC) were examined by ultrasound (US) preoperatively before cannulation of RIJV, than 7th postoperative day (POD) and in case of any new pathology 3 month after surgical

observational study during selected study period. Patients in both groups (Neck cannula group - NC group and Central venous catheter only group - CVC) were examined by ultrasound (US) preoperatively before cannulation of RIJV, than 7th postoperative day (POD) and in case of any new pathology 3 month after surgical procedure. Complete, partial and no compresibility of RIJV as an equivalent of absent, partial or complete vein thrombosis were recorded at each US examination in both groups. Also the size of neck cannula, the number of attempts during cannulation and total time of insertion of all catheters were recorded and compared between the groups, futhermore these data were correlated with US findings on RIJV.

Results and Discussion: Altogether 107 patients (NC group: n=56; CVC group: n=51) were enrolled during study period. No statistically significant difference was detected in rate of partial thrombosis between the groups, significantly higher (p<0,05) rate of total occlusion of RIJV was recorded in NC group (n=3; 5%) on the 7th POD but with complete recanalization in all 3 cases at three-month US examination. Correlation was not found neither between the size of NC and any thrombosis in NC group nor between number of cannulation attempts and rate of any thrombosis in both groups.

**Conclusion**: Neck cannula insertion in MICS procedures is safe procedure regarding US findings on RIJV at three-month control.

Acknowledgements: Supported by Institutional research: MH CZ - DRO (UHHK, 00179906).

## 07AP07-3

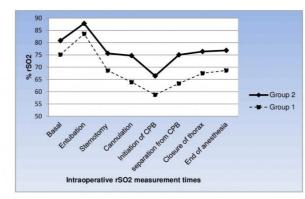
## Relationship between intraoperative cerebral desaturation and postoperative complications in patients undergoing congenital heart surgery

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Background and Goal of Study: Near infrared spectroscopy has been shown to be efficacious in monitoring cerebral and somatic saturation and in preventing postoperative complications in patients undergoing congenital heart surgery. In this study, we aimed to investigate the incidence of cerebral desaturation and the possible relationship between intraoperative cerebral desaturation and postoperative complications.

Materials and Methods: A total of 115 patients were prospectively included in the study. Cerebral regional desaturation score was calculated using the ratio under the threshold value (desaturation points under 25% basal level) X seconds. The patients were divided into two groups: group 1 (desaturation score >3000%.sec) and group 2 (desaturation score ≤3000%.sec). The groups were compared in terms of demographic data, intraoperative and postoperative variables, postoperative complications, and duration of intensive care and hospital stays.

**Results and Discussion**: Atrial septal defect (23.5%), ventricular septal defect (14.8%) and Tetralogy of Fallot (9.6%) were among the most frequent diagnoses. Twenty-eight patients (24.3%) had cyanotic congenital heart disease. A total of 55 patients experienced over 3000%.sec desaturation ( $\chi^2$ =57,119; p<0.001) (Figure 1. Groups' intraoperative rSO2 trends). In the multiple logistic regression analysis, desaturation score > 3000%.sec (p<0.001), low body surface area (p=0.001) and prolonged cardiopulmonary bypass (p=0.004) were found to be associated with postoperative complications.



Abbreviations: rSO2; cerebral regional oxygen saturation, CPB; cardiopulmanary bypass

(At all measurement times, rSO2 values in group 1 were lower than group 2, p<0,001).

Conclusion: In patients undergoing congenital heart surgery, desaturation score > 3000%.sec is associated with a negative effect on patient prognosis.

References:

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# 07AP07-4

The endothelial glycocalix changes are associated with hemodynamic and metabolic responses in on-pump valve repair surgery

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**Background and goal:** The endothelial glycocalix (EG) system is an important protective regulator of vascular integrity, permeability, and endothelial activation. The perioperative EG shedding can be associated with capillary leak, hemodynamic disturbances, and increased postoperative morbidity. The goal of this study was to assess the EG response to elective on-pump valve surgery.

**Methods:** Twenty-six adult patients scheduled for elective valvular interventions on cardiopulmonary bypass were enrolled into a single-centre prospective observational study. The components of EG including Heparan Sulfate Proteoglycan (HSPG) and Syndecan-1 (S1) were measured after the induction of anaesthesia, and at 6 and 24 hrs postoperatively (ELISA Kits for HSPG, SDC 1, USA). The hemodynamic variables, blood gases, pro-B-type natriuretic peptide (NT-proBNP), and biochemical parameters were measured perioperatively. The statistical analysis was performed using Mann–Whitney *U*-test, ANOVA, Spearman's *rho*, and ROC-analysis. Data are presented as median (25°–75° percentiles). *p* values < 0.05 were regarded as statistically significant.

**Results:** At 6 hrs after surgery, we observed a decrease in HSPG concentration from 6.13 (4.20–9.04) ng/ml to 5.08 (4.18–7.21) ng/ml (p < 0.01), while S1 increased from 0.80 (0.56–1.13) ng/ml to 1.25 (1.04–1.41) ng/ml (p < 0.001). At 24 hrs, HSPG and S1 returned to values close to baseline. The baseline HSPG correlated with systemic vascular resistance index (rho = -0.55, p = 0.004), postoperative cardiac index (rho = 0.43–0.46, p = 0.03), pulse pressure variation (rho = -0.76, p = 0.003), and glucose concentration (rho = -0.50, p = 0.02). In addition, the baseline HSPG concentrations above 5.1 ng/mL predicted postoperative hyperlactatemia (>2 mmol/l) with AUC 0.75, sensitivity 100% and specificity 58% (p = 0.02). The baseline NT-proBNP demonstrated weak correlation with HSPG concentration at 6 hrs after surgery (rho = 0.42, p = 0.04). The values of HSPG at all stages and the baseline S1 concentration correlated with duration of mechanical ventilation (rho = 0.46-0.49, p < 0.02).

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**Conclusion:** At the selected perioperative time-points, the EG system demonstrated relatively minor shedding to the elective on-pump cardiosurgical interventions and moderate associations with hemodynamics, metabolic response, and the duration of respiratory support.

**Acknowledgements:** The authors thank for the help of Drs. TV. Chernova, MM. Sokolova, EV. Fot, and AA. Smetkin.

### 07AP07-5

# Implantation of left ventricular assist device with unipulmonary ventilation

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**Background:** The ventricular assist device (VAD)has the potential to improve outcomes in patients with acute heart failure. Case of implantation left VAS in patient with a cardiogenic and vasoplegic shock after a cardiac stroke. During the surgical procedure he suffered an accidental pulmonary laceration with fatal consequences and hindering the anesthetic ventilatory technique requiring single lung ventilation.

Case report: A 59 years old male presented an extensive anterior infarction (KILLIP 4). The patient presented a cardiogenic and vasoplegic shock(LVEF10%). At the OR, we started an inhalatory anesthesia with perfusion of vasoactives. During the implantation of the assit device the middle lobe of the right lung was lacerated, requiring to introduce a bronchial blocker by the endotracheal tube under direct vision with a bronchoscope. We started one lung protective ventilation. With the previous ALI and edema the unipulmonary ventilation did not allow to reduce the oxygen supply less than 100% and by means of recruitment maneuvers with optimal PEEP 11. The anticoagulant management to cannulate prior to cardiopulmonary bypass contributed to hemorrage specifying massive transfusion.

**Discussion**: This could be a typical case of implantation of ventricular assist device, choosing one with continuous flow since they seem to have less indication of bleeding and thromboembolism. The time before a heart transplantation is unknown so this is another reason to chose a device that allows prolonged use. The ventilatory difficulties grow with the unfortunate pulmonary laceration. The progression of bronchial blocker through the endotracheal tube in those conditions of active bleeding was a big anesthetic challenge. Another challenge in this case is the need of partial anticoagulation for the cannulation of cardiopulmonary bypass since there is a massive active hemorrhage with hard surgical control. There is no any case in the bibliography with these conditions. This is why the present case could serve as a model for future complicated cases in the implantation of VAD.

**Learning points:** As anesthesiologist we should be prepared for any unexpected event, specially in emergency situations with critical patients. Their fragility makes them so vulnerable to any error. It is our responsibility to check the availability and good condition of the material, thinking in advance and to have prepared several action plans if the problem is not easily resolved.

## 07AP07-6

Relationship between serum lactate levels and outcome in pediatric patients undergoing congenital heart surgery

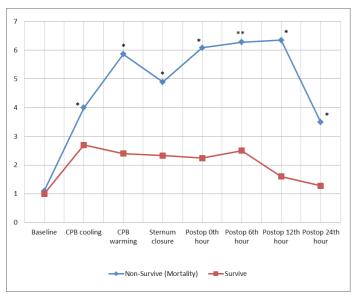
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**Background and Goal of Study**: Increased lactate levels are considered as the signs of oxygen deficiency at the tissue level. In this study, we aimed to investigate the mortality and morbidity according to the lactate change in pediatric patients undergoing congenital heart surgery.

Materials and Methods: A total of 236 patients were retrospectively included between June 2015 and May 2016. The arterial blood gas analysis results at baseline (after the administration of an arterial cannula), during the cooling and warming-up phases in cardiopulmonary bypass (CPB), during the sternal closure, and at 0, 6, 12, and 24 hours in the postoperative intensive care unit stay were recorded. The patients were divided into two groups according to their lactate levels: group 1 (lactate < 4.5 mmol/L, n=183) and group 2 (lactate ≥4.5 mmol/L, n=53). The primary endpoint was the relationship between increased lactate levels, complications, and mortality. The secondary endpoint was the progress of lactate levels within the first 24 hours

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Results and Discussion: Of the patients, 121 (51.3%) were males. The mean age was 56.4 months (median: 42 months; range: 1 day to 204 months). Sixtynine patients (29.2%) had cyanotic heart disease. A total of 53 patients (22.5%) had lactate levels of  $\geq$ 4.5 mmol/L (Figure 1. Relationship between lactate levels and mortality). At least one complication development (p=0.027) and mortality rate (p<0.001) were significantly higher in the patients with lactate levels of  $\geq$ 4.5 mmol/L. Seventeen patients (7.2%) died in the postoperative period, and 15 of them had lactate levels of  $\geq$ 4.5 mmol/L within the first 24 hours. In terms of mortality, lactate levels of  $\geq$ 4.5 mmol/L at any time, prolonged mechanical ventilation, and undergoing complex surgery (high Risk-adjusted Classification for Congenital Heart Surgery scores) were the independent risk factors for mortality.



**Conclusion**: Our study results suggest that a blood arterial lactate level of ≥4.5 mmol/L is a risk factor for postoperative morbidity and mortality in pediatric patients undergoing congenital heart surgery.

### 07AP07-7

# Postoperative vasoplegia after LVAD implantations: external validation of a preoperative multivariable risk model

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Background and Goal of Study: Post-cardiac surgery vasoplegia is associated with increased mortality and morbidity. Van Vessem et al. (Eur J Cardio-Thoracic Surg. 2017) developed a risk model for predicting post-operative vasoplegia in end-stage heart failure patients. The proposed risk model contains: age, gender, procedure (left ventricular restoration, CorCap implantation or Left Ventricular Assist Device (LVAD) implantation), creatinine clearance, thyroxine, anaemia and β-blocker use. As the LVAD group in the above study was small (15%), we investigated the predictive accuracy of this risk model in patients undergoing LVAD implantation in our academic hospital.

Materials and Methods: Patients undergoing first time long-term LVAD implantation from 2006 to 2016 were included in this single-centre retrospective cohort study. The same definition of vasoplegia was used as in the study of van Vessem: a cardiac index ≥2.2 l/min/m2 and a need for continuous vasopressor support (norepinephrine >0.2 μg/kg/min and/or any dose of terlipressin) for 12 consecutive hours in the first 72 hours post-operatively. External validation was conducted with C-statistic and the Hosmer-Lemeshow goodness-of-fit (H-L) test to quantify discrimination and calibration

Results and Discussion: Included were 153 patients. The incidence of vasoplegia was higher in our study (42%, n=65) than that of van Vessem (29%, n=66), but lower than in their LVAD subgroup (60%, n=20). The H-L test indicates that observed and expected proportions are not different (p=0.69, df=8). The AUC before and after intercept calibration in our cohort was 0.61 (95%CI 0.52-0.70) indicating that this risk model performed poorly at predicting the occurrence of postoperative vasoplegia in LVAD patients. A prediction model will most often perform less in a validation cohort compared to the initial derivation cohort (0.76, 95%CI 0.69-0.83). Moreover, a risk model developed in a population with a lower risk score is not necessarily applicable on a population with a higher risk score. Our population was

younger, less males were included, our patients used less  $\beta$ -blockers and all patients were

scheduled for LVAD implantation. Further refinements in the prediction analysis of developing post-LVAD implantation vasoplegia is needed.

Conclusion: In this external validation study, the risk model developed by van Vessem could not successfully predict which patients scheduled for LVAD implantation will develop vasoplegia.

### 07AP07-8

The performance of the RADIAL score to predict primary graft failure in heart transplant recipients surviving prolonged ventricular assist device support

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Background and Goal of Study: Primary Graft Dysfunction (PGD) often occurs intraoperatively and is the primary cause of early mortality after heart transplantation (HT). PGD is characterized as circulatory failure due to ventricular dysfunction occurring within 24 hours of reperfusion requiring inotropic and mechanical support. The RADIAL score is a simple grading system for predicting severe PGD and is calculated by adding a point for each of the following categories; Right atrial pressure>10mmHg, recipient Age>60y, Diabetes mellitus, Inotrope dependence, donor Age>30y, Length of ischemic time>240. Higher scores are predictive of PGD. However, at our center HT recipients predominately rely on ventricular assist device (VAD) support for exceptionally long periods and the RADIAL score has not been validated in such patients groups. Our goal was to examined the performance of the the RADIAL score for predicting PGD at our single center.

**Methods**: After review board approval, we conducted a retrospective analysis of 63 adult HT recipients at our hospital from 2010 to 2016. Collected data included age, sex, reliance and length of VAD support, and the occurrence of PGD. The RADIAL score was calculated for each case. Our primary outcome was the correlation of the RADIAL score with the occurrence of PGD. To assess the predictive value of the RADIAL score a logistic-regression model was constructed from the collected results and the area under a receiver-operating characteristic (ROC) curve was calculated. A value over 0.7 was considered as an acceptable predictive performance model.

**Results**: We included 63 HT cases for the final analysis; average right recipient atrial pressure  $8\pm4$  (mmHg), recipient mean age  $39\pm13$  (y), diabetes mellitus (n=0), inotrope dependence (n=35), average donor age  $42\pm13$  (y), length of ischemic time 217  $\pm$  45 (min). Recipients predominantly required VAD support (90.5%) with a mean support period of  $2.4\pm1.1$ (y). There were 27 cases of PGD (mild 9, moderate 13, severe 5). The average RADIAL score for PGD and non-PGD cases was,  $2.4\pm1.0$  and  $1.9\pm1.0$ , respectively (p = 0.06). The area under the ROC curve calculated from our model was 0.61.

Conclusion: The performance to for the RADIAL score to predict PGD was low in our model. Although this was a small single center analysis, the RADIAL score may not be useful in predicting PGD in patients undergoing HT after surviving longer periods of VAD support.

### 07AP07-9

# Postoperative mid-term outcomes of mitral valve repair evaluated by three-dimensional transesophageal echocardiography

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Background: In mitral valve (MV) repair, the optimal annuloplasty ring is associated with better clinical outcomes1. The annuloplasty ring size is generally determined with sizer measured the commissure-commissure (CC) distance and the anterior leaflet size in arrested heart. In contrast, three-dimensional transesophageal echocardiography (3D-TEE) allows to measure the mitral annulus to select the annuloplasty ring size under beating heart, in which MV geometry changes dramatically. Several reports showed that surgical results depended on the appropriate annuloplasty ring size2. However, there are few reports to investigate whether perioperative 3D-TEE measurement would affect the postoperative outcomes. In this study, we examined whether the intraoperative measurement of MV by 3D-TEE would affect the postoperative recurrent mitral regurgitation (MR). Methods: This study retrospectively reviewed 94 patients underwent MV repair for moderate to severe degenerative MR between January 2015 and December 2016 and followed up more than postoperative 1 year. By 3D-TEE, CC distance and the anterior-posterior distance of the middle anterior leaflet (A2 height) were measured. Ring sizing for MV annuloplasty was done using specific sizer. After excluding 5 patients with immediate postoperative more than mild residual MR, 89 patients were reviewed. After following more than 1 year, whether recurrent MR more than mild

was occurred was investigated. After calculating a cut-off value of A2 height/CC

ratio with ROC curve, patients were divided into 2 groups: <0.7 or >0.7. The Cox proportional hazards model was conducted to estimate hazard ratio (HR) of A2 height/CC ratio for the freedom from recurrent mild or greater MR, adjusting for age, two of anytholesty ring.

**Results**: Univariate analysis showed HR=6.65 [95% CI 1.29 to 34.30, P=0.02] whereas multivariate analysis showed HR=7.67 [95% CI 1.44 to 40.87, P=0.02]. Using Kaplan-Meier method, the residual MR was statistically significant to aggravate in A2 height/ CC ratio >0.7 group (P<0.01). All progression cases of residual MR were from posterior leaflet lesion.

Conclusion: During the MV annuloplasty, the high A2 height/CC ratio may affect the postoperative results. Particularly with the posterior leaflet lesion, we suggest that it is necessary to select a smaller annuloplasty ring size than determined by the sizer

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- 2. J Thorac Cardiovasc Surg. 2007; 133: 995-1003.

# Acute and Chronic Pain Management and Palliative Medicine 07AP08-1

# Use of dexmedetomidine for medical thoracoscopy evaluation of its safety and efficacy

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Backround and goal of study. Medical thoracoscopy is commonly performed under conscious sedation with IV midazolan and fentanyl or under monitored anaesthesia care (MAC) with IV propofol and fentanyl. The aim of the present study was to evaluate the safety and efficacy of dexmedetomidine (DEX) and the need to use ketamine for rescue sedation and analgesia in patients undergroing medical thoracoscopy.

Methods: During a two years period, thirty two patients (age 59-85 yo), ASA I-III, scheduled for medical thoracoscopy were included. The application of medical thoracoscopy was for diagnosing pleura effusion, for performing pleurodesis and for biopsy of parietal pleura. The patients were in the lateral position and DEX was used for MAC. The initial loading dose of 1 μg/kg of DEX was administered over 10min followed by a maintenance infusion beginning at a rate of 0,6 μg/kg/h. Fifteen minutes after starting DEX, patients were assessed for level of sedation using the Observer's Assessment of Alertness/Sedation scale (OAA/S). Any patient having a score>4, received IV ketamine 1mg/kg. Ketamine 1mg/kg was also given if the ancesthetist determined the presence of pain or the patient was moving. At any time, if clinically indicated, the patient could be converted to an alternative anesthetic therapy. OAA/S scores and all standard vital signs were obtained Results: Mean operation time was 24min (15-70)

Dex was discontinued in one patient and IV propofol 150mg and fentanyl 100mg were given. Ketamine was used for rescue sedation and analgesia in all patients. Common adverse events with DEX were protocol- defined bradycardia and hypotension that were mild in severity. Clinically significant respiratory depression (respiratory rate<8 or an oxygen saturation of <90%) wasn't observed in any patient Conclusion: Dex in combination with ketamine is an effective and safe sedative for patients undergroing monitored anesthesia care for medical thoracoscopy Reference:

Monitored anesthesia care with dexmedetomidine: A prospective, Randomized,
 Double – Blind, Multicenter Trial. Candiotti KA et al Anesth Analg 2010; 110: 47-56

## 07AP08-2

# Efficacy and safety evaluation of two types of recruitment maneuver

After one lung ventilation in thoracic surgery

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Background and Goal of Study: Thoracic surgery often requires one lung ventilation (OLV). To continue the double lung ventilation (DLV), the recruitment maneuver (RM) is one of the methods for restoring gas exchange in the collapsed lung. This paper aims to assess the effect of two different RM methods on oxygenation parameters, respiratory mechanics and hemodynamics in patients operated with OLV.

Materials and Methods: The study included two groups of 20 patients, who underwent thoracoscopy and OLV. The RM method "40x40" (CPAP 35-45 cmH2O for 35-45 sec, FiO2=1,0) was applied for the patients of the 1st group, whereas a "slow" RM (VCV, Vt 8-10 ml/kg, PEEP 10-15 cmH2O for 10-15 min) was applied for the patients of the 2nd group. The efficacy of the procedure was assessed visually, as well as the oxygenation indices (PaO2, ScvO2), respiratory mechanics (PIP, PpI, Pdr, Cdyn, Raw) and hemodynamics (MAP, CVP, HR) before and after its carrying out.

Results and Discussion: RM was successfully completed for the patients of both groups and this was confirmed by the expansion of the operated lung, as well as

an improvement in oxygenation (an increase in PaO2 and ScvO2) and respiratory mechanics (an increase in Cdyn with a decrease in Raw). There were no significant differences between these indices in patients of the both groups before and after the RM. The essential difference was revealed in relation to the RM influence on the pressure in the airways (AW) and hemodynamics. Therefore, after the completion of the RM, the values of PIP (46.8±6.2 cmH2O), Ppl (40.5±4.3 cmH2O) and Pdr (22.6±4.8 cmH2O) in the 1st group were significantly higher than those in the 2nd one (28.2±4.5 cmH2O), 25.4±3.8 cmH2O and 13.6±4.3 cmH2O). Further, at the current stage, the HR (113.7±11.5 per min) and CVP (132.5±17.8 mmH2O) values in the 1st group also significantly exceeded those in the 2nd group (85.7±8.3 per min and 103.6±13.4 mmH2O), and on the contrary, the MAP level was much lower (62.4±12.3 mmHg and 78.6±10.1 mmHg). It is obvious that the method "40x40" significantly increases pressure in the AW, which leads to the rise in ITP and the CVP, a reduction of venous return with a decrease in cardiac output and the level of MAP. The tachycardia is compensatory nature.

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**Conclusion**: Thus, both methods of performing RM demonstrate similar efficacy, improving oxygenation and respiratory mechanics. At the same time, the "40x40" method has a more evident negative effect on hemodynamics.

### 07AP08-3

Non-intubated thoracoscopic surgery (NITS) is a safe alternative of one lung ventilation (OLV) in patients undergoing video assisted lobectomy: a case control, non-inferiority, pilot study

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Background and Goal of Study: Video-assisted thoracoscopic surgery (VATS) has become a widely accepted approach worldwide. Conventionally it is performed with lung isolation and mechanical ventilation. Non-intubated thoracoscopic surgery is a novel approach (1), with theoretical benefits of the avoidance of endotracheal intubation and positive pressure ventilation. However, little is known about its pathophysiological effects. Therefore, our goal was to compare the effects of NITS versus OLV on systemic inflammation, lung function and gas exchange during and after lobectomy.

Materials and Methods: In a prospective observational case-control, non-inferiority study patients undergoing NITS were compared to patients managed with OLV. The primary end points were postoperative procalcitonin (PCT) and C- reactive protein (CRP) levels. Blood samples were drawn preoperatively (T0) and postoperatively at T12, T24, T48. Secondary outcomes were: postoperative lung function (LFT); arterial blood gases (ABG) determined pH, pO2 and pCO2, lactate; white blood cell counts (WBC), chest drain removal and length of hospital stay (LOS).

Results and Discussion: Over a period of 12 months 61 patients were involved in our study, 36 undergone NITS and 25 patients had OLV. There was no difference between the two groups in demographics (age, gender, type of tumor) and in length of surgery. CRP was significantly lower at T48 in the NITS-group: median=56.8(IQR=32.7-75.8) vs. 126.4(71.9-143.5) mg/l, p<0.01. There was no significant difference in PCT levels (ng/ml) at each assessment point: T0: median=0.06(IQR: 0.06-0.06) vs. 0.06(0.06-0.06), T12:0.09(0.06-0.17) ng/ml vs. 0.09(0.06-0.12), T24:0.11(0.06-0.20) vs. 0.11(0.06-0.18), T48:0.1(0.06-0.16) vs. 0.09(0.07-0.14); respiratory function, ABG and WBC. Chest drain removal (median=2[IQR=2-4] vs. 3[3-4] days, p=0.025).

Conclusion: To our best knowledge this is the first study suggesting that NITS causes similar surgical stress caused inflammatory response (or even better as far as CRP is concerned), postoperative oxygenation and ventilation as compared to OLV. Therefore, it seems to be at least a non-inferior alternative of OLV and may also provide benefits for patients undergoing lobectomy such as shortened need for chest drains and earlier discharge.

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### 07AP08-4

# Non-intubated anaesthetic technique for open bilobectomy in a patient with severely impaired lung function

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**Background**: Non-intubated thoracoscopic surgery (NITS) is becoming increasingly popular for video assisted thoracoscopy (VATS) (1). However, there is not enough data to define the indications and contraindications of this technique especially as an alternative to one lung ventilation (OLV). We present a case in whom poor lung function tests recommend against surgery with OLV.

Case Report: A 73 year old man, with coronary artery bypass, aortic abdominal aneurysm and hypertension in his medical history, was diagnosed to have a solid tumor compressing the right main bronchus.

Pulmonary function test revealed FEV1:27%, Tiffneau index:43% and the Carbon Monoxide Diffusing Capacity of 26%. The maximal oxygen consumption (VO2-max) was 13.9 ml/kg/min preoperatively. Bilobectomy was required, but current European Thoracic Surgery guidelines recommended against it due to poor lung functions. Based on our positive recent experiences we decided to proceed with our NITS approach: target controlled infusion of propofol; airway controlled by laryngeal mask; gas supply delivered via T-piece; monitoring (ECG, SpO2, invasive blood pressure, EtCO2, entropy). Paravertebral and vagal blocks were performed under direct vision (VATS) by the surgeon, after which thoracotomy and right lower and middle lobe lobectomy was performed.

Patient remained hemodynamically stable throughout the operation. Temporary respiratory acidosis occurred (Table 1), without any cardiorespiratory adverse events. SpO2 remained 97-99% on FiO2: 0.5-1.0 with a respiratory rate of 18-22/min. At the end of surgery a serratus anterior block was established and pain relief was provided by continuous infusion of bupivacaine. After uneventful awakening and 5 h observation in the post anesthesia care unit he was discharged to the ward with stable vital signs and pain free. Oxygen supplementation was stopped on day 1 and full mobilization was started on day 2. The chest tube was removed on day 5 and he was transferred to a pulmonology ward on day 7.

**Discussion**: Our case demonstrates that NITS might be a useful alternative of OLV during open thoracotomy in patients with severely impaired lung function even when conventional procedures such as anatomical resection and OLV are not recommended. **References**:

1.Gonzalez-Rivas, et al. Non-intubated video-assisted thoracoscopic lung resections: the future of thoracic surgery? Eur J Cardiothorac Surg 2016;49:721-31 Learning points: Non intubated technique, serratus anterior block.

# 07AP08-5

# Thoracic epidural vs intercostal block for postoperative pain management in VATS (Video-Assisted Thoracoscopic Surgery)

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Background and Goal of Study: Thoracic Epidural (TE) and Paravertebral Block are the gold standard for intra and postoperative pain management in thoracic surgery, with plenty of evidence about their use in thoracotomy. However, their utility in VATS (Video-assisted thoracoscopic surgery) is being questioned, as there are thoughts that a less invasive surgery should require a less invasive pain management technique too.

Our study's main objective is to determine the effect of Intercostal Block (ICB) in postoperative pain scores during the first 48h after VATS surgery, compared with TE.

**Materials and Methods**: We retrieved records of 42 patients who had undergone VATS for lobectomy in the past 5 months from our hospital's data base. They were divided in two groups of 21: in the first one, the surgeon had performed an ICB with Bupivacaine 0.5%; in the second group, a TE catheter had been placed, followed by a continuous infusion of Ropivacaine 0.2%.

We reviewed data about postoperative pain, both in rest and movement, registered at each nursing shift: admission into the ICU, evening and midnight the same day, at 8.00am and noon the following day, and 48h after the surgery, using the VAS (Visual Analog Scale) for pain. Morphine administration was also documented.

Results and Discussion: Both groups were homogeneous with an mean age of 62 years and an ASA score of II. The median VAS score at rest for the TE group (p25-p75) was, for each time (admission, evening, midnight, 8.00am, noon and 48h post-surgery): 2(0-5); 2(0-5); 1(0-5); 1(0-3,75); 1(0-2); and 0(0-2). For the ICB group, the medians (p25-p75) were 2(0-5,75); 1,5(0-5); 1(0-5); 1(0-4); 1(0-3) and 0.5(0-2), respectively. Statistically significant differences were not found on either

On the other hand, the medians for VAS score in motion were as follow: for the TE group, 4(1,5-7,75); 5(2,25-6,75); 5(2,25-7); 4(2-5); 2,5(1,25-5) and 2,5(2-3,75). And for the ICB group, 3,5(0-6,5); 4(1-6); 4(1,75-5,5); 4(2-5,25); 4(3-5,25) and 2(1-4,25). There weren't any significant differences detected between both sides either.

Conclusion(s): Overall, both groups presented similar VAS score after the first 48h after the surgery. No distinction was found in terms of rescue analgesia for both techniques either

Ultimately, we found ICB provides postoperative analgesia comparable to TE in VATS, and therefore it could become the procedure of choice for this kind of surgery.

### 07AP08-6

# Nonintubated thoracoscopic surgery for pulmonary resections through laryngeal mask airway and inhaled anesthesia

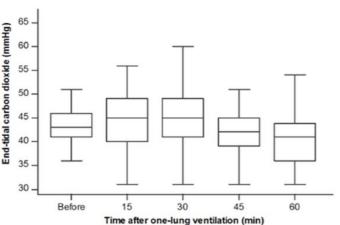
Hung M. H.<sup>1</sup>, Shih P. Y.<sup>1</sup>, Hung P. Y.<sup>1</sup>, Chen J. Y.<sup>1</sup>, Chen J. S.<sup>2</sup>

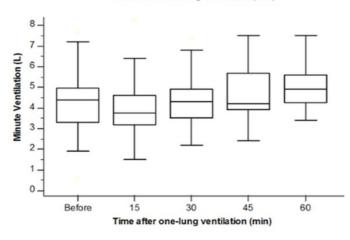
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Background and Goal of Study: An evolving paradigm in modern thoracic surgery is a combination of minimally invasive surgery and anesthesia, i.e., nonintubated thoracoscopic surgery (VATS).<sup>1, 2</sup> Without tracheal intubation and ventilatory support, the adequacy of spontaneous breathing and the lack of accurate monitoring of ventilation during nonintubated VATS are highly concerned and not fully investigated <sup>3</sup>

Materials and Methods: From July through November 2017, 52 consecutive patients with peripheral lung nodules underwent nonintubated VATS using a larygneal mask airway with sevoflurane to maintain a bispectral index value between 40 and 60. Regional anesthesia including intercostal and vagal blocks were performed under direct vision of thoracoscopy.

Results and Discussion: There were 38 patients with primary or metastatic lung cancers and 14 patients with nonmalignant tumors. Thoracoscopic lobectomy was performed in 6 patients, segmentectomy in 5 and wedge resection in 41. Most of them were completed via single-incision (88%) or with mediastinal lymphadenectomy (96%). No patient required conversion to a thoracotomy or tracheal intubation for one-lung ventilation. The median postoperative chest drainage and hospital stay were 1.0 and 2.0 days, respectively. Postoperative adverse events were only seen in 6 patients with nausea and vomiting which was easily manageable by medications. Through a laryngeal mask airway, the minute ventilation and the partial pressure of end-tidal carbon dioxide were accurately monitored in all nonintubated patients. None of them ever reached a pulse oxygen saturation below 94%.





Conclusion: Nonintubated VATS through a laryngeal mask airway with inhaled anesthetics is feasible and safe. It may be considered as a more reliable alternative

anesthetic management for nonintubated VATS considering it can provide a consistent monitoring of respiratory adequacy including end-tidal carbon dioxide and minute ventilation for the whole procedure.

#### References:

- 1. Hung et al. Eur J Cardiothorac Surg 2014;46:620-5.
- 2. Hung et al. Ann Thorac Surg 2014;98:1998-2003.
- 3. Ambrogi et al. J Thorac Cardiovasc Surg 2012;144:514-5.

### 07AP08-7

# Impact of driving pressure on local inflammatory response in the ventilated lung after one lung ventilation period

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Background and Goal of Study: Driving pressure (DP) is equivalent to the ratio between the tidal volume and the compliance of the respiratory system. Previous studies have shown an association between DP with lung injury and mortality<sup>1</sup>. The goal of the study was to asses how the level of DP during one-lung ventilation (OLV) along lung resection surgery could affect the pulmonary inflammatory response.

Materials and Methods: We designed a prospective study that included 171 patients undergoing lung resection surgery that expended > 1 hour of OLV. All of them were ventilated with volume-controlled mode (VCV): tidal volume (TV) 8 ml/kg, PEEP 5 cmH2O, FiO2 0.5 and respiratory rate modified to maintain EtCO2 30-35 mmHg; during OLV: TV 6 ml/kg, PEEP 5 cmH2O, FiO2 0.6 and permissive hypercapnia. Bronchoalveolar lavage (BAL) was performed in both lungs before and after OLV period to measure inflamatory markers. These markers were analysed using Western Blot. Haemodynamic and respiratory parameters (including DP) were registered at baseline, 30 min after initiating OLV, and at the end of OLV. Patients were divided in two groups: DP≥20 (n21) or < 20 cmH2O (n150) during OLV. Statistical analysis: Non-parametric test comparing markers between groups and bivariate correlation to find any difference between DP and cytokines were used.

Results and Discussion: There was a significant correlation between proinflammatory cytokines measured in BAL at the end of surgery and DP values during OLV (TNFα r0.227 p0.003; IL7 r0.233 p0.002; IL8/IL10 r0.171 p0.026; MMP9 r0.261 p0.001). We did not observe any difference in pro-inflammatory cytokines before OLV between two groups but patients with a DP≥20 had a more intense inflammatory response than patients < 20 at the end of surgery (TNFα DP<20: 20.99 and DP>20: 24.89 p0.007; IL7 DP<20: 5.12 and DP>20: 5.65 p0.004; IL8/IL10 DP<20: 0.75 and DP>20: 1.30 p0.048; MMP9 DP<20: 1392 and DP>20: 1433 p0.001).

**Conclusion**: To our knowledge, this is the first study comparing the relation between the effect of DP during OLV and pulmonary inflammatory response. The presence of a high DP during OLV in lung resection surgery is associated with an increase in the local inflammatory response.

### References

1.Neto AS et al. Association between driving pressure and development of postoperative pulmonary complications in patients undergoing mechanical ventilation for general anaesthesia: a meta-analysis of individual patient data, Lancet respir med, 2016.

## 07AP08-8

# Risk factors to develop postoperative acute kidney injury in hypertensive patients who undergo lung resection surgery

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Background and Goal of Study: Lung resection surgery (LRS) is associated with a high risk of postoperative acute kidney injury (AKI). One of the most important preoperative factors is the presence of arterial hypertension (HTA). The aim of our study was to compare perioperative variables in hypertensive patients who developed or not postoperative AKI after LRS.

Materials and Methods: The present study is a sub-study of the randomized controlled trial NCT 02168751, approved by the local Ethics Committee in Madrid. 174 patients who underwent LRS were included in the study. 79 of these patients were previously diagnosed of HTA. We classified hypertensive patients in two groups depending on the development or not of postoperative AKI. Heart rate, mean arterial pressure (MAP) and cardiac index (CI) were recorded at baseline, at 30 minutes after initiation of one-lung ventilation (OLV) and at the end of surgery. Blood cytokine immunoassays were performed at: baseline, at the end of surgery and 6 hours following surgery. Concentrations of biomarkers were analysed using Western blot. AKI was defined as an increase of creatinine of at least 0.3 mg/dl and/or oliguria (less than 0.5 ml/kg/h during more than 6 h). We used Mann-Witney test to compare quantitative data between two groups, and Chi2 (or Fisher test) to

compare qualitative variables.

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Results and Discussion: Of the 174 patients included, 12 patients developed AKI. All of them were previously diagnosed of HTA. The incidence of AKI in hypertensive patients who underwent LRS was 15.2% (12/79). The demographic and intraoperative values more related to AKI (p < 0.05) were: Length of surgery, duration of OLV, preoperative creatinine, colloids administration and MAP at 30min OLV. Mortality at 30 days and mortality at first year were lower in the group of patients who did not develop AKI. The release of proinflammatory cytokines (TNF c, IL-1, IL-2 and IL-6) was higher in the hypertensive patients who developed AKI at 6h postoperative than in the other group (p < 0,05).

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Conclusions: Our study showed the association between postoperative AKI development in LRS and duration of surgery, colloids administration, lower values of MAP, lower values of CI and a higher perioperative inflammatory response in hypertensive patients. The anaesthetic management can modify most of these variables, the optimization of these factors could decrease the high incidence of AKI after LRS and mortality related.

### 07AP08-9

# Sevofluorane versus propofol for lung resection surgery and long-term survival (3 years): a prospective analysis

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Background and Goal of Study: Recent publications have suggested differential effects of anaesthetic agents on cancer cell growth. Previously, we found that patients anaesthetized with sevoflurane had a significantly lower mortality in the first year than patients anaesthetized with propofol¹. This retrospective analysis investigated the association of anaesthetic technique (propofol versus sevoflurane) with long-term survival in patients receiving elective lung resection surgery (LRS) in a comprehensive cancer Center over 3 years.

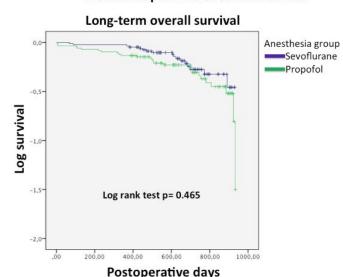
Materials and Methods: This study is a sub-study of the trial NCT 02168751, performed in patients who underwent LRS and approved by the local Ethics Committee in Spain in 2011. We excluded patients who received non-oncological LRS. Long-term follow up of prospective RCT in which patients were randomly assigned to maintain anaesthesia with sevoflurane or propofol. Opioids and neuromuscular block drugs were used according to the anaesthesiologist's criteria. All patients received the same intra and postoperative analgesia via paravertebral thoracic catheter. Overall survival was estimated for each group using the Kaplan-Meier curve. Estimated survival curves were compared using the log-rank test. p was set at 0.05.

Results and Discussion: 150 patients undergoing oncologic LRS were included in the study,73 in the sevoflurane group and 77 in the propofol group. Patients' characteristics were similar in both groups. No differences were found in mortality at first month, sixth month, and third year after the surgery. The mortality at first year was higher in the propofol group (p<0.05). Mean survival was similar in both groups (806 days in sevoflurane group and 752 days in propofol group). The Kaplan-Meier curve is showed in Figure 1.

**Conclusions**: There appears to be no significant differences in overall survival after oncological LRS with the use of sevoflurane compared to propofol.

1. De la Gala F,et al. Postoperative pulmonary complications, pulmonary and systemic inflammatory responses after lung resection surgery with prolonged one-lung ventilation. RCT comparing intravenous and inhalational anaesthesia. Br J Anaesth 2017;119(4):655-63.

### FIGURE: Kaplan-Meier survival curves



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### 07AP08-10

# Anesthetic management in Pulmonary Alveolar Proteinosis (PAP)

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**Background:** PAP is a syndrome characterized by abnormal accumulation of phospholipids from pulmonary surfactant. Its main complication is progressive hypoxia and the usual treatment is Bronchoalveolar lavage (BAL). The BAL should be performed under general anesthesia with one lung ventilation with selective intubation; the dependent lung ventilation is greatly affected by the underlying pathology. For all this, the anesthetic management of this condition can be a challenge for the anesthesiologist.

Case report: A 55 yrs male, with a history of recurrent pneumonia, was studied for hypoxia and hemoptysis and he was diagnosed of PAP. He was scheduled for BAL in the operating room (OR). In the OR the patient maintained SatO2 91% with Ventimask (FiO2:50%). He was under 100% oxygen for 10 minutes as preoxygenation. Anesthesia induction was performed without incidents and left doublelumen tube was correctly positioned and checked by auscultation and fiberbronchoscopy. So, before BAL, a test of one lung ventilation was performed (10 min with 100% oxygen while collapsing of the right lung) The BAL was started by the right lung because it was the most affected: with 0.9% Saline solution with bicarbonate and heparin sodium at 37°C. After the procedure, the right lung was recruited with increasing PEEP and double lung ventilation was started with FiO2 of 100%. It was repeated on the opposite lung. He was extubated without incidences. Learning points: BAL involves general anesthesia with selective intubation and severe alterations between ventilation perfusion during the procedure. Security checks should be made to ensure tightness of the double lumen tube, by auscultation and under direct vision with fiberoptics. BAL is the treatment of choice in PAP with refractory hypoxia or when other treatments fail References:

1. Paquet C., Karsli. Anesthesiology. 2009 Jan;110(1):190-2

### 07AP09-1

# Management of a patient with Eisenmenger Syndrome requiring emergency laparotomy in a District General Hospital-A case report

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**Background**: Eisenmenger syndrome is a cyanotic heart condition where long standing left-to-right shunt causes pulmonary hypertension,pulmonary vascular remodelling,right ventricular hypertrophy and ultimately reversal of shunt<sup>1</sup>.

Case Report: Male, 35 years, presented with incarcerated umbilical hernia. History included Down syndrome,complete AV septal defect,established Eisenmenger syndrome, obesity, obstructive sleep apnoea requiring CPAP and home oxygen. His longstanding hernia was refused elective repair owing to high perioperative risks. His vitals were stable. CT confirmed a large anterior abdominal wall hernia containing bowel loop which appeared compromised. Echocardiogram showed severe pulmonary hypertension(90mmHg). We involved multidisciplinary teams including specialist from tertiary centre for guidance since the surgery was deemed urgent to prevent bowel infarction and transfer to a tertiary centre was not a safe option. Pre-induction noradrenaline and milrinone was started. Modified rapid sequence induction was done with fentanyl 200 mcg, ketamine 100 mg, rocuronium 70 mg and anaesthesia was maintained with sevoflurane in oxygen. Surgery took 90 minutes and the incarcerated bowel was reperfused successfully. At the end of surgery patient deteriorated with SpO2 55% and BP of 50/30.We used a combination of noradrenaline, adrenaline, milrinone, as well as selective pulmonary vasodilators sildenafil and nebulised iloprost, to rebalance his pulmonary and systemic circulations. He then developed a narrow complex tachycardia with multiple ectopics. He was transferred to ICU where he was maintained on vasopressin and milrinone infusion while we weaned off noradrenaline. Iloprost and sildenafil were continued in the postop period. He was extubated after 2 days and was discharged

**Discussion:** Eisenmenger physiology necessitates maintaining a balance between systemic and pulmonary circulations with respective vascular resistances determining flow across the shunt.We used pulmonary vasodilators including Sildenafil and iloprost to maitain this balance.Ketamine helped defend the SVR in face of severe pulmonary hypertension.

Learning points: Efficient management of patient with cyanotic heart conditions like Eisenmenger, presenting for emergency surgery in non-specialist hospital implicates continuing input from patient's specialist team and early involvement of pharmacist for procurement of specific drugs.

### Reference:

1. Intensive Care Medicine 2011;37:502-9.

### 07AP09-2

# New biomarker of oxidative damage in patients with left ventricular hypertrophy

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Background and Goal of Study: Left ventricular hypertrophy (LVH) is a problem in the clinic. Oxidative stress has been implicated in LVH. Our research group investigates new therapies in the early regression of cardiovascular remodeling that act on biomarkers of oxidative stress (1,2). The aim of the study is to search for new plasmatic oxidative stress biomarkers that allow the diagnosis of LVH and the search in the future of new therapies in patients with left ventricular hypertrophy (therapeutic target).

Materials and Methods: Observational, prospective, non-randomized, comparative study of 2 groups of patients: LVH group (n = 35) and control group (without LVH, n = 35). The echocardiographic study allowed the detection of patients with LVH. The extraction of a blood sample allowed us to study the variables of oxidative stress in the plasma of both groups: total thiols, thiolated proteins and thiolated protein index (TPI = thiolated proteins / thiols). The area under the curve for TPI was calculated and we use the logist regression analysis to estimate the association between TPI and clinical variables of interest. The biomarkers were compared in both group using student independent t-test. The data were expressed as mean ±SEM. P< 0.05 was considered significant. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.

Results and Discussion: No significant differences were observed between both groups in the total thiols. However, we detected an increase in the thiolated proteins (P <0.01) and TPI (p <0.001) in the HVI Group with respect to the Control Group. The area under the ROC curve for PTI was of 0.75 (95% CI: 0.63-0.86). The regression model demonstrated that PTI is an independent risk factor (P = 0.02, OR = 7.68, 95% CI: 1.37- 42.99) for clinical variables (sex, age, arterial hypertension, diabetes mellitus, dyslipidaemia, renal insufficiency, coronary / valvular pathology). Conclusion: Our results suggest that TPI could be a specific biomarker of oxidative stress in patients with LVH.

**Reference**: Study financed by the Health Research Fund FIS 16/02069 and Fondos FEDER.

### Acknowledgements:

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### 07AP09-3

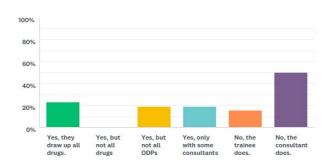
# Preparation of drugs in theatre by non-medically qualified practitioners: A comparison of practice in cardiac centres in the United Kingdom

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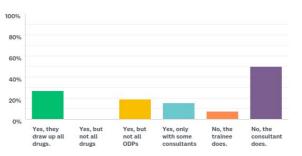
Background and Goal of Study: The Centre for Workforce Intelligence (CfWI) in-depth review for anaesthetics and intensive care in the UK has indicated that by 2033 there will be a shortfall of 3,800 consultants (33% of total workforce). The review suggests that a non-medically qualified workforce could usefully augment anaesthetic service delivery. Within our cardiac centre the operating department practitioners are trained to provide an extended role including drawing up drugs for cases. The goal of this study is to assess current practice in other UK centres. Materials and Methods: In June 2017, 37 cardiac centres in the UK were surveyed. 27/37 (73%) responded to an electronic survey relating to the practice of non-medically qualified personnel drawing up drugs for elective and emergency cases. Results and Discussion:

# During elective cases, does the ODP draw up your drugs?



For elective cases 35% of centers allowed ODPs to draw up drugs, with 23% drawing up all drugs for all cases. 65% of respondents stated that the doctors draw up drugs.

During emergency cases, does the ODP draw up your drugs?



For emergency cases this increases to 43%, with a reduction in the proportion of trainees performing the task.

Conclusion: In the majority of cardiac centres across the UK, drugs are prepared in theatre by doctors. In our centre we have successfully utilised ODPs to perform this task and suggest that other centres adopt this approach. The data demonstrates that ODPs more commonly draw up drugs in theatre during emergency cases, when trainees are less available. Non-medically trained personnel are increasingly being used to perform tasks classically performed by doctors and this may help to address future workforce issues.

#### Reference:

Workforce Data Pack 2016, https://www.rcoa.ac.uk/system/files/TRG-WorkforceDataPack2016.pdf

### 07AP09-4

# Postoperative Atrial Fibrilation (POAF) Score validation in our population

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**Background and Goal of Study**: POAF is a frequent complication after cardiac surgery. Its incidence is between 20-50% depending of the type of surgery and it's related to higher morbi-mortality rate, major complications and longer hospital stay. Our goal was to know the POAF incidence in and validate the POAF score our population (1).

Materials and Methods: We recruit patients undergoing elective cardiac surgery in Hospital Clinic de Barcelona and Hospital Sant Pau from December 2015 to March 2016, with no history of atrial fibrillation (AF) or other arrhythmias. Pre and intraoperative factors were analyzed. The development of POAF, the variables related to it, its evolution and duration as well as the length of hospital stay in the ICU were recorded.

Results and Discussion: We included 280 patients, 113 patients undergoing coronary surgery (CABG), 106 patients valvular surgery, 49 patients valvular surgery associated with CABG, 7 patients ascending aortic replacement and 5 patients undergoing myxoma surgery. The population had an average age of 66.73 years [23 to 91 years] and 84 were women (30%).

The incidence of POAF was 31.2%. In our sample, the statistically significant independent risk factors were: age > 70 years, COPD and chronic kidney disease. The length of stay in the ICU for patients with POAF was 9.07 days (mean) and 4.72 days (average) for patients without POAF; the length of hospital stay for patients with POAF was 15.16 days (mean) and 10.81 days (mean) for patients without POAF and the differences observed are statistically significant.

In our sample, we evaluated the sensitivity and specificity of the POAF score, finding a sensitivity of 67.8% and specificity of 64.1% with an area under the curve as a cutoff point in the ROC curve of 0.67.

**Conclusion**: We have an incidence and associated independent risk factors similar to the large international series, which also have an ICU and hospital longer stay for in the presence of POAF, same as us.

The POAF score has shown to have an acceptable sensitivity and specificity in our population to identify, preoperatively and in a simple way, patients at high risk of presenting POAF in whom preventive antiarrhythmic therapies would be justified. **References**:

1. Mariscalco et al. Bedside Tool for Predicting the Risk of Postoperative Atrial Fibrillation After Cardiac Surgery: The POAF Score. J Am Heart Assoc. 2014 Apr; 3(2): e000752.

### 07AP09-5

"Massive Pulmonary Embolism Following Varicose Vein Surgery Under Spinal Anesthesia"

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**Background and Goal of Study**: Venous tromboembolism (VTE) emerges as deep venous trombosis (DVT) or pulmonary embolism (PE). Pulmonary embolism (PE) is responsible for 150.000-200000 deaths per year and also it's an avoidable cause of hospital deaths. In this article, a patient who has developed cardiac arrest due to massive PE following varicosis surgery under spinal anesthesia will be presented.

Materials and Methods: A 40 years old woman with ASA I physical status was scheduled for elective left leg varicose vein surgery. Surgery was performed under spinal anesthesia with hyperbaric bupiyacaine. She had no problems and after 95 mins of surgery she was taken to postanesthesia care unit (PACU). In PACU, during the mobilisation the patient had sudden cardiac arrest. Cardiopulmonary resuscitation was started (CPR). She responsed to CPR, first evaluation has revealed she had bilateral massive pulmonary embolism and extracorporeal membrane oxygenisation (ECMO) was initiated, also inotrop infusions was started. Her first Glascow Coma Scale (GCS) was 3 following resuscitation then GCS was improved and she was full concious. Pulmonary embolectomy was planned and performed under cardiopulmonary bypass (CPB). Weaning from the CPB was successful and after observation of no need for ECMO via blood gas analysis, also weaning from ECMO was done immidiately. Following decannulation and protamin application, invasive blood pressures remained stable and by this period of time, inotrops was reduced. After the operation she was transferred to intensive care unit (ICU). The next day she was extubated successfully and discharged from ICU to cardiaovasculary wards within 2 days. Also her labaratory evaluation for possible risk factors for VTE revealed no problems.

Results and Discussion: Risk factors for VTE are major medical illness, obesity, cancer, age over 60 years, prolonged immobilization, lower limb paralysis, use of hormone replacement therapies ect. Additionally, it has been reported spinal anesthesia increases the VTE risk in patients undergoing total arthroplasty (1). Conclusion: It must be kept in mind spinal anesthesia may be a related risk factor in such patients.

#### References:

1. NAKAMURA, Mashio, et al. Spinal anesthesia increases the risk of venous thromboembolism in total arthroplasty: Secondary analysis of a J-PSVT cohort study on anesthesia. Medicine, 2017, 96:1-5.

## 07AP09-6

# Changes on thoracic aorta's structure with an antiarrhythmic agent

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Background and Goal of Study: Dronedarone is a multichannel blocker used to treat atrial fibrillation (AF). Left hypertrophy is widely known as AF substrate. Our group previously proved that treatment with dronedarone produces an early regression of myocardial remodelling in an experimental model of arterial hypertension1. Thus, we wondered if it could also induce changes on Aorta's structure.

Materials and Methods: Adult male spontaneously hypertensive rats (SHR) were randomly divided into therapy group (SHR-D, n=8) and placebo group (SHR, n=8). Wistar Kyoto rats were used as normotensive controls (WKY n=8). After 2 weeks of intervention, systolic blood pressure (SBP) and heart rate (HR) were measured and ascending thoracic aorta was dissected to study its histological characteristics (a total of 8 segments of thoracic aorta per group were stained with orcein and analized): internal and external diameters (ID, ED), cross-sectional area (CSA), wall width (WW). Comparisons among groups were made by ANOVA test of one factor with Bonferroni's correction. P< 0.05 was considered statistically significant. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain.

Results and Discussion: Dronedarone reduced SBP in SHR-D (P<0.001) and HR (P<0.01) with respect to SHR. SHR group showed greater ID, ED, WW, CSA than WKY group (p<0.001). However, treatment with dronedarone produced a decrease in ED, WW, CSA compared to SHR (p<0.001), without statistical differences in ID. Conclusion: 14 days of treatment with dronedarone produced a regression in aortic structural remodelling of spontaneously hypertensive rats.

## References:

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Valverde D, Soto-Montenegro ML, Desco M et al. Dronedarone produces early regression of myocardial remodelling in structural heart disease. PLoS One. 2017; 21;12:e0188442.

#### Aknowledgment

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## 07AP09-7

# Rapid ascent to high altitude (4559 m) does not impair left ventricular diastolic function in healthy volunteers

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Background and Goal of Study: Acute hypoxia, as it occurs with high altitude exposure or during acute respiratory distress syndrome (ARDS), causes hypoxic pulmonary vasoconstriction and consequently pulmonary hypertension. The resulting increase in right ventricular afterload has been suggested to impair left ventricular (LV) diastolic function by shifting the ventricular septum towards the LV. This study evaluated physiologic variables and comprehensive echocardiographic indices of LV diastolic function following rapid ascent (<22 hours) to 4559 m in healthy volunteers.

**Methods**: Fifty subjects ascended in groups of 10 from 1130 to 4559 m within 22 hours including an overnight stay at 3611m. All participants underwent 2D echocardiography during baseline examinations at low altitude (424 m, Salzburg, Austria) and after 7, 20 and 44 hours at high altitude. Heart rate (HR), mean arterial pressure (MAP), and systolic pulmonary artery pressure (sPAP) were assessed and comprehensive volumetric-, spectral Doppler-, tissue Doppler- as well as speckle tracking derived strain-indices for LV diastolic function were obtained.

Results and Discussion: HR (HRlow: 64.2±11.2 vs. HRhigh: 79.1±14.2 min-1, p<.001), MAP (MAPlow: 88.9±5.9 vs. MAPhigh: 91.7±7.0 mmHg, p=.002); and sPAP (sPAPlow: 24.4±3.8 vs. sPAPhigh: 38.5±8.2 mmHg, p<.001) increased significantly following ascent and remained elevated at high altitude. Left atrial (LA) reservoir Strain (ε) (εlow: 44.6±9.4 vs. εhigh: 49.6±12.6%, p<.05) increased significantly following ascent, remained elevated at high altitude and did not correlate with changes in physiologic variables. Spectral-Doppler derived index for LV filling (E/Alow: 1.7±0.5 vs. E/Ahigh: 1.4±0.5, p<.001) changed significantly due to a significant increase in late diastolic filling (Alow: 43.3±9.0 vs. Ahigh: 53.1±12.2 cm·sec-1). Changes in E/A correlated with changes in HR (r=.46, p<.001) but did not correlate with changes in sPAP or MAP. E/E' as an estimate of LV filling pressure and LV diastolic function did not change.

Conclusion: Rapid ascent of healthy individuals to 4559 m increased sPAP but did not impair LV diastolic function, possibly due to increasing global LA performance. As functional LA reserve might be required for maintaining diastolic integrity at high altitude, individuals with pre-existing LA or LV disease may be at increased risk for left heart failure and high altitude pulmonary edema following rapid ascent to high altitude.

### 07AP09-9

# Paravertebral block in cardiac surgery: effect on respiratory function in patients undergoing mammary artery grafting via thoracotomy

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Background and Goal of Study: The aim of this study was to investigate the efffects of ultrasound-guided thoracic paravertebral block versus sevoflurane-fentanyl anesthesia on respiratory function in patients undergoing mammary artery grafting via thoracotomy.

Materials and Methods: 20 patients were randomized into 2 groups to receive either sevoflurane anesthesia with paravertebral block (n=10) or sevoflurane-fentanyl general anesthesia (n=10).

Results and Discussion: Pulmonary functions were assessed before surgery, 24 hours after surgery and on the fourth post-operative day. Lung functions decreased on first postoperative day and returned to baseline value by fourth day in both groups. Vital capacity and forced vital capacity (p<0.01) were significantly higher at 24 h with paravertebral block compared to the general anesthesia group. There was no significant difference in the forced expiratory flow 25-75% between the 2 groups, however, in the paravertebral group these values were higher. Patients with paravertebral block were able to cough more effectively.

**Conclusion**: To conclude, ultrasound-guided thoracic paravertebral block appears to preserve lung function by providing better pain control and more effective coughing when compared with sevoflurane-fentanyl general anesthesia.

### 07AP10-1

# Thyroid hormone levels and mortality after heart transplantation

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Background and Goal of Study: Thyroid hormone levels decreases after acute, serious systemic stress. Triiodothyronine (T3) and tetra iodothyronine (T4) have physiological effects on the cardiovascular system. T3 and T4 decrease peripheral vascular resistance and have a positive chronotropic and inotropic effect. The purpose of our study was to examine the relationship among T3, T4 levels and mortality after orthotopic heart transplantation.

Materials and Methods: The single center retrospective study was approved by the IRB and contained the data of 127 patients undergoing orthotopic heart transplantation between January 2015 and July 2017. Beside postoperative thyroid function (T3, T4, TSH levels), vasopressor-inotropic needs, demographic parameters, mechanical cardiac support and UNOS (United Network for Organ Sharing) score were investigated. We have checked the survival on 29th November 2017 for last time. The normal T3 level is 2.89-4.88 pmol/L, T4 levels is 9.00-23.20 pmol/L in our institutional laboratory, according these values we have determined lower level of thyroid hormones. Eighty five patients had postoperative thyroid levels. We used Mantel-Cox log-rank test and multivariable Cox regression for further investigation.

Results and Discussion: 12 of the 85 (14.1%) patients died, the mean survival time was 466 days after transplantation. 30-days mortality was 7.1%. 8 (9.4%) patients have hypothyroidism, 6 (7.1%) patients have hyperthyroidism before the results. We have detected lower T3 levels in 48, both lower T3, T4 levels in 4 patients. and 37 patients T3, T4 levels were normal. With Mantel-Cox log-rank test we found significant difference in survival in patients with both lower T3, T4 levels (Chi-Square: 9.59; p=0.002), and non-significant difference in patients with lower T3 and normal T4 levels (n=42; Chi-Square: 2.20; p=0.138) compared to those patients with normal T3, T4 levels. In multivariable Cox regression analysis, we found independent relationship among both lower T3, T4 levels and 30-days mortality (OR:18.26; 95% CI: 1.22-272.22; p=0.035) and total mortality (OR: 21.86; 95% CI: 2.42-197.74; p=0.006) adjusted for UNOS score, mechanical circulatory support requirement after transplantation and mechanical ventilation after operation. Conclusion: Based on the above results, thyroid function should be monitored after heart transplantation. Early thyroid hormone replacement therapy might be discussed.

## 07AP10-2

# Hybrid Transcatheter Aortic Valve Implantation and Off-Pump Coronary Artery Bypass in a High-Risk Patient Case report

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Background: Transcatheter Aortic Valve Implantation (TAVI) has become an alternative technique to surgical aortic valve replacement for high-risk patients. Off-Pump Coronary Artery Bypass (OPCAB) is a common way to treat coronary artery disease (CAD) in Japan. TAVI and OPCAB have common advantages; they are performed on the beating heart without cardiopulmonary bypass. But hybrid TAVI and OPCAB is a challenging combination.

Case Report: 78-year-old female with severe aortic stenosis (AS) and CAD was planned to undergo TAVI and OPCAB simultaneously. General anesthesia was induced smoothly with fentanyl and midazolam, and maintained with sevoflurane and fentanyl. We utilized arterial line, central venous catheter and transesophageal echocardiogram. Firstly, while the left internal thoracic artery was anastomosed to the left anterior descending artery, small doses of phenylephrine and norepinephrine were required to maintain hemodynamics. Next, transfemoral TAVI was started. When the Evolut® was inserted through native aortic valve, complete atrioventricular block developed, and temporary ventricular pacing was needed. After the Evolut® was deployed, great saphenous vein was anastomosed to the left circumflex artery (LCx) and aorta. While the heart was lifted, increased dose of norepinephrine was required. Aortic valve position and coronary inlet were carefully monitored. The operation finished without obvious problems. The patient was moved to ICU, kept intubated. On the next day, she was extubated, but LCx restenosis and left femoral artery occlusion occurred. Therefore, additional procedures were performed.

**Discussion:** CAD is sometimes present with AS patients. The number of reported cases of hybrid TAVI and OPCAB is limited1. During hybrid surgery, we have to be careful about interaction between the two diseases and the two procedures; hemodynamic changes related to valve insertion, lifting of the heart, anastomoses of the grafts, and complications of each procedure. Considering the potential benefits of the hybrid surgery, it could be an option for high-risk patients. But we should continue to investigate the risks of the hybrid surgery as well.

### References:

1 Circ J 2016;80:1946-1950

Learning points: In our case, we had no trouble in anesthetic management during

the operation. Hybrid TAVI and CABG can become a treatment option for highrisk patients. But, indication should be discussed carefully and further studies are needed to assess effectiveness and safety.

### 07AP10-3

## Microcirculatory perfusion disturbances and endothelial hyperpermeability following cardiopulmonary bypass persist in the early postoperative period

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Background and Goal of Study: Increased endothelial permeability following cardiopulmonary bypass (CPB) is thought to be an important contributor to microcirculatory perfusion disturbances and postoperative organ dysfunction. We therefore hypothesised that microcirculatory perfusion disturbances remain altered after surgery and are paralleled by prolonged impairment of endothelial barrier function.

**Materials and Methods**: Microcirculatory perfusion was assessed in 17 patients undergoing cardiac surgery with CPB using sublingual sidestream dark-field imaging and the percentage of perfused vessels was calculated. Plasma was obtained before connection to CPB (pre-CPB), during CPB, after weaning from CPB and 72 hours following CPB. Using electric cell–substrate impedance sensing of human endothelial cells, the effect of plasma exposure for 90 minutes on *in vitro* endothelial barrier was measured. Plasma heparan sulphate and syndecan-1 levels were studied with ELISA as markers for glycocalyx degradation.

Results and Discussion: Patients, aging 68±7 years, underwent 103±18 minutes of CPB. Microcirculatory proportion of perfused vessels immediately decreased from 92±6 to 69±9 % (*P*<0.001) after onset of CPB and did not restore in the first 72 postoperative hours (71±5 vs 92±6 %, *P*<0.001). Using an *in vitro* endothelial barrier assay, plasma obtained after CPB decreased endothelial resistance with 17% compared to pre-CPB plasma (1.2±0.05 vs 0.9±0.08, *P*=0.01). The reduction in endothelial resistance was still present when exposed to plasma obtained 72 hours after CPB (1.2±0.05 vs 1.0±0.05, *P*=0.009). Moreover, CPB was associated with increased plasma levels of heparan sulphate (24±8 vs 14±2 ng/ml, *P*=0.0008) and syndecan-1 (61±9 vs 10±5 ng/ml, *P*<0.0001).

Conclusion: Microcirculatory perfusion disturbances in patients undergoing cardiac surgery with CPB persist in the first postoperative days and are paralleled by prolonged endothelial hyperpermeability and shedding of endothelial glycocalyx constituents. Future research should reveal whether targeting endothelial barrier could preserve microcirculatory perfusion and organ function in patients undergoing cardiac surgery with CPB.

## 07AP10-4

# Preoperative biological determinants of postoperative vasoplegia after first time long term LVAD insertion

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Background and Goal of Study: Vasoplegia after Left Ventricular Assist Device (LVAD) insertion occurs frequently and is associated with increased mortality and morbidity. In search of clinical factors involved in the development of vasoplegia we have previously identified previous cardiothoracic surgery, preoperative dopamine use, increased bilirubine levels and decreased creatinine clearance as independent predictors. The current work focuses on fundamental biological mechanisms and explores the hypothesis that preoperative molecular events are associated with and help to predict post-LVAD vasoplegia.

Materials and Methods: Vasoplegia was defined on the basis of vasodilation, hemodynamic criteria and high vasopressor requirements during the first 48 hours after first longterm LVAD insertion. We have selected 21 pro- and anti-inflammatory cytokines for cytokine balance, markers of endothelial activation, apoptosis, and copeptin and thyroxin for hormonal assessment. R-Studio for supervised cluster analysis was used to evaluate the relation between biomarkers and post-LVAD vasoplegia and SPSS to explore differences in biomarkers between both groups. Results and Discussion: In 127 patients operated on between 2006 and 2016, the incidence of postoperative vasoplegia was 29.1%. Both cytokines TNFR1 and TNFR2 and endothelial markers ANG2 and sVCAM were higher in vasoplegia patients (p<0.05). TIMP1 and FAS were higher in vasoplegia patients implicating

potential involvement of apoptosis and extracellular matrix in vasoplegia (p<0.05). ROC analysis was used to investigate if these preoperative biomarkers could predict future vasoplegia. ROCs varied between 0.62 and 0.71. Inclusion of the biomarkers into the initial model (4 clinical markers) resulted in a predictive value of 0.80 (95% CI 0.72-0.89) compared to 0.76 (95% CI 0.67-0.86) for the initial model. Conclusion: Preoperative plasma levels of biomarkers of inflammation, apoptosis and endothelial activation were significantly higher in patients developing post-LVAD insertion vasoplegia compared to controls. While these biomarkers fail to predict postoperative vasoplegia on their own, they probably might improve the preoperative prediction model based solely on clinical parameters. These findings support the inflammation and endothelial activation concept of vasoplegia. Further studies are needed to validate our findings and expand them to evaluation of biological events in the intra- and postoperative period.

## 07AP10-5

## Prevalence of preoperative anaemia and its relation to transfusion and morbimortality in patients undergoing cardiac surgery in Hospital Clinic Barcelona

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**Background and Goal of Study**: The prevalence of anaemia in the population suffering from chronic heart failure is high and its relation with the evolution of the disease is well stablished<sup>1</sup>. Recently, a significant number of studies suggest that anaemia may be associated with an unfavourable evolution in several clinical disorders<sup>1</sup>.

The purpose of this study is to determine the prevalence of anaemia in patients undergoing cardiac surgery, as well as identify complications related to anaemia and the number of patients requiring transfusions.

Materials and Methods: We conducted an observational, descriptive and retrospective study in Hospital Clinic Barcelona. We collected data from the preanesthetic assessment of patients undergoing cardiac surgery between January 2017 and May 2017. Statistical analysis of the data was performed using SPSS (IBM software). Patients signed an informed consent accepting the use of their information for the purposes of the study.

Results and Discussion: Data from 129 patients undergoing cardiac surgery was obtained. We found a prevalence of anaemia of 27,91% in our population. Of those patients with anaemia, only 38,8% had a complete anaemia screening test to know the cause of anaemia. We found a significant statistic relationship between acute kidney injury (AKI) and anaemia in patients undergoing surgical cardiac procedures (OR=3,5; Cl95%:1-12,37). The average time since detection of anaemia to surgery was 23,42 days and only 19,4% received treatment. Anemic patients were also associated with a higher risk to receive red blood cells (RBC) than non anemic patients (OR = 3,9; Cl95%:1,73-8,77). 40,31% of patients in our sample required tranfusion of RBC.

Conclusions: From the results of this study, we conclude that the presence of anaemia in patients undergoing cardiac surgery is high and that it is associated with complications such as AKI and transfusion of RBC. Despite the fact that anaemia affects a large number of patients undergoing cardiac surgery, only a small proportion of them receives treatment before surgery. Ways of improving anemia such as iron supplementation, erythropoyetin administration or both are valuable options for these patients, depending the cause of anaemia. More studies are needed to determine the actual prevalence of anaemia and complications related to it.

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### 07AP10-6

## Multiple coronary artery fistulas to pulmonary artery

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**Background**: Coronary artery fistula (CAFs) are present in 0.002% of the general population representing 0.4% of all cardiac malformations. Fistulas can originate from the right coronary (50-60%), left anterior descending (25-42%), circumflex (18.3%), diagonal branch (1.9%), or left main coronary artery (0.7%) (1). Single fistulas are most common, 74-90% (2). However, multiple fistulae with separate origins from the coronary artery tree are rare. Here we present a case of multiple CAFs arising from different sites to pulmonary artery.

Case Report: A 7 year old girl with a history of symptomatic heart murmur was found to have collateral flow entering the pulmonary artery by echo. CAF was suspected and a cardiac catheterization was performed. Inhalation induction was applied followed with endotracheal intubation and there was no event in whole procedure. Multiple CAFs of various sizes were found arising from left main and anterior descending coronary (LAD) artery entering the proximal pulmonary artery (Figure). Because the child was asymptomatic and closure of the larger fistulae will likely result in rapid enlargement of the smaller others, it was decided to defer interventions for later in life when a long covered stent can be a viable option. This patient had an uneventful recovery at PACU and was discharged to home at the same day.

**Discussion**: Most children with CAFs are asymptomatic and continuous cardiac murmur is the most commonly reported finding on physical examination. Symptoms of myocardial ischemia arise due to diversion (steal) of oxygenated coronary blood flow to the lower pressured pulmonary artery circulation. Other symptoms may include volume overload due to left-to-right shunt, arrhythmia, aneurysm and rupture (3). A thorough preoperative evaluation, avoiding large increases in myocardial oxygen demand and maintaining coronary perfusion pressure are the major considerations for smooth anesthetic management.

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Learning points: Anesthesia management on CAFs.

## 07AP10-8

# Comparison of urinary biomarkers for prediction of acute kidney injury after coronary artery bypass surgery

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Background and Goal of Study: Acute kidney injury (AKI) after coronary artery bypass grafting (CABG) is one of the main complication that increases morbidity and mortality. The serum creatinine which is frequently used as a marker of renal function does not reflect the status of kidney function during acute changes. The aim of this study is to assess the correlation between three urinary biomarkers [Microalbumine (MA), Neutrophil gelatinase-associated lipocalin (NGAL), Kidney injury molecule-1(KIM-1)] and AKI in CABG patients.

Materials and Methods: All patients >18 years of age, underwent cardiopulmonary bypass between February 2016 and July 1016 were enrolled in the prospective study. The primary outcome was AKI, defined as ≥ %25 decrease in glomerular filtration rate. The GFR was calculated as creatinine clearance rates with 24-hour urine collection. The single urine samples for MA and NGAL were obtained at postoperative 2-h and for KIM-1 at 24-h.

Results and Discussion: A total of 70 patients were included in this study. AKI was identified in 18 (%25.7) patients while other 52 patients (74.3) were classified as non-AKI. The MA and NGAL were significantly higher in AKI patients than in non-AKI patients (median [IQR], MA: 37.87 [15.81-78.94] v 18.24 [11.04-38.63] [µg/ml], p=0.022; MA/Cr: 150.77 [65.91-535.08] v 81.18 [41.95-180.26] [µg/mg], p=0.05; uNGAL 33.35 [7.3-67.58] v 11.50 [6.98-18.13] [ng/ml], p=0.023; uNGAL/Cr: 81.66 [47.84-274.95] v 52.95 [31.04-89.53] [ng/mg], p=0.023). The 2-h NGAL /Cr values correlated with length of stay in hospital (p=0.042) and 2-h MA/ Cr measurements correlated with length of ICU stay (p=0.02).

**Conclusion:** Single measurements of urine NGAL and MA in 2-h after CABG may be useful for predicting the occurrence of AKI while, urine KIM-1 which was measured in postoperative 24.hour was not associated with AKI.

### 07AP10-9

# The ACS NSQIP Surgical Risk Calculator in estimation of the perioperative death and serious complications after cardiac surgery - retrospective experience of one center

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Background and Goal of Study: Reliable risk models to predict mortality following cardiac surgery are the matter of debate. The ACS NSQIP risk calculator is recommended by ESC /ESA for non-cardiac surgery assessment to predict hospital mortality and complications. Euroscore II is a recognized tool to estimate the risk after cardiac surgery.

The study aim was to evaluate the value of ACS NSQIP calculator for prediction of hospital death and other complications in adult cardiac surgery patient's population. Additionally, its predictive value was compare to Euroscore II.

Materials and Methods: The medical records of 200 patients who underwent cardiac surgery between 1.05-30.11/2017 at University Hospital were retrospectively analyzed. The collected data were compared with the ACS NSQIP calculated risk of death and serious complications. The statistical analysis was carried out using Hosmer-Lemeshow test, where p > 0,05 indicates credibility of calculations. The ACS NSQIP predicted risk of death was compared with Euroscore II using Spearman rank correlation test.

Results and Discussion: Serious complications occurred in 20,5% of studied patients. 30-days mortality rate was 2%.

The ACS NSQIP risk calculator significantly predicted risk of death (p=0,88). The ACS NSQIP can also be useful in assessing the risk of pneumonia (p=0,27),

cardiac complications (p=0,1) and hospital readmission (p=0,2). The predicted risk of death by ACS NSQIP calculator significantly correlated with the Euro Score II (p < 0.05)

Conclusion: The ACS NSQIP Surgical Risk Calculator is a useful tool to predict perioperative risk of death after cardiac surgery. Its value for prediction of other complications needs further elucidation.

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## 07AP10-10

# Prevalence of difficult intubation in cardiac surgery: relation to obesity, age, gender and type of surgery

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Background and Goal of Study: Cardiac surgery has shown higher difficult intubation (DI) rates compared to other kind of surgeries [1][2]. Older age, male gender, morbid obesity and dental problems have been associated with these findings [1].

The aim of this study is to describe the prevalence of DI in cardiac procedures in our centre, as well as to analyze wether parameters as age, body mass index (BMI) and type of surgery (valve replacement (VR) or coronary artery bypass (CAB)) could be predictors of DI in our population.

Materials and Methods: We reviewed retrospectively a total of 590 patients undergoing cardiac surgery; 333 VR, 199 CAB, and 58 were other procedures. Age, height, weight, type of surgery, Cormack-Lehane Grade (CLG) and intubation technique were assessed. Patients with CLG III and IV were considered DI. Obesity was defined as BMI >30. Analysis were performed using univariate and multivariate logistic regression models.

**Results and discussion:** Amongst our population, 374 were men (63%) and 216 (36%) women. Median age was 68,6  $\pm$ 11,6 years, weight 75  $\pm$  15 kg, height 1,64 $\pm$ 0,09 m and BMI 27,55  $\pm$  4,8. We reported 25,6% obesity and 1,7% morbid obesity. The overall incidence of DI was 15% (87/590). The incidence of DI showed no difference between obesity patients (17,4%) compared to non obesity (14%, p=0,307). Similar results comparing DI in VR (15,1%) and CAB (15,4%, p=0,576). Otherwise there was higher prevalence of DI in men (17,4%) versus women (10,7% p=0,028).

The analysis demonstrated that the independent predictor associated with DI in our population would be the male sex (OR 1,954 (95% CI 1,153-3,31; p=0,011), neither age, kind of cardiac surgery, or obesity.

Conclusion: Patients submitted for cardiac surgery in our center had a higher prevalence of DI compared to the rates reported in other surgical procedures according to the literature. Male gender was a variable associated with DI and there were no significant differences suggesting that age, obesity and type of surgery could be independent risk factors for DI.

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## 07AP10-11

# Effects of diuretics on postoperative AKI in patients after cardiovascular surgery under cardiopulmonary bypass

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Introduction: Acute kidney injury (AKI) after the cardiovascular surgery is not rare. Various factors such as administration of drugs, background of the patient and cardiopulmonary bypass are thought to be related to acute kidney injury. It is unclear whether perioperative administration of diuretics had an influence on the incidence of postoperative AKI in patients after cardiovascular procedures under cardiopulmonary bypass.

Materials and methods: This study was a retrospective observational study. We evaluated patients who underwent the cardiovascular surgery under cardiopulmonary bypass in our hospital from January 1 to December 31 in 2016. We excluded patients who required regular hemodialysis due to chronic end-stage kidney disease. AKI was diagnosed by KDIGO criteria within 3 postoperative days. We conducted statistical analysis for background of the patient, dose of diuretics (furosemide, mannitol, carperitide and others), fluid volume, urine volume, amount of bleeding, blood pressure, central venous pressure, cardiac index, creatinine, eGFR, and aortic cross clamping time in two groups of patients (AKI group and non AKI group). Student's t-test was used for continuous variable, and Fisher's exact test was used for categorical data

Results: There were 76 patients during the study period. Seven patients were excluded because they were on chronic hemodialysis. AKI occurred in 14 patients

(20.3%). There was no significant difference between the two groups in gender, duration of anesthesia, urine volume, and doses of mannitol and carperitide. There were more patients who were preoperatively not on diuretics other than furosemide in the AKI group than in the non-AKI group (85.5% in the AKI group vs 14.5% in the non-AKI group, P=0.0398). Patients in the AKI group required a larger amount of furosemide postoperatively than did patients in the non-AKI group (AKI group:158.7 mg [95% CI,96.9-220.6] vs non-AKI group:72.7 mg [95% CI,42.4-103.0],P=0.0151). In addition, perioperative mean blood pressure was lower in the AKI group than in the non-AKI group (AKI group:55.9 mmHg [95% CI 46.4-65.5] vs non-AKI group:66.9 mmHg [95% CI 64.7-69.0], P=0.0295).

**Conclusion:** Perioperative administration of diuretics is associated with a high incidence of AKI after cardiovascular surgery under cardiopulmonary bypass.

## 07AP11-1

# Postoperative pain management in thoracic surgery: Paravertebral block versus thoracic epidural

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Background and Goal of Study: Thoracotomy is one of the most thoracic surgeries, associated with substantial postoperative pain (1). An adequate pain relief decreases postoperative complications and chronic pain development (2,3). An analgesic method providing postoperative pain control with minimal side effects is required. The goal of our study is to compare postoperative analgesia after thoracotomy thought thoracic epidural or continuous paravertebral block.

Materials and Methods: We retrospectively reviewed records of patients undergoing thoracotomy from January to December 2017 and its postoperative analgesia technique. Patients were grouped in analgesic technique received: Group P: Ultrasound guided thoracic paravertebral block and Group E: Thoracic epidural analgesia. Both were continuous with elastomeric pump of levobupiyacaine 0.125% (5-12 mL/h. Bolus 5 mL). All patients received acetaminophen 1g/8h and dexketoprofen 50mg/8h. Analgesic efficacy, pain scores (Visual Analogic Scale-VAS) at three times (arrival at intensive care unit (ICU), 24h and 48h) length of stay and complications were compared between the two groups. Results were analysed by Chi-square test and Mann-Whitney U-test, p < 0.05 was considered significant. Results and Discussion: 32 patients were registered (Group P 14 (43.8%), Group E 18 (56.3%)). Both the groups were similar with regard to demographic factors (p > 0.05). There were no statistically significant differences between groups in postoperative acute pain (Table 1,p > 0.05). Length of stay, analgesic efficacy and rescue analgesia required were similar in the two groups (Table1, p > 0,05). Complications were infrequent

VAS arrival ICU (mean ± SD)	VAS 24h (mean ± SD)	VAS 48h (mean ± SD)	Rescue analgesia	Length of stay (mean ± SD)	
3.36 ±1.3	1.25 ± 0.8	1.21 ± 1.25	15,4%	$5.66 \pm 3.0$	
2.8 ± 1,9	1.30 ± 1.6	1.06 ± 1.02	22.2%	6.11 ±2.2	
Conclusion: Paravertebral and epidural block have similar outcomes in acute pain control and complications. Technique choice should be based on patient					
	ICU (mean ± SD) 3.36 ±1.3 2.8 ± 1,9 on: Paravertebr	ICU (mean ± SD) SD)  3.36 ±1.3 1.25 ± 0.8  2.8 ± 1,9 1.30 ± 1.6  on: Paravertebral and epid			

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### 07AP11-2

# Pulmonary hypertension as an independent factor for increased 28-day mortality in Lung transplantion

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Introduction: Pulmonary hypertension (mean pulmonary artery pressure (mPAP) >25 mm Hg) is frequently reported in patients (pts) planned for lung transplantation (LT). The role of mPAP as a risk factor for increased 28-day mortality following LT is debated. We analysed the role of mPAP in the perioperative period of a cohort of LT patients. The mPAP assessed in the preoperative phase (mPAPpre) and immediately after anesthesia induction (mPAPop) and the delta between these measurements were analysed and compared with 28-day mortality after LT.

Materials and Methods: From our local database, we extracted the records of pts who underwent LT between 2006-2013. The eligible population consisted of pts with mPAP available on their medical records in the pre and peroperative period. Two binary variables were tested for their significance (one-sided 2-sample test for equality of proportions with Yates' continuity correction at confidence level of 95%) with regards to 28-day mortality: 1) both mPAPpre and mPAPop values >25 mmHg and 2) mPAPop value >mPAPpre value, on the whole cohort and on the subgroup of pts receiving Nitric oxide (NO).

Results and Discussion: Overall 138 LT pts (91 males (66%), age 54 years) were analysed. The main causes for LT were: idiopathic fibrosis (46%), COPD (25%), alfa-1 antitrypsin deficiency emphysema (13%). 132 (95.7%) pts received NO. At Day28 post-LT, 123 (89%) patients were alive. 59 pts (44%) had both mPAPpre and op values ≥25 mmHg (group 1), 75 pts (56%) had at least one value < 25 mmHg (group 2). 22 pts (16%) had no PAP value >25. No difference in terms of 28-day mortality rate was observed between these two groups: 11.9% vs 9.3% in Group 1 and 2, respectively (p-value = 0.42). 93 pts (69%) had a mPAPop value > mPAPpre value, while for 41 pts (31%) the mPAPop value < mPAPpre value. No difference in terms of 28-day mortality rate was observed between these two subpopulations: 11% vs 10%, respectively (p = 0.5). Among the 132 pts who received NO, 89 pts (69%) had a mPAPop value > mPAPpre value, while for 40 pts (31%) the mPAPop value < mPAPpre value. No difference in terms of 28-day mortality rate was observed between these two subpopulations: 11% vs 10%, respectively (p-value = 0.5).

**Conclusion:** We did not evidence any link between mPAP and 28-day mortality rate whatever considering the peroperative value or the delta between the preoperative and operative period in LT pts.

### 07AP11-3

# Three methods of lung isolation using a bronchial blocker and laringeal mask in patients with a difficult airway

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**Background and Goal of Study**: Lung isolation in thoracic surgery is a challenge because it is often associated with a superior and / or an inferior Difficult Airway (DA) 1. We analyze a series of cases of DA using a laryngeal mask (L.M.) and a bronchial blocker (B.B.).

Materials and Methods: Case nº 1: a 62-years-old patient, ASA III, who was previously operated of a left thyroplasty underwent an upper left lobectomy. He had the left vocal cord displaced to the midline. Therefore, endotracheal intubation was avoided due to the risk of displacement of the prosthesis. Then a L.M. Fastrach was inserted. Finally the lung isolation was performed using an Arndt B.B. inserted through the L.M. guided by a fiberoptic bronchoscope, obtaining optimal right lung ventilation and collapse of the left lung.

Case nº 2: a 77-years-old patient, ASA IV underwent an upper right lobectomy due to a malignant pulmonary nodule. The patient suffered from chronic bronchitis, sleep apnea obstructive syndrome and retrognathia. After the anesthetic induction, a L.M. Aura Gain was inserted checking that manual ventilation was adequate. Later an orotracheal Fastrach tube and a B.B. Uniblocker were introduced guided by a flexible videoendoscope (AMBU), achieving an optimal tracheobronchial view and a lung collapse (Fig 1).

Case nº3: a 69-year-old patient, ASA II, underwent a lung resection due to a metastatic nodule in right upper lobe. The patient suffered a cavum adenocarcinoma treated with chemotherapy and radiotherapy and a left pulmonary resection due to metastasis. He had several DA predictors. After induction and observing a Cormack-Lehane IV grade, a L.M. AuraGain was used and a VivaSight™-SL-ETView tube was inserted through the L.M. guided by a Frova cateter; after that, we introduced a B.B. Uniblocker also guided by this camera incorporated into the tube (Fig. 2). Results and Discussion:The result of these three cases was excellent to ensure the ventilation, as a channel to facilitate the intubation, an extubation by stages and / or a safe reintubation.

Conclusion:We believe that the DA approach can be performed by L.M. and B.B.1 under fiberscope vision and / or VivaSight™ endotracheal tube-SL-ETView2. References:

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## 07AP11-4

The accuracy of lung ultrasonography to identify the position of left-sided double lumen tracheal tube in elective thoracic surgery: a preliminary study

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Background and Goal of Study: In thoracic surgery, a double lumen tracheal tube (DLT tube) for one-lung ventilation is required for the surgical procedure. Conventionally, the location of the tip bronchial cuff of DLT tube has been identified by chest auscultation accompanying sequential one-lung ventilation and its accuracy is known to about 60%. Compared to auscultation technique, ultrasound can provide an easy, fast and direct visualization of pleural movement. Therefore, ultrasonography can be more accurate to identify the position of DLT tube.

Materials and Methods: We enrolled 35 patients and randomly assigned 2 groups, group A (n=18) using chest auscultation and group B (n=17) using ultrasonography to identify the location of DLT tube. After anesthesia induction, a left-sided DLT

tube was intubated with blind manner using direct or video laryngoscope and fixed arbitrarily from 27 to 31 cm. After a successful intubation, the location of tip identification was identified by the presence of breathing sound in group A or by lung sliding sign in group B. Finally, fiberoptic bronchoscopy was performed to confirm the location of the tip of DLT tube. The accuracy was calculated from the proportion of correct ratio in all determination. At each patient, we measured the location of DLT tube by two anesthesiologists (one is novice to lung ultrasonography, but experienced chest auscultation, the other is experienced both of two techniques).

Results and Discussion: In novice anesthesiologist, the accuracy of DLT location identification was 50% in group A and 64.7% in group B (p=0.387). In experienced, the accuracy was 61.1% in group A and 70.6% in group B. (0.560).

**Conclusion(s)**: From the present study, the accuracy was likely to be similar between two techniques. However, this is just a preliminary data and further data would provide more interesting findings.

### 07AP11-5

# **Critical Care After Lung Resection - Incidence and Outcome**

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**Background and Goal of Study:** Un-planned critical care admission is a devastating complication of lung resection. Within the UK Association of Cardiothoracic Anaesthesia and Critical Care's annual collaborative audit into Critical care Admission following Lung Resection (CALoR) we sought to characterise this patient population, providing an up to date estimate of incidence, and explore patient outcome.

Materials and Methods: This was a multicentre retrospective audit examining adult patients undergoing lung resection in 2013-2014. Critical care admission was defined as un-planned need for intubation with mechanical ventilation and/or renal replacement therapy. Sixteen UK centres contributed to the audit where detailed demographic and clinical data were collected on every patient admitted to critical care. Centres also provided the total number of patients undergoing lung resection within the study period.

Results and Discussion: A total of 11,208 patients underwent lung resection with 253 requiring critical care – an admission rate of 2.26%. Respiratory failure was the primary cause of admission in 68% of cases, with infection and sputum retention being the most common diagnoses; 88% of all patients received antibiotics targeted at a respiratory source of infection. Overall critical care mortality was 36%. Eighty percent of survivors were discharged home whilst the remainder were transferred to other care facilities. The mean duration of mechanical ventilation, intensive care and hospital stay was 14, 19 and 33 days respectively. Tracheostomy was used to facilitate liberation from mechanical ventilation in 49% of patients

Conclusion: This is the largest study examining unplanned critical care admission following lung resection reported to date. There exists significant therapeutic nihilism concerning the deteriorating post-operative lung resection patient, anticipating poor outcomes. Though patients admitted to critical care following lung resection undoubtedly have significant resource requirement, we suggest a survival rate of 64% is encouraging. Future work should allow analysis of the longer-term impact of critical care admission on functional capacity and quality of life. Large scale, prospective audit and research tailored towards this challenging patient cohort would allow for better understanding of factors associated with critical care admission and outcome, and could potentially allow development of a risk prediction model.

### 07AP11-6

# Ultrasound guided paravertebral catheter for postoperative multimodal analgesia thymectomy surgery by VATS approach

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Background and Goal of Study: Thymectomy is performed in myasthenia gravis patients to relief symptoms or reduce medication. Video-assisted thoracoscopic (VATS) approach was recently introduced for thymectomy at our center instead of sternotomy. The first patients were treated by conventional postoperative analgesia, but in our VATS experience the postoperative pain is important. So we wondered if this technique really required multimodal analgesia like other VATS surgeries.

Materials and Methods: Retrospectively we analyze the series of the first cases performed during 2017. We review quality of analgesia recorded by a Verbal Numerical Rating Scale (VNRS) registered at the end of the surgery, first and second day after surgery and the average of opioid rescue needed in the first 24 hours. Multimodal regimen of analgesia as protocol in our center is provided by using ultrasound guided catheter for continuous paravertebral block CPBV (infusion with ropivacaine 0,375%), non-steroidal analgesics (NSAIDs) and opioid analgesia as needed.

Results and Discussion: 12 patients were included (42% Male, 58 % Female), 5 of

them were done under general anesthesia (group A) and the rest combined general anesthesia and CPBV as multimodal analgesia (group B). The VPNS media was 6,5 (SD 2,2) at the end of the surgery 3,0 (SD 2,4) at the first day 2,1 (1,4) at the second day in group A. The VPNS media was 5,6 (SD 2,7) at the end of the surgery, 3,2 (SD 1,8) at the first day 1,8 (SD 1,8) at the second day in group B. Only 3 patients (37%) of the 7 patients in group B need rescue analgesia in contrast to 4 (80%) of the 5 patients in group A. No complications related to the analgesic technique were found in any groups. Regarding the pain assessed at three months after surgery, there were no differences between the two groups, they were asymptomatic for pain at surgical site.

Conclusion(s): Multimodal analgesia approach with CPBV is a better alternative for myasthenia gravis patients who underwent VATS thymectomy, lowering the consumption of opioids in the first 24 hours and having a good pain relief. To avoid opioids is an important issue considering the neurologic characteristics of this patients. However, we need to perform prospective studies that confirm this preliminary results.

### 07AP11-7

# Near-infrared spectroscopy is not useful to detect impairment of oxygenation during thoracic surgery with one-lung ventilation

Loop T.1

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Background and Goal of Study: The near-infrared spectroscopy is a method to measure cerebral tissue oxygen saturation (SctO2) continuously. During thoracic surgery with one-lung ventilation (OLV) various studies found a significant decrease in SctO2. This study tested the hypothesis that thoracic surgery with OLV and normoxia is not accompanied with a significant decrease in regional SctO2.

Materials and Methods: After informed consent SctO2, oxygenation and invasive hemodynamic blood pressure (MAP) were measured in adult patients undergoing thoracic surgery at opened pleura and OLV. Tracheae were intubated with DLTs of the Robertshaw type with the bronchial branch placed contralateral to the side of surgery. During pressure controlled OLV values of SctO2, paO2/FiO2 and MAP were recorded at baseline, lateral position, 15 min after initiation of OLV and pre-

Results and Discussion: 38 patients were included in this study (mean age 63 (21 – 83); ASA II/III/IV 17/17/4). Since MAP was comparable at all time points (Fig.1A), paO2/FiO2 ratio dropped during OLV (Fig.1B). SctO2 levels did not show any significant difference at any time point (Fig. 2A). Only six patients showed critical SctO2 levels below 60% (Fig. 2B).

**Conclusion**: The near-infrared spectroscopy and the measurement of SctO2 does not reflect the reduction and drop down of the oxygenation status during OLV if normoxic conditions were maintained.

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## 07AP11-8

# Use of an amplatzer device for endobronchial closure of bronchoplerural fistula following a right pneumonectomy

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Background: Bronchopleural fistula (BPF) is a dreaded and severe complication of pneumonectomy because of its high morbidity and mortality rates. Its incidence ranges between 3 and 26% approximately. There are different surgical and endoscopic therapeutic options to solve the BPF. We present a case of endobronchial closure of a BPF using an Amplatzer septal occluder (ASO), a device originally designed for transcatheter closure of cardiac septal defects.

Case Report: 67-year-old man was admitted into our ICU 7 days after right pneumonectomy for adenocarcinoma was performed. He developed respiratory insufficiency needing Optiflow 45 lpm and FiO2 0,45. Bronchoscopy revealed a large BPF (7mm) in the medial edge of the righ pneumonectomy stump. Treatment with antibiotics, cures, chest tube drainage and thoracostomy failed. Thoracic surgeons dismissed surgical treatment. Interventional pneumologists and cardiologists decided to place a 10 mm ASO through the BPF. The procedure was successfully performed under mild sedation with complete closure of the fistula. Intubation was not needed during the procedure, only Optiflow was used. The patient was transferred to the ward 20 days after the endoscopic procedure. Few months later, TRAM flap was performed, this procedure was delayed because of a pulmonary embolism during the recovery period.

Discussion: Traditional surgical therapies for BPF have included primary repair or delayed closure with creation of a cavity with or without omental or muscle flap reinforcement. Newer less invasive techniques utilize bronchoscopy to deliver bioglues, stents or coils and constitute another suitable treatment option. The ASO (St Jude Medical, Minnesota) is the standard of care for transcatheter atrial septal defect closure. It is a self-expandable, braided ninitol and interwoven polyester

double-disk device. In our case, a guide wire was introduced through the fistula under direct bronchoscopic visualization. The Amplatzer device was then placed by pulling gradually. The distal disk was pulled back against the distal side of the defect, then the central waist filled the defect and the second disk was placed on the proximal side of the defect. This endoscopic technique is well tolerated even under conscious sedation

**Learning points**: The ASO is an effective tool for the endoscopic closure of BPF following pneumonectomy for patients in poor general condition that are considered inoperable.

### 07AP11-9

# The effect of preoperative anemia on postoperative morbidity and mortality in patients undergoing thoracic surgery

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### Background and Goal of Study:

Anemia is common in patients undergoing thoracic surgery due to three main risk factors including iron deficiency anemia, chronic disease anemia, iatrogenic anemia, all of which can be prevented and treated.

The incidence of anemia was found as 26% in a multicenter study involving patients undergoing cardiac surgery, which increased to 47 % in patients having elective vascular surgery. However data on the incidence of preoperative anemia for thoracic surgery are limited. We hypotized that the incidence of anemia may be higher than expected, which may be associated with both peri- and postoperative complications.

Materials and Methods: After obtaining the instutional board approval, this retrospective study enrolled 107 patients older than 18 years who underwent thoracic surgery by a thoracotomy or thoracoscopy between January 2016 and July 2017. We recorded demographic features, pre- and postoperative hemograms and other laboratory tests, comorbidities, the transfusions of blood and blood products, complications, mortality, type of surgery, rate of re-exploration, length of ICU and hospital stay. The patients were classified into two groups according to the presence or absence of anemia. The anemia was defined according to the WHO criteria as a hemoglobin level <12 g/dL in woman and <13 g/dL in man.

**Results and Discussion:** The incidence of anemia was 43.9%, being higher in man with 57,4%. Compared with patients without anemia, patients with anemia had a significantly increased length of hospital stay, higher rate of ICU admission, higher levels of pre- and postoperative creatinine and lower levels of postoperative Hb and Htc and lower value of preoperative INR (p<0.05, Table 1).

The patients who required ICU admission significantly differed from those who did not in low levels of preoperative Hb, pre- and postoperative Htc and increased duration of operation, hospital stay and intraoperative RBC use (p<0.05, Table 2). **Conclusions:** Our findings suggest that the incidence of anemia is high in patients undergoing thoracic surgery. Eventhough the rate of mortality is not affected, anemia is associated with a higher rate of ICU admission and longer hospital stay. Additionally an increased intraoperative use of RBC is likely to contribute to morbidity by exposing patients to transfusion-associated complications. The treatment of anemia during preoperative period should be considered for the candidates of thoracic surgery.

# 07AP11-10

# Surgical resection of giant mediastinal tumor with partial clamping of the superior vena cava without extracorporeal circulation

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**Background**: Perioperative management of mediastinal masses with superior vena cava (SVC) invasion is very complex due to compression by the tumour and clamping complications.

Case Report: A 44-year-old man was diagnosed with a 15x11x12 cm nonseminomatous germinal tumor in the anterior mediastinum with infiltration of the pericardium, SVC and left upper lobe. He underwent neoadjuvant chemotherapy treatment plus radical intention surgery. There was neither clinical nor radiological evidence of airway compromise so we proceeded to a rapid sequence induction. BIS, cerebral oximetry and invasive hemodynamic parameters were added to routine monitoring as well as central venous accesses in the lower limb. The complete resection included the left innominate vein and part of the SVC reducing its lumen <50%, that produced hypotension and tachycardia requiring vasoactive support. There was also a 30 point bilateral fall in oximetry without any BIS parameter changes. Acute edema and light cyanosis of head and arms were evidenced, disappearing after 24h and 3 weeks, respectively. The patient was extubated the day after surgery with no neurological damage.

Discussion: Complete clamping of SVC leads to a decrease in the venous return of the upper body that causes edema and an impaired cerebral perfusion. It can be avoided mainly by using extracorporeal circulation or performing a veno-venous/ veno-right atrium bypass before clamping (1). It isn't clear how long, up to 290 min in some cases, clamping is tolerated without producing irreversible brain damage (2). Our case had a better clamping tolerance for the following reasons: 1) SVC clamping was partial 2) previous existence of collateral circulation secondary to left innominate vein thrombosis (1). Hemodynamic changes and edema could even appear with partial clamping. We have observed that a severe and bilateral decrease in oximetry was not correlated with BIS drop. Neurological damage after awakening was neither related to it.

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Learning points: Either partial or total clamping of the VCS during mediastinal mass resection entails a situation of great complexity. It is not described how long it is tolerated without neurological damage. Some acute complications could be reversible.

### 07AP12-1

# latrogenic common carotid artery rupture during neck surgery rescued using covered stent

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**Background:** Carotid artery rupture during head and neck surgery is a catastrophic, life-threatening emergency. Although recent incidence has declined, it still occurs in many patients. Hemorrhage from the carotid artery is usually massive and uncontrollable. Fast, aggressive treatment to prevent hemodynamic instability is required.

Case Report: A 31-year-old male who was 171 cm tall and weighed 85 kg was scheduled for lymph node excision under general anesthesia. He was diagnosed with thyroid cancer 4 years prior, and underwent a total thyroidectomy with modified radical lymph node dissection of the neck. He was taking levothyroxine sodium for replacement of thyroid hormone. During outpatient treatment after the surgery, a 3.3-cm sized cystic lesion was found at the right supraclavicular area. To rule out metastatic lymph node disease, lymph node excision was planned under general anesthesia. After dissection, metastatic lymph node invasion of the right CCA was confirmed. During careful dissection, the CCA ruptured unexpectedly and massive arterial spurting occurred. For bleeding control, the surgeon applied direct manual compression with the hand. Several attempts to directly repair the ruptured CCA failed, we concluded that endovascular management was a better choice to enhance the patient's safety. The exposed CCA was treated with a covered stent successfully.

**Discussion:** Complications associated with neck dissection are various. Even under the best circumstances, the mortalilty is unacceptably high. Even if a patient survives, the sequelae resulting from cerebral ischemia can be devastating. Therefore, immediate aggressive intervetnion of anesthesiologist is necessary. After endovascular management or operative ligation, the patient should be monitored in an intesive care unit for signs of cerebral ischemia. **References:** 

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**Learning points**: This case suggests that when major vascular damage occurs, interventional techniques can serve as treatment. As the field of interventional radiology is rapidly and continuously evolving, anesthesiologists must be aware that the use of interventional radiology is an option when severe major vessel or oran injury occurs in the perioperative period

# 07AP12-2

# Endovasculat type B aortic dissection under local anaesthesia and sedation

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**Background**: Type B AD leds to a blood flow through the walls of the descending aorta. It needs control of blood pressure in order to prevent lesion evolution. Surgery is due for patients with malperfusion or active hemorrhage. Open surgery implicates risks of paralysis, lung dysfunction, and fatal bleeding. Endovascular stent grafting is settled as a therapy for other type of aortic aneurysms, and is now evolving as a treatment for this cases!

Case Report: 74yo male with history of hypertension, dislipemia, Child A hepatic cirrhosis, previous smoking and alcohol abuse visited at the ER for back pain, chest disconfort and dyspnea. X-Ray showed a widen mediastinum and left pleural

effusion. CTA reveled a Type B AD and left haemotorax. Labetalol CP was initiated and the patient was brought to the operating room. Sedation was induced with midazolam 2mg and remifentanyl 0.05mcg/kg/min. Surgical approach was through right humeral and left femural arteries with local infiltration of levobupivacaine 0.5%. The stent graft was advanced through the left femoral artery and deployed past the left subclavia emergence. Unexpectedly no hemodynamical changes took place.

**Discussion**: Endovascular repair in Type B AD appears to be associated with better early and midterm outcomes compared to conventional therapy!. It can be performed under general anesthesia, neuroaxial block² or local anesthesia and sedation. Weak points of regional or local anesthesia include patient movements that can be avoided if the patient is collaborative. Local anesthesia and sedation allow spinal cord ischemia monitoring, avoid airway complications and postoperative depression form residual drugs.

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Learning points: In Type B dissection heart rate and blood pressure should be aggressively controlled with beta-blockers targeting 60 beats/min and 100 mm Hg, respectively. When diagnosis is confirmed, patients should be immediately brought to a hybrid operating room for endovascular and/or surgical treatment options. Endovascular therapies are becoming the standard care, seeming to provide better outcomes compared to open surgical repair approach. Endovascular stent grafting can be performed under sedation and local anesthesia if the patient is collaborative.

# 07AP12-3

# Awake sedation with propofol during carotid endarterctomy provides better stress relief compared to alprazolam premedication alone

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Background and Goal of Study: Increased perioperative plasma concentration of cortisol is a marker of intraoperative stress. We assumed, that carotid endarterectomy (CEA) performed under awake sedation with propofol is more beneficial to prevent such stress than alprazolam premedication only.

Materials and Methods: A total of 40 consecutive patients with significant carotid artery stenosis were enrolled into this prospective study. All operations were performed in regional anaesthesia. As premedication, all patients took 0.5 mg alprazolam 30 minutes before the procedure. After randomization 20 patients had awake sedation with target controlled propofol infusion (TCI), the other 20 had only premedication (BDZ). Cortisol plasma levels were serially analysed: prior to surgery (T1), before (T2) and after release of carotid clamp (T3), at 2 (T4) and 24 post-operative hours (T5). Alprazolam levels were also measured before and after the surgery.

**Results and Discussion**: The plasma concentration of cortisol was significantly lower in the TCl group at both T3 (p=0.04) and T4 (p=0.006) compared to BDZ group. Alprazolam levels did not correlate with cortisol levels at any time point. A significant positive correlation was found between the clamp time and plasma cortisol level at T3 (p=0.01), similarly between the degree of contralateral carotid stenosis and plasma cortisol level at T3 (p=0.03).

Conclusion: Intraoperative propofol sedation provides better stress relief compared to alprazolam premedication during awake CEA.

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# 07AP12-4

# Medullar protection in endovascular surgery of thoracoabdominal aorta

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Background and Goal of Study: The drainage of CSF as a protective medullar measure in the aortic vascular surgery has shown a reduction in the incidence of

measure in the aortic vascular surgery has shown a reduction in the incidence of medullar ischaemia increasing the medullar perfusion by decreasing intrathecal pressure. Even though its practice is widely accepted in open Aortic surgery, there is still no consensus on its prophylactic insertion in endovascular surgery.

**Materials and Methods**: It is a 68-year- old patient, with an asymptomatic horacoabdominal aneurisma, programmed for endovascular repair by a

fenestrated endograft with visceral involment (2 renals / 1 AMS / Celiac trunk). No intraoperative incidents. At the end of the surgery there were no focal neurological deficiencies. In the recovery room the patient refers a motor weakness in lower extremities. Under suspicion of medullar ischaemie, we decided to place an intradural catheter to drain CSF. There was a total resolution of the neurologic symptoms. Four days after the patient was discharged home, he reported a progessive interescapular pain. Angio-TC is performed showing an aortic dissection type B with extension until the proximal end of the aortic endograft. Labetalol is started to maintain a strict tensional control. The patient was proposed for a difered stent-graft placement. Before the surgery a lumbar catheter to drain CSF was placed with any incidence. Intraoperative hemodynamical monitoring was performed with transesophageal echocardio. Postoperative period without complications and the catheter could be removed 2 days later.

**Results and Discussion**: Spinal chord injury is uncommon after FEVAR. The role of prophylactic CSF drainage is difficult to establish from the available literature. The indications of CSF drainage according to the protocol of our center includes: patients with previous aortic endovascular surgery, subclavic oclusion, hypogastric oclusion and long endograft extension. Our patient had nocriteria to place a prophylactic catheter in the first surgery, but due to the neurological complications it was used as a rescue mesure.

**Conclusion:** Although the role of CSF drainage as a medullar protection is not established as a gold standard in thoracoabdominal endovascular surgery, its application in selected cases can be very useful, being one of the fundamental pillars in the prevention and treatment of medullar ischaemia.

## 07AP12-5

# Evolution of anaesthesia management for transfemoral aortic valve implantion ir aortic stenosis. Review of cases of our center

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Background and Goal of Study: Aortic stenosis is the most frequent valvular pathology in patients over 65 years of age. Surgical valvular replacement is the standard treatment (recommendation class I), however, it presents a high morbimortality. Transcatheter aortic valve implantation (TAVI) is emerging as an alternative, less invasive technique. There are two main approaches: transfemoral and transapical. The tendency to minimal invasion, together with the unnecessary use of transesophageal echocardiography (TEE) during the transfemoral procedure, has led to a modification of the anesthetic technique. Our objective is to review the anesthetic management of TAVIs performed at the General Hospital of Valencia from October 2012 to the present, and compare it with the current bibliography

Materials and Methods: 99 patients were reviewed, of which 82 were operated on transfemorally. Initially, the transfemoral TAVI was performed under fluoroscopic and echocardiographic control, the anesthetic technique being general anesthesia (GA) with endotracheal intubation (ETI). Since October 2015 the use of GA with laryngeal mask (LMA) (18 cases) and sedation (2) has been progressively introduced, coinciding with the abandonment of TEE by hemodynamics after acquiring more experience. Significant hemodynamic complications were recorded in 8 cases, all of them with AG and ETI

Results and Discussion: The anesthetic technique of choice in TAVI remains a matter of discussion. Sedation reduces time and costs, as well as allowing neurological monitoring. But they are procedures that occur frequently with hemodynamic instability, so the GA and ETI offers greater safety by allowing immobility, in addition to ensuring the airway. Note the role of the LMA because it avoids laryngoscopy and intubation, as well as the use of neuromuscular blockers allowing an early awakening. For this reason, it is common that at the beginning of the learning curve, in more complicated procedures or in certain groups of patients (difficult airway, obstructive sleep apnea), an AG + ETI is chosen and that the use of the ML and sedation in those cases indicate.

**Conclusion**: Despite the evolution in the learning curve of the responsible team, complications of significant repercussions sometimes arise. Therefore, the choice of anesthetic technique should be based on patient comorbidity, institutional practices and team experience.

### 07AP12-6

# Endovascular repair of abdominal aortic aneurysms: current state and future expectations

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**Background and Goal of Study**: Abdominal aortic aneurysms (AAA) are a significant health issue and the cause of death in 1–3% of men over the age of 65 years in developed countries. The incidence is increasing and added to this is an ageing population with a greater prevalence for AAA and other comproling to the composition of the co

Open aneurysm surgery has been performed for over 50 years and is considered the gold standard treatment. However, mortality rates remain high despite advances in perioperative care, with quoted rates of 1.4–6.5% and 23–69% for nonruptured

and ruptured aneurysm repair, respectively.

In an attempt to lower this risk, less invasive endovascular techniques were developed and are considered a good alternative for those who do not qualify for open surgery.

But do these techniques success in providing less morbidity? Are we enough prepared to practice this treatment? We want to expose our experience, even if it's little, in the management of these patients.

Materials and Methods: We collected data for all the fenestrated endovascular aneurysm repairs (FEVAR) that were performed from 2013 up to 2017 in our hospital.

Results and Discussion: Of 26 patients (6 yuxtarenal aneurysms, 9 pararenal, 8 toracoabdominal and 3 mycotic) we had 11,5% of 30-day mortality, one of them was during the surgery. Complications were not negligible and we had 15,3% of endoleaks, 11,5% of pulmonary complications, 23% cardiological, 7% of intestinal ischemia, 3% of medullary ischemia; and above all renal complications were the most frequent ones (34%).

Conclusion(s): Endovascular aneurysm repair (EVAR), has surpassed open repair as the technique of choice in many centres in response to several large studies which showed significantly improved 30-day mortality. Although EVAR is obviously less invasive than open surgical repair, it is not free of complications.

These complications can potentially result in severe morbidity or even mortality, stressing the need for an exhaustive early detection and subsequent treatment. This includes surgical considerations, pre-operative optimization, the choice of anaesthetic technique, pharmacological protective strategies as well as a correct post-surgery care.

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### 07AP12-7

## Cognitive impairment in frail patients undergoing vascular surgery

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Background and Goal of Study: Frailty, is a commonly used term to describe the most vulnerable patients, based on physical attributes and capabilities only, while the conception of cognitive frailty is rarely integrated in the diagnostic process. The aim of our study was to show out the effects of cognitive impairment influencing the postoperative outcome of vascular surgery patients.

Materials and Methods: Data of 164 patients, undergoing vascular surgery, between 2014-2017 in the Heart and Cardiovascular Center of Semmelweis University in Budapest, were examined. All patients were asked to fulfil a questionnaire measuring psychosocial risk factors, including the Mini-Mental State Examination (MMSE), meanwhile, our study group collected and registered all the intraoperative and postoperative variables. The endpoints were defined as short-term outcomes, like the incidence of postoperative complications, the lengths of ICU and in-hospital stays and in-hospital mortality. For statistical analysis logistic and multivariate regression models were used.

Results and Discussion: The mean age of the study population was 67.06 years, the average MMSE points reached by the patients were 27.4 points (SD ±2.8). After adjusting the result for age and education level, the analysis demonstrated an average difference of 0.28 (SD ±2.9) from populations specific standards. Adjusted for Vascular POSSUM, age and gender, mild cognitive impairment (≥3points of difference from expected standard) was associated with an increased risk for postoperative peripheral circulatory failure (B=0.051; p=0.037), infection (B=0.093; p=0.016) and arrhythmias (B= -0,11; p=0.015) but not with short-term in-hospital and ICU stays. Vascular-POSSUM scores were also related to decreased MMSE deviation-points (B=0.13; p=0.009). During the 30-days follow-up in-hospital death did not occur.

**Conclusion**: The consideration of both physical and cognitive factors, leads to an improved prediction of adverse outcomes in vascular surgery patients.

# 07AP12-8

# Assessment of psychosocial factors during preoperative risk stratification in patients undergoing vascular surgery

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Background and Goal of Study: The clinical decision-making process can be facilitated using different risk-scoring systems. Due to previous studies and observations, we were assuming that not only clinical variables but also psychosocial factors and measurements of quality of life would greatly affect clinical outcome. This study represents preliminary results of our efforts to create an expanded risk-scoring system, including not only clinical variables, but psychosocial factors as well.

Materials and Methods: In our prospective observational study, we included the data of 164 consecutive patients, undergoing vascular surgery in the Cardiovascular Center of Semmelweis University. All patients were asked to fulfill a questionnaire neasuring psychosocial risk factors, such as general quality of life, measurements of cognitive function and scores representing affective disorders. We also assessed previously existing conditions present in the patient history. Meanwhile, our study group collected and registered all the available intraoperative and postoperative variables. Primary study endpoints were defined as major postoperative complications, number of reoperations, duration of hospital- and ICU stay, and innospital mortality. For statistical analysis, a multivariate regression model was used. Results and Discussion: Mean length of hospital stay was 9.1±6.5 days. Risk factors for postoperative peripheral circulatory failure were identified as a higher score on the Geriatric Depression Scale (OR=1.457 p=0.004), on the Beck Depression Inventory (OR=1.127 p=0.023) and on the Type D personality assessment (OR=1.200 p=0.020) as well as struggling with a poor financial situation (OR=8.486 p=0.004). The results were corrected for age and previous vascular-POSSUM scores. In our linear model, the Beck Depression Inventory seemed to influence the length of the ICU stay (B=0.400 p=0.120). We identified pre-existing COPD as an independent risk factor for cumulative complications (OR=3.176 p=0.007).

**Conclusion**: Our data suggests that psychosocial factors, such as depression and affective disorders, although previously often ignored during the preoperative risk stratification, could indeed influence patient outcome and frequency of postoperative major complications.

### 07AP12-9

# Rapid pacing for thoracic endovascular aortic repair: a case report

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**Background:** Endovascular aortic interventions are suitable alternatives to open surgery. Accurate positioning of the stent graft is a critical point because of systolic thrush. Techniques used to prevent it include pharmacological and mechanical methods. Rapid Right Ventricular Pacing (RRVP) is an emerging alternative with good patient tolerance and less complications. **Case report:** Male. 79 years. American Society of Anaesthesiology (ASA) status

Case report: Male, 79 years, American Society of Anaesthesiology (ASA) status 3 (hypertension, chronic obstructive pulmonary disease), with an aortic arch aneurysm previously submitted to an aortic arch debranching, was proposed for Thoracic Endovascular Aortic Repair (TEVAR). ASA standard, invasive blood pressure, depth of anaesthesia and cerebral oximetry monitoring were used.

Patient was sedoanalgesiated with Midazolam 2mg and Fentanyl 100mcg. A flow directed Pacing catheter was passed through an 8.5FR introducer inserted in right internal jugular vein. RRVP was tested to a cardiac frequency of 180 without patient complaint. Two vascular Valiant Thoracic endoprosthesis were placed through a femoral access. At the time of testing position and prosthesis deployment, RRVP was started and systolic blood pressure dropped to 50mmHg. After stopping the RRVP, normal rhythm and blood pressure were observed. No relevant changes in cerebral monitoring were found. Final angiography showed no endoleak of prosthesis. The patient was admitted at Post-Anaesthetic Care Unit and discharged after 24hours.

**Discussion:** RRVP results in accelerated heart rate with consequent decrease of intra-aortic blood flow, allowing a more precise graft deployment without displacement, which is associated with lower incidence of endoleak. The faster onset of RRVP and rapid return to normal values can shorten the duration of the procedure. The procedure is done with minimal sedation, important in individuals with poor clinical status. Most complications are puncture-related. Rhythmassociated complications can occur in patients with heart diseases. In this case, no cardiac events were found.

Conclusion: RRVP has been used in TEVAR with reliable results and is a good option for difficult cases. Besides technical facilitation, it's associated with a less complications and secondary effects than traditional measures, allowing to maintain patients with mild sedation and shortening hospital length of stay. RRVP seems to be advantageous over traditional methods of controlling blood pressure in patients submitted to TEVAR.

### 07AP12-11

Hemodynamic modification and EEG monitoring during carotid surgery: a review of the hemodynamics and the neurological perioperative complications in 275 consecutive cases

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**Background and Goal of Study**: Endarterectomy (CEA) is the standard treatment of carotid stenosis. Continuous EEG is one of the monitoring used to detect cerebral ischemia (1). When this appears, the EEG changes and the hemodynamic variations

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for CEA to describe these modifications.

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induced either spontaneously or by the anesthesiologist are not described. We therefore reviewed the peroperative electronic records of our patients anaesthetised

Materials and Methods: This is a retrospective single institution study, approved by our IRB, that reviewed the data recorded by our anesthesia information management system (Innovian Anesthesia Drager) in 275 patients who underwent CEA from 01 2012 till 12 2016. All the cases were performed under general anesthesia with propofol and remifentanil controlled by TCI using respectively the Schnider or the Minto model. A continuous EEG using 10 leads placed as described by the "10-20" international system was used in all the cases. The EEG was continuously observed by a neurologist and a written summary was avalaible in the medical record system. The cases for which an EEG modification was noted around the clamping time of both the internal and external carotid have again been thoroughly reviewed by a single neurologist (NG) to confirm the changes and the exact timing of the event. The mean blood pressures (MPB mmHg) were extracted from the database 20 minutes before and after the event. ANOVA for repeated measures was used to compare MBP.

Results and Discussion: 29 (10,54%) patients presented significative EEG changes (EEGdelta group). 27 of them required to bypass the clamp with a shunt and only 2 responded positively to an increase in MBP. The MBP recorded during the clampling was however significantly higher in the EEGdelta group (96.8 (+/-12.0) vs 89.6 (+/- 9.6) (p=0.001). The most frequently reported EEG change was a isolated lateral attenuation (72% of EEGdelta); occuring mostly in the first 20 seconds. The patients with a contralateral stenosis > 80% showed more EEG changes (P=0.045). None of the other recorded peroperative data were associated with FEGdelta

**Conclusion**: An increase in MBP was observed in the EEG delta group, however most of these still required a shunting. The cause of this modification is not obvious from our data and should be further studied.

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### 07AP12-12

# Intraoperative Fluid Management for Patients Undergoing Renal Transplantation: SVV versus CVP

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Background and Goal of Study: Optimizing intravascular volume is crucial for early graft function after renal transplantation (RT). Central venous pressure (CVP) represents a standard decision-making tool in fluid management in RT, despite the various potential complications and limitations. Stroke volume variation (SVV) is a simple and less invasive hemodynamic variable for evaluating fluid responsiveness and preload status and its use was associated with improved outcomes in patients undergoing high-risk surgery. The aim of this study was to evaluate the effectiveness of SVV versus CVP in guiding fluid administation during RT.

Materials and Methods:We retrospectively analyzed two groups of RT recipients who underwent RT under general anesthesia and volume control ventilation: standard CVV-guided (Group A, n=16) vs. SVV-guided (Group B, n=16) fluid administration. The SVV was derived from the FloTrac/Vigileo system and the protocol consisted of a baseline sodium saline administration rate of 2 ml/kg/hr and any additional bolus if SVV > 12%. Vasopressors, mannitol and furosemide were used in both groups according to the institution protocol. We examined the differences in intraoperative fluid volumes, graft dysfunction on 7th postoperative day as assessed by the need for renal replacement therapy (RRT), length of hospital stay (LOS) and 30-day survival rates between the two groups.

**Results and Discussion**: The average volume of total fluids administered (calculated as total crystalloid over patient's weight and surgical time) was  $14.6 \pm 8.3$  ml/kg/hr for the CVP group and  $12.4 \pm 6.6$  ml/kg/hr for SVV group (p=0.04). The total intraoperative fluid balance for the CVV group was  $3630 \pm 1460$  ml and for the SVV group was  $3010 \pm 850$  ml (p<0.001). The median LOS was 6 [5, 9.5] days for the CVP group and 5 [4, 7] days for the SVV group (p=0.025). 30-day survival rates and graft dysfunction rates did not differ between the two groups

**Conclusion**: These results suggest that SVV may be a useful tool for optimizing intravascular volume during RT and it could also lead to shorter LOS. Future studies should examine the effect of SVV-guided fluid management on parameters of graft function postoperatively.

## 07AP13-1

# More experienced anesthesiologist show increased difficult intubation rates in cardiac surgery: a third-level hospital retrospective cohort study

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**Background and Goal of Study:** Cardiac surgery has shown higher difficult intubation (DI) rates compared to other kind of surgeries. Older age, male gender, morbid obesity and dental problems have been associated with these findings. The aim of this study is to describe the prevalence of DI in patients undergoing

cardiac surgery in our center, as well as to analyse whether patient or physician related parameters could be risk predictors of DI.

Materials and Methods: An unicenter retrospective cohort study was designed We reviewed a total of 590 patients undergoing cardiac surgery during 2016; 333 Valve Replacements (VR), 199 coronary artery bypass (CAB), and 58 other procedures. We assessed the following variables: age, height, weight, type of surgery, Cormack-Lehane Grade (CLG), anesthesiologist in charge and method of intubation. DI was defined as CLG III and IV. We defined obesity as BMI >30.

Results and Discussion: Amongst a total of 590 patients, 374 were men (63%) and 216 (36%) women. Median age was 68,6 (SD 11,6) and median BMI 27,55 (SD 4,8). CL Grade was for I 64,6%, II 20,4%, III 14,1%, IV 0,9%; repectively; resulting 15% the overall incidence of DI. There was higher prevalence of DI in men (17,4% vs 10,7%; p=0,028), but not difference was seen in Age (p=0,713), Obesity (p=0,313) and type of surgery (p=0,615). We classified anesthesiologist according to years of experience between senior (more than 15 years) and junior. We found senior anesthesiologist as a independent predictor of risk of DI (OR 1,79 IC 95% 1,05-3,07). Methods of intubation in the group of DI were laryngoscopy 26,4%, Frova mediated 35,6%, videolaringoscopy 18,4%, videolaringoscopy + Frova 14,9% and elective bronchoscopy 3,4%.

Conclusion: Patients submitted for cardiac surgery in our center had a higher incidence of DI as compared to DI rates reported in other surgical procedures. Although male gender was a variable associated with DI, there were no significant differences that may suggest wether age, obesity and type of surgery can be independent risk factors for DI.

Difference between anesthesiologist could be explained by a myriad of reasons: less OR-clinical practice; age-declining clinical abilities; improving training programmes; as well as more opportunities of continuous education for younger physicians.

## 07AP13-2

# Extra systoles cannot predict fluid responsiveness during cardiac surgery

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Background and Study aim: Prediction of fluid responsiveness is an important part of perioperative goal directed therapy. Still, fluid challenges and a subsequent assessment of the patients' hemodynamic response is the only way to assessibuid responsiveness in a majority of surgical settings because well validated techniques using preload fluctuations (passive leg raising and dynamic variables) are inapplicable in the operating theatre. A recent study showed that the post extra systolic beat has an increased preload compared with previous sinus beats. Fluid responsiveness is expected if the post extra systolic beat leads to increased cardiac performance (e.g. systolic blood pressure (SBP) or pulse pressure (PP)). Further, it was demonstrated that a 50 ml fast crystalloid infusion (micro fluid challenge (MFC)) can induce transient changes in cardiac contraction which predicts fluid responsiveness. We aimed to investigate the clinical usability of this extra systolic method and the MFC method during cardiac surgery.

**Materials and Methods**: We included 56 patients scheduled for on pump coronary artery bypass graft. Patients were observed for extra systoles (ES) during a stable phase following sternotomy. Classification variables for extra systoles (e.g.  $\Delta PP_{ES}$  and  $\Delta SBP_{ES}$ ) were defined as the change in a variable from the median of the 10 preceding sinus beats to the post extra systolic beat. For the micro fluid challenge, arterial waveform characteristics from the 30 seconds before infusion were compared with the 30 seconds after infusion onset. Patients were considered fluid responsive if stroke volume index (SVI) increased by more than 10% following a fluid challenge. Receiver operating characteristic (ROC) statistics were calculated for indices  $\Delta PP_{ES}$  & MFC,  $\Delta SBP_{ES\&MFC}$ ,  $\Delta CP/dE_{ES\&MFC}$  (maximal pressure upstroke slope) and  $\Delta PEP_{ES\&MFC}$  (pre-ejection period).

Results: 31 of the 56 patients had eligible extra systoles. Area under the ROC-curve (AUC) for  $\Delta PP_{ES}$  were 0.70 (CI [0.35;1.00]), for  $\Delta SBP_{ES}$  AUC were 0.65 (CI [0.23;1.00]),  $\Delta PP_{ES}$  had AUC 0.64 (CI [0.08:1.00]) and for  $\Delta PEP_{ES}$  AUC were 0.62 (CI [0.29:0.95]). The micro fluid challenge showed poor predictive value with all AUC; below 0.5

**Conclusions**: Extra systoles predict fluid responsiveness with mediocre accuracy in patients undergoing cardiac surgery. Changes in arterial waveform indices following a micro fluid challenge cannot predict fluid responsiveness.

### 07AP13-5

# Implementation of Early Mobilization Protocol Can Lead to Better Cognitive Outcome after Cardiac Surgery

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Background and Goal of Study: We aimed to determine the effects of implementation of "early mobilization protocol" on incidence of cognitive dysfunction

after cardiac surgery in current study.

Materials and Methods: In randomized controlled trial, 80 adult patients who had undergone elective cardiac surgery were randomly assigned to intervention [early mobilization protocol; (n=40)] and control [routine physical therapy; (n=40)] groups. Early mobilization started from the first post-op morning and continued until discharge from ICU. Cognitive dysfunction was assessed by the Mini Mental State Examination (MMSE) questionnaire. The MMSE questionnaire was completed at three occasions for every patient: one day before surgery, first post-op day, and the day before discharge from ICU.

Results and Discussion: Preoperative cognitive status had no difference between the two groups (p=0.310). Post-op cognitive dysfunction was significantly more commonly reported in the control group. MMSE scores were higher in early mobilized patients compared to control group on the first post-op day [Median: 28; Inter quartile range: (26-30) vs. Median: 25; IQR: (22-27); p=0.001], at the time of discharge from ICU (Median:29; IQR: (28-30) vs. Median: 26; IQR: (25-28); (p=0.001)]. In multivariate analysis, duration of tracheal intubation and "early mobilization protocol" had significant effect on patients' length of ICU stay.

**Conclusion**: Implementation of early mobilization protocol has possitive effects on cognitive outcome and ICU stay after cardiac surgery.

### 07AP13-6

# Short-term Esmolol confers cardioprotection persistent after treatment withdrawal

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Background and Goal of Study: Esmolol is an ultra-short beta-blocker widely used to treat patients with arterial hypertension. Our group previously demonstrated that short-term treatment (48 h) with esmolol produces early regression on vascular remodeling, although the long-term effect has not been studied yet. We hypothesized that the effect of esmolol on coronary arteries might remain in the long-term.

Materials and Methods: Fourteen-month-old male spontaneously hypertensive rats (SHR) were randomly into therapy group with esmolol (300 μg/kg/min during 48h) (SHR-E, n=9) and placebo group (SHR, n= 9), and 7 days after treatment, segments of left anterior descending coronary arteries were dissected and mounded on a wire myography. Vasodilator function was evaluated with increasing concentrations of acetylcholine (Ach 10³ to 10⁴ mol/L) in segments precontracted with 5 hydroxytryptamine (5-HT 3x10⁻7 mol/L). Then concentration-response curves with serotonine were performed (3x10⁻9 to 3x10⁻9 mol/L) to assess vasoconstrictor function. Comparisons among groups were made by Student's T-test. Relaxing responses are expressed as percentage reduction in the 5-HT preconstricted state. The results were expressed as mean ± S.E.M.

**Results and Discussion**: Esmolol significantly improved the endothelium-dependent relaxation induced by Ach at all concentrations tested. Esmolol significantly reduced the contraction of coronary artery compared with the control SHR at higher concentrations of 5-HT.

Conclusion: The effect of esmolol on coronary arteries function remain in the long

## References:

1. Quintana-Villamandos et al. Early regression of left ventricular hypertrophy after treatment with esmolol in an experimental rat model of primary hypertension. Hypertens Res 2013;36:408-413.

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### 07AP13-8

# Percutaneous valve implantation - case report

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**Background**: The percutaneous pulmonary valve implantation was the first percutaneous intervention in the treatment of regurgitant valve disease in humans. The most common indication for pulmonary valve implantation is residual right ventricular outflow tract lesion after correction of congenital heart disease that may be stenotic, regurgitant or mixed. Tetralogy of Fallot is one of the most common congenital heart lesions in this group.

Case report: A 45-year-old female patient was admitted to Cardiac Surgery OR after a complicated percutaneous pulmonary valve implantation. She had tetralogy of Fallot corrected in 1987 and reoperated in 1992 with placement of pulmonary homograft valve. In the hemodynamic room, she developed hemodynamic instability with monomorphic VT with pulse. After 4 synchronised shocks and a loading dose of amiodarone sinus rhythm was observed. Due to severe hypotension noradrenaline infusion was initiated. She arrived at the OR conscious and oriented, with no signs

of respiratory difficulty and hemodynamically stable with perfusion noradrenaline. A balanced general anaesthesia was performed with fentanyl, etomidate, rocuronium and sevoflurane. Percutaneous valve prosthesis was removed and a bioprosthesis was surgically implanted in pulmonary position. During the surgery she remained hemodynamically stable and no complications arose. She was transported to the ICU and was extubated 30h after surgery. On the 3rd postoperative day, she developed dyspnoea and decreased saturation. She was reintubated and mechanically ventilated. During transport preparation to perform an angio-CT due to pulmonary thromboembolism suspicion, she developed CPR. Despite promptly resuscitation manoeuvres, dead followed.

**Discussion**: Although percutaneous implantation of cardiac valves is considered a safe and effective non-surgical therapeutic with high success rate, as an alternative to surgical valve replacement, embolization or valve migration is one of the possible complications of this procedure and may require emergency surgical treatment. **References**:

1. Ann Pediatr Cardiol.2012 Jan-Jun; 5(1): 53-60. Glob Cardiol Sci Parct.2015; 2015(2): 23. JACC. 2015.; 66

**Learning points:** This type of procedures should be performed in medical centres that can provide prompt cardiac surgery support.

### 07AP13-9

# Cardiac surgery in sick cell disease - case report

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**Background:** In sick cell disease (SCD), hemoglobin S (HbS) can lead to vasoocclusion and organic ischemia. When these patients undergo heart surgery with CPB, they need special precautions to prevent fatal vaso-occlusive events.

Case report: We present a case of a 15-year-old girl with rheumatic valvulopathy submitted to aortic valve replacement with mechanical prosthesis, mitral valvuloplasty and tricuspid annuloplasty. She presented fatigue, orthopnea and dyspnea for small efforts with 7 years of evolution, with progressive aggravation and preoperative history of seizures. Anti-congestive and sickle cell therapy was optimized. Analytically, Hb 8.8 g/dL and HbS 33.5%, During surgery, the patient remained hemodynamically stable, with SpO2> 98%, pH> 7.3 and diuresis> 0.5mL/Kg/h. CPB circuit was instituted at a temperature of 34°C and 3U of red cells were administered. The patient was hemodynamically stable when transferred to intensive care unit (ICU). The postoperative Hb was 10 g/dL and HbS 18,4%. Adequate postoperative management including analgesia, avoiding acidosis, hypoxia and hypovolemia. She was extubated 8 hours after surgery. She initiated hypocoagulation with warfarine and regular therapy with ursodeoxycholic acid. hydroxicobalamin and folic acid was implemented. On the first postoperative day, she developed left hemiparesis, with CT scan showing right ischemic stroke and EEG showing disorganized and slow electrical with greater functional commitment of the right hemisphere.

**Discussion:** Between 25-30% of patients with SCD undergoing surgery will have a postoperative complication and surgical complications are responsible for 7% of the total deaths related to this disease. One of the main postoperative complications are cerebral stroke. Classical factors that predispose to falciformization are present in cardiac surgery. Despite the careful peri-anaesthetic management to avoid those factors, unfortunately we couldn't prevent the occurrence of a serious complication. **References:** 

1. J Anaesthesiol Clin Pharmacol. 2011 Oct-Dec; 27(4): 547–549. Indian J Anaesth. 2014 May-Jun; 58(3): 319–322. Acta Haematol. 2016;136(3):147-51.

**Learning points:** Pre-anaesthetic (clinical, analytical and transfusional) optimization and adequate planning of intraoperative anaesthesia care of patients with SCD are essential for success and recovery without complications.

## 07AP13-10

# Age-related difference in the effect of acute hyperglycemia on myocardial ischemia-reperfusion injury

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Background and Goal of Study: Age and acute hyperglycemia are known risk factors for myocardial ischemia-reperfusion injury and combined frequently in clinical circumstances. However, there are limited data to examine myocardial ischemia-reperfusion injury in animal models exhibiting these co-morbidities concomitantly. Thus, we investigated the effect of acute hyperglycemia on myocardial ischemia-reperfusion injury in different age-groups and possible mechanisms.

Materials and Methods: Three different age groups of male Sprague Dawley

Materials and Methods: Three different age groups of male Sprague Dawley rats were included (young-aged, 3 months; middle-aged, 10-12 months; and old-aged, 20-22 months). Rats received 1.2 g/kg of dextrose (hyperglycemic group) or same volume of normal saline (normoglycemic group) according to the group. Rats were subjected to coronary artery occlusion for 45 min followed by reperfusion for 240 min. By measuring the infarct size and ejection fraction, we estimated the susceptibility to ischemia-reperfusion injury in rat. Proteins related to apoptosis (C-PARP, Bcl-2, Bax, and cytochrome C) and autophagy (Bnip3, Beclin-1, Atg5r, and LC3B-II) were evaluated by western blot assay.

Results and Discussion: Infarct size was increased by acute hyperglycemia in young- and middle-aged rats but not in old-aged rats, while reduction of ejection

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Conclusion: The results of current study demonstrated that acute hyperglycemia did not aggravate myocardial ischemia-reperfusion iniury in old-aged rats, unlike young and middle-aged rats. This heterogeneity may be a consequence of attenuation in changes of apoptotic and autophagic signalling after ischemiareperfusion injury under acute hyperglycemia in old-aged heart.

## 07AP13-11

# Pretreatment with glucose-insulin-potassium improves ventricular performances after on-pump coronary artery bypass surgery: a randomized controlled trial

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Background and Goal of Study: Low cardiac output syndrome (LCOS) is a main cause of death following open heart surgery. Using transesophageal echocardiography (TEE), we evaluated the effects of an infusion of glucose-insulinpotassium (GIK) in patients with coronary artery disease undergoing on-pump myocardial revascularization.

Materials and Methods: In a single center double-blind randomized controlled trial, moderate-to-high risk patients (Parsonnet score > 7) were randomly assigned to receive GIK (20 IU insulin with 10 mEq KCL in 50 ml glucose 40%) or saline infusion over 60 min upon anesthetic induction. The primary outcomes were the changes in left ventricular ejection fraction (2D and 3D-LVEF), transmitral flow propagation velocity (Vp) and peak global longitudinal strain (PGLS). TEE measurements were performed before GIK/saline infusion and at the end of surgery. Postoperatively, the incidence of LCOS, the need for combined inotropes (at least 120 min) and the length of stay in intensive care unit (ICU) were considered secondary outcomes. Results and Discussion: Compared with saline [N=54], GIK pretreatment

[N=46] was associated with preserved 3D- LVEF (mean +4% standard deviation [SD] 13%), 2D-LVEF (+3% [13]), unchanged PGLS (-2% [17]) and higher Vp (+22% [23]), whereas in the saline group, 3D-LVEF, 2D-LVEF, PGLS and Vp all decreased after bypass (-12% [11], -8% [14], -14% [19], -21% [15], respectively). Postoperatively, the GIK group had a lower incidence of LCOS (18% vs 41% in the saline group), lesser requirement for inotropic support (37% vs 67%) and shorter median length of stay in ICU (3.0 [3.0] days vs 4.0 [3.0]).

Conclusion(s): Administration of GIK before aortic cross-clamping was associated with better preservation of left ventricular function early after coronary artery bypass surgery. Further studies should explore the mechanisms of enhanced GIK-induced myocardial protection and confirm the consequent positive clinical impact.

# Acute and Chronic Pain Management and Palliative Medicine

## 08AP01-1

Assessment of prophylactic intravenous prochlorperazine at the end of surgery for prevention of nausea and vomiting during intravenous patient-controlled analgesia with fentanyl

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Background and Goal of Study: The addition of droperidol to patient-controlled analgesia (PCA) is the current gold standard prophylactic anti-emetic in fentanylassociated postoperative nausea and/or vomiting (N/V). Even when droperidol is added to the PCA, some patients complain of N/V. We aimed to assess whether prophylactic intravenous prochlorperazine (PCZ) at the end of surgery could prevent N/V during intravenous PCA (IV-PCA) with fentanyl.

Materials and Methods: We retrospectively studied 74 patients administered IV-PCA immediately after surgery from February to August 2016. IV-PCA was prepared with fentanyl 15mcg/ml and droperidol 40mcg/ml, and was set to provide 1ml/hour plus a bolus dose of 1ml with a lock-out period of 10 min. Of the 74 patients, 39 were also administered a single dose of PCZ 5mg immediately after surgery (Group A) and 35 were not (Group B). All patients were followed for the first 24 hours. Patients could request a single dose of PCZ whenever they experienced N/V. The number of patients with, and the number of times that PCZ was requested were documented during two time periods, 0-12 hours and 12-24 hours after surgery. Chi-squared test and Student's t-test evaluated the difference between the two groups: p < 0.05 was significant.

Results and Discussion: The number of patients with N/V was 2 (5.1%) in Group A and 9 (25.7%) in Group B during 0-12 hours, and 5 (12.8%) in Group A and 5 (14.7%) in Group B during 12-24 hours after surgery. The difference in the number of patients experiencing N/V in the first 12 hours was statistically significantly different between the two groups, however, not for the 12-24 hour period (p=0.028 and p=1.00, respectively). The mean number of times PCZ was requested was also statistically significantly different during 0-12 hours, however, not for the 12-24 hour period (p=0.02 and p=0.67, respectively).

Conclusion: Our experience suggests that prophylactic intravenous PCZ at the end of surgery may be effective for preventing nausea and vomiting during fentanyl IV-PCA in the first 12 hours after surgery.

## 08AP01-2

## Effectiveness of intraoperative magnesium sulphate on acute pain management after major abdominal surgery

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Background and Goal of Study: Although magnesium demonstrated promising analgesic and anti-nociceptive properties, a relevant clinical role in postoperative pain control remains unclear.

This prospective randomized, double-blind placebo-controlled trial was designed to assess the effect of a single intravenous dose of magnesium sulphate administered 1h before the end of the procedure, on acute postoperative pain relief during first 24h post-procedure in major abdominal surgery patients.

Materials and Methods: After local Ethics Committee approval and obtaining informed written consent, 73 patients (ASA I-III) undergoing elective major abdominal surgery under general anesthesia, were randomly allocated to two groups: group M (n=37 patients) that received 40 mg/kg magnesium sulphate, intravenously infused in 250 ml normal saline and group C (n=36) treated with the same volume of placebo, just 1h before the end of surgery.

Postoperative analgesia during first 24h postoperatively was achieved with iv morphine via PCA and paracetamol (1g/8h) in both groups

Pain scores (VAS) at rest and while coughing assessed at 1h, 6h, 12h, 24h and total morphine requirement during study period were recorded as primary end-points. The secondary end-points included the incidence of shivering, nausea/yomiting, the hemodynamic profile and patient satisfaction (4 stage scale)

Data were analyzed using t-test and Mann Whitney U-test, p<0.05 being considered

Results and Discussion: Pain scores evaluated at rest and while coughing were significantly lower in group M compared to group C, throughout the study period

(p<0.05). Magnesium-treated patients consumed less morphine via PCA during first 24h post-procedure (p<0.05).

The incidence of shivering, as well as nausea/vomiting were statistically decreased in group M compared to group C (p<0.05). No difference was reported between groups with respect to hemodynamic parameters. High satisfaction with pain management was experienced by less patients in group C, compared to group M

Conclusion(s): Magnesium sulphate administered 1h before the end of surgery, as a single intravenous dose could be considered as an effective and safe adjuvant for postoperative analgesia strategy, reducing opioid consumption without increase of adverse events, during first 24h after major abdominal procedures.

### 08AP01-3

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Changing tramadol by intravenous perfusion of lidocaine + ketamine for postoperative pain management in laparoscopic colorectal surgery. Did it decrease the incidence of postoperative nausea, vomit and ileus?

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Background and Goal of Study: Enhanced recovery after surgery guidelines recommend the use of multimodal strategies with paracetamol and NSAIDs for management of postoperative pain in laparoscopic colorectal surgery (CRS)1. Opioid based therapies provide better analgesia but they may increase the incidence of postoperative nausea and vomit (PONV) or ileus. Other drugs as intravenous lidocaine and ketamine may be added at these therapies. The goal of the study was to audit if the change of a weak opioid like intravenous tramadol by intravenous lidocaine + ketamine perfusion decreased the incidence of PONV and ileus without increasing postoperative pain in laparoscopic CRS.

Materials and Methods: We performed an audit where we compared 2 cohorts of different postoperative analgesia therapies in patients scheduled to laparoscopic oncologic colorectal surgery:

A) 2016 therapy based on a lidocaine (1mg/Kg/h) + ketamine (0,07mg/Kg/h) infusion + paracetamol (1g/6h) + dexketoprophen (50mg/8h) named as LKPD. B) 2015 therapy based on a tramadol (1mg/Kg/8h) + paracetamol (1g/6h) dexketoprophen (50mg/8h) named TPD.

Both strategies were administered intravenously for the first 24h postoperative. We collected demographic and intraoperative data (age, gender, BMI, ASA status and type of surgery). We compared the incidence of PONV (yes/no) and ileus (yes/ no). We also analyzed pain at movement and at rest referred by the patient at 24 hours postoperative. Pain was assessed with a numeric scale (0-10). This data was obtained from a prospective collected database. Statistical analysis: We compared PONV and ileus with a Fisher test and pain with a student t test.

Results and Discussion: We analyzed 121 patients (TPD Group=58 and LKPD Group=63). No differences found between the two groups regarding demographic and intraoperative data. Incidence of PONV in the first 24 hours was 17% in LKPD group vs 43% in TPD group (p<0,005). Incidence of postoperative ileus was 21% in LKPD group vs 32% in TPD group (p=0.38).

No statistical differences were found in pain at movement (LKPD 4.6±1.8 vs TPD 4.3±2.4) or pain at rest (LKPD 2.4±0.4 vs TPD 2.6±1.7) referred at 24h. Conclusions: Using intravenous lidocaine + ketamine instead of tramadol

decreases the incidence of PONV without worsening pain control.

A lower incidence of postoperative ileus is seen in LKPD group without reaching statistical differences

# 08AP01-4

## Sublingual sufentanil patient-controlled analgesia in orthopedic surgery: a case series

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Background and Goal of Study: The sufentanil sublingual tablet system (SSTS; Zalviso®) is a novel patient-controlled analgesia (PCA) device intended to overcome some of the drawbacks of opioid-based intravenous PCA. Based on the results of three phase III studies, the SSTS has been approved in the EU for the management of acute moderate to severe postoperative pain in adults in a hospital setting.

This case series presents the experience with the SSTS after orthopedic surger in 50 patients, from May to October 2017, 23 after total knee arthroplasty (TKA), 10 total hip arthroplasty (THA) and 17 anterior cruciate ligament reconstructions

Materials and Methods: All patients received a spinal anesthesia with bupivacaine 10-12.5mg for knee surgery and levobupivacaine 10-12.5mg for hip surgery. After surgery, the first dose of sublingual sufentanil was administered before reversion of the sensory block. Patients also received a combination of paracetamol plus non-steroidal anti-inflammatory drug (NSAID). The SSTS was maintained up to 72h and adverse events were recorded. Data were downloaded from the devices and patients were contacted 1 to 3 months after discharge, to evaluate the degree of satisfaction with the SSTS, in a 0 to 5 scale (0 - totally unsatisfied; 1 - very unsatisfied; 2 - unsatisfied; 3 - satisfied; 4 - very satisfied; 5 - totally satisfied).

Results and Discussion: The incidence of adverse events was 6% for pruritus, 6% for dizziness, 2% for nausea without vomiting and 2% for nausea with vomiting. The cumulative incidence was 8%. All events were mild to moderate and controlled with rescue therapy. No other adverse events were recorded

The average patient global satisfaction was 4,3, ranging from 2 to 5.

The average treatment duration was 48.4 hours (Standard Deviation (SD) 20.71. with a average consumption of 17,7 tablets (SD 10,8). The average interval between tablets was 204.8 minutes, with a average interval of 126.4 minutes on the first day. 290,9 minutes on the second day and 391,6 minutes on the third day.

Data also showed a higher consumption in younger patients, with a higher incidence of nausea and vomiting in this subgroup. The other adverse events had no relevant

Conclusion: The sufentanil sublingual tablet system is a valid alternative for postoperative pain control in major orthopedic surgery, with a high patient global satisfaction and low incidence of adverse events.

### 08AP01-5

## Comparison of analgesic efficacy of oxycodone and fentanyl after total hip replacement surgery

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Background and Goal of Study: Total hip replacement (THR) is often accompanied by severe post-operative pain. There are several studies that oxycodone has sufficient analgesic effect and somewhat higher, but tolerable side effects compared with fentanyl as adjunctive drug in treating both acute and chronic moderate to severe post-operative pain without ceiling effects. However most of studies expected visceral pain relief about k receptor effect. In this study, we designed to study whether oxycodone can be an effective alternative of fentanyl at early post-operative pain management in orthopedic surgery.

Materials and Methods: Twenty patients were involved in randomized control rial. Anesthesia was induced with 1-2 mg/kg propofol and 0.8 mg/kg rocuronium. Desflurane (5-7 vol%) was used with air (50%) and oxygen (50%) mixture for maintenance of anesthesia. Remifentanil was infused 1.5-5.0 µg/min. Analgesic agents were administered at 20 min before the end of surgery; 50µg fentanyl (F) group (n=10) and 4mg oxycodone (O) group (n=10). Numeric rating scale (NRS.0-10;0 = no pain and 10 = worst possible pain) of postoperative pain at post anesthetic care unit (PACU) were measured. All patients had intravenous patient-controlled analgesia (IV PCA) with 15 µg/kg fentanyl for 2 days. (0.31 µg/kg/h). Additional intravenous fentanyl bolus was used instead of pushing PCA bolus button at ward. It was monitored that additional analgesic agent was administered during 0-6, 6-12. 12-24, and 24-48 h after surgery. Mann Whitney U test was performed to compare continuous variables between the two groups. P value less than 0.05 was considered statistically significant.

Results and Discussion: There were no statistically significant differences between the two groups in patient age, weight, height, duration of surgery, and total remifentanil consumption (P>0.05). NRS of group O at PACU was lower than that of group F (P<0.05). (Fig. 1) A lower proportion of patient's number was observed in Group O than Group F during 0-6 h; it is statistically significant (P<0.05), (Table 1), Conclusion: Oxycodone revealed lower NRS and lower fentanyl consumption during early postoperative period compare with fentanyl. Therefore, we conclude that oxycodone is more effective than fentanyl in acute phase of postoperative pain control. Oxycodone will be another analgesic agent at postoperative period in orthopedic surgery

# 08AP01-6

# The beneficial effect of preoperative gabapentin on acute postoperative pain after laparoscopic sleeve gastrectomy

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Background and Goal of Study: Considering that an adequate postoperative analgesia is crucial for patients' well-being and early recuperation, the aim of this study is to assess the efficacy and safety of preoperative gabapentin in the management of acute postoperative pain during first 24h after laparoscopic sleeve

Materials and Methods:42 patients (ASA I-II) scheduled for laparoscopic sleeve gastrectomy were recruited to participate in a randomized double-blind, placebocontrolled study. These subjects were randomized into two groups: group G (n=22) and group P (n=20) both receiving an oral dose of 400 mg gabapentin, respectivelly a matching placebo capsule, administered 1h prior to the surgical procedure.

PCA with intravenous morphine was used as strategy for acute postoperative pain treatment in both groups. The primary outcomes were postoperative pain severity (VAS) at rest, evaluated at 1h, 6h, 12h and 24h, time to first analgesic bolus requirement and cumulative morphine consumption during first 24h postoperatively. The incidence of sedation, dizziness, nausea/vomiting and urine retention were recorded as secondary outcomes. Mann Whitney U-test and t-test were used to evaluate the results, p<0.05 being considered statistically significant.

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Results and Discussion: VAS scores analysis revealed significantly decreased values for group G compared to group P, during first 24h postoperatively (p<0.05). Although group G showed a delayed analgesic request compared to group P, this difference is devoid of statistical significance. Total morphine consumption in group G was statistically lower by comparison to group P (p<0.05).

The rate of nausea/vomiting, as well as the incidence of urine retention were significantly lower in group G compared to group P(p<0.05). On the other hand, there was no statistical difference between groups regarding the number of patients experiencing sedation and dizziness.

Conclusion(s): Preoperative single oral dose of 400 mg gabapentin is effective in improving acute postoperative pain management during first 24h after laparoscopic sleeve gastrectomy, with substantial decrease in morphine requirement and a subsequent reduction in some morphine-associated adverse effects.

## 08AP01-7

# The analgesic efficacy of oxycodone in acute postoperative pain in the third molar extraction model: Oxycodone vs. fentanyl

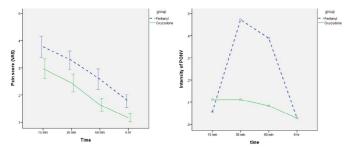
Lee J. E.<sup>1</sup>, Park H. M.<sup>1</sup>, Lim J. A.<sup>1</sup>, Jin Y. H.<sup>1</sup>, Kim H.<sup>1</sup>, Cho C.<sup>1</sup> <sup>1</sup>Kyunpook National University Hospital - Daegu (South Korea)

Background and Goal of Study: Postoperative pain is one of leading causes of delayed discharge, and acute pain may develop as chronic pain if it is not well controlled early. Oral surgery, especially in the thrid molar extraction, neuraxial analgesia can not be performed, so acute pain control mainly depends on systemic analgesics. Various acute pain control regimens are still being studied. Among them, oxycodone, which has a longer duration of pain relief than other analgesics, is highly effective and well tolerated in other surgeries, so we compared the postoperative analgesic efficacy, adverse events, opioid consumption, and patient's satisfaction of oxycodone and fentanyl in patients after oral surgery.

Materials and Methods: All patients underwent the third molar extraction surgery under the general anesthesia. We prospectively enrolled patients who had been administered oxycodone IV (n=36, 0.05mg/kg) and fentanyl IV (n=36, 1µg/kg) 10 min before the end of surgery. 0.075mg of palonosetron was also injected into all patients. The recovery profile (pain, PONV, vital sign, sedation scale, and adverse event) was recorded during 1hr at the post-anesthetic care unit and 6hr after

Results and Discussion: There were no significant differences in demographic data. Under the potency ratio of 1:50 (fentanyl: oxycodone), the overall intensity of pain was significantly lower in the oxycodone group than fentanyl in the PACU, and Oxycodone group had significantly fewer additional analgesic requirements than fentanyl group in the PACU. The incidence of nausea was significantly greater in the fentanyl group than oxycodone group. Changes in sedation scale was identical. No opioid-related adverse event was identified

Conclusion: In the third molar extraction, oxycodone has much longer analgesic effect than fentanyl, which can reduce total opioid consumption in the PACU. Oxycodone group also showed lower incidence of PONV compared to fentanyl Finally oxycodone is particularly effective opioid analgesic than fentanyl for acute postoperative pain control, patients experienced satisfying analgesia



# 08AP01-8

## **Opioid Sparing Effects of Intraoperative Dexmedetomidine** or Ketamine in Patients Undergoing Minimally Invasive **Thoracic Surgery**

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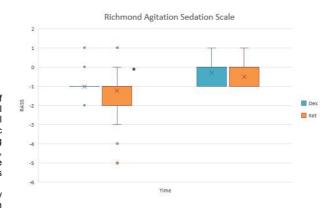
Background and Goal of Study: Ketamine and more recently Dexmedetomidine have been used as opioid sparing adjuvants in the "Enhanced Recovery After Surgery" (ERAS) pathways. Postoperative sedation, confusion and hemodynamic changes are significant side effects. The goal of this study was to examine the effects of these medications on analgesia and sedation in patients undergoing minimally invasive thoracic surgery (MITS).

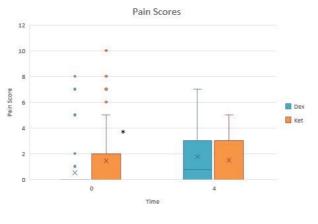
Materials and Methods: With IRB approval, 130 records of MITS patients were retrospectively reviewed. Ketamine (Ket=67) or Dexmedetomidine (Dex = 63)

were administered intraoperatively and stopped prior to awakening. Postoperative analgesia consisted of an intravenous opioid PCA and adjuvants, excluding neuraxial analgesia. Intra- and postoperative morphine equivalents, non-opioid anti-inflammatory drugs, sedation (Richmond Agitation Sedation Scale) and pain scores were compared between the two groups at PACU arrival and after 4 hours. Fisher's exact test was used for categorical variables, and Wilcoxon rank sum test for continuous one

Results and Discussion: Patient characteristics and comorbidities were comparable between the two groups. Intraoperative morphine equivalents were similar as well as the use of acetaminophen, ketorolac, and dexamethasone. Ket patients had lower RASS and higher pain scores on PACU arrival that resolved at 4 hours. There was no difference in surgical times, intraoperative fluids, estimated blood loss, pressor requirement, as well as PACU and hospital stay.

Conclusion: Dexmedetomidine or Ketamine as part of multimodal analgesia in MITS patients seem to have similar effects on intraoperative analgesia and hemodynamic parameters. Ketamine may cause more sedation and higher pain scores at PACU arrival but this effect is transient. Dexmedetomidine can be considered an alternative for MITS ERAS pathways.





## 08AP01-9

## Dexmedetomidine as an adjunct in perioperative analgesia following spinal surgery

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Background and Goal of Study: Dexmedetomidine (DXT) is an alpha2-agonist drug with sedative and analgesic properties used in anesthetic context as an analgesic adjunt in postoperative pain. The main purpose of this study was to evaluate the effect of this drug in postoperative analgesia guality after spinal

Materials and Methods: A retrospective analysis of the medical records of all adult patients submitted to lumbar disk surgery in a median size private hospital in Portugal over one year. Several variables were recorded including age, gender, ASA score, DXT doses, intensity of pain using the Numerical Rating Scale (NRS) and side effects in the first 24 hours. For statistical analysis, the significance level considered was 0.05 and SPSS Statistics was used.

Results: There were 36 cases: 19 female, 17 male; average 54.1/SD 15.1 with no gender difference. Two different groups were identified. Group 1: 14 cases with intra-operative plus postoperative perfusion dose between 0,5 and 1.0 mcg/kg/h. Group 2: 22 cases with intra-operative perfusion dose between 0,5 and 1,0 mcg/kg/ min. The postoperative analgesics regimen in the first 24 hours was paracetamol NSAIDs and metamizol by iv bolus administration. There weren't strong opioids need for postoperative pain control. Global average NRS 2,3/SD 2,3. Group 1 average NRS 2,9/ SD 2,49. RASS score between -1 and 0. There was 1 case of postoperative delirium, no other intra-operative or postoperative events were described like hemodynamic or respiratory complications

**Discussion:** The analgesic and opioid-sparing effects of DXT have been described in previous studies. Similar to these studies, our data reported low NRS scores and no opioid consumption after lumbar disk surgery, suggesting an improved analgesic effect without other clinically relevant side effects. There wasn't a statistically significant difference between groups. However, postoperative infusion may have clinical relevance as it promotes sedation, which is important in patients that need longer periods lying down

Conclusion: This study shows that DXT is a promising and safe adjunct in general anaesthesia and in postoperative pain control after spinal surgery. Analgesic and anti- inflammatory properties confer exceptional benefits for these patients avoiding prolonged convalescence and chronic pain. Large trials are needed to clarify Dexmedetomidine role on long-term outcomes

### 08AP02-1

## Pulsed Radiofrequency application in the palliation of pain secondary to femur metastasis - case series

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Background: Metastatic disease is bone's the most common malignancy, it's associated with significant morbidity and impact in patient's quality of life, and it's treatment aims palliation. Pulsed Radiofrequency (PR) is a recent method of pain treatment, although little is known about its use in Oncology. The current cases describe patients with persistent bone pain due to femur metastasis, despite pharmacological therapy, in which PR application achieved pain palliation.

Case Report: 1: 58-year-old, lung carcinoma with multiple osseous metastasis (MOM), affecting the right femur, at the time without authorization for pembolizumab treatment because the patient's pain led him to an ECOG score of 2. Initial evaluation: hip pain irradiating to the right leg, rating 6 at rest and 9 with movement (6/9) in the visual analogue scale (VAS). PR of femur sensory branches was performed. In the last evaluation, 6 months after PR, the patient pain rated 0/2 in VAS, resulting in an new ECOG score of 0 and pembolizumab treatment was authorization

2: 62-year-old, diagnosed with breast carcinoma and multiple bone metastasis encompassing left fémur. Initial evaluation: pelvis pain irradiating to the left leg, rating 5/8-9 in VAS. PR of femur sensory branches was performed. In the last evaluation, 10 months after PR, the patient experienced total pain relief.

3: 60-year-old diagnosed with MOM, envolving left femur, after breast cancer Initial evaluation: left hip pain, rating 4-5/9 in VAS. RP was performed on L2-L4 roots. In the next week the patient was taken to the emergency room complaining about slowing of speech and visual hallucinations; brain CT was performed which excluded secondary lesions. After Pain Group indication, all pain medication was suspended. Since then there were no more episodes. Last evaluation, 2 months after RP, the patient had total pain relief.

Discussion: When compared with RC, PR causes less tissue destruction resulting in less side effects. In these cases, the procedure was well tolerated, without any complications. In all cases, pain medication was discontinued and an improvement in patient's quality of life and autonomy was observed.

### References

1. Chua N, Vissers K, Sluijter M. Pulsed Radiofrequency treatment in interventional pain management: mechanisms and potential indications – a review. Acta Neurochir 2011: 153: 763-771.

Learning points: Pulsed Radiofrequency demonstrated to be effective in palliating metastatic bone disease pain

## 08AP02-2

## Suprascapular block for chronic shoulder pain, retrospective evaluation of results

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Background and Goal of Study: Chronic shoulder pain (CSP) can be secondary to multiple musculoskeletal disorders, such as adhesive capsulitis, arthrosis frozen shoulder, acromioclavicular joint syndrome, rotator cuff tendinopathy and full-thickness rotator cuff tears. To provide pain relief and to facilitate functional rehabilitation of patients suffering CSP, suprascapular nerve block (SSNB) can be made as a useful treatment. The objective of our study is to retrospectively evaluate the analgesic effect of SSNB with local anesthetics combined with corticoids and pulsed radiofrequency (PRF).

Materials and Methods: We studied retrospectively a cohort of 50 consecutive patients receiving suprascapular nerve block for chronic shoulder pain between January 2014 and January 2017. Ultrasound-guided SSNB was performed with a mixture of ropivacaine 0,2% (4ml) + triamcinolone 40mg and PRF for 240 seconds. We evaluate demographic characteristics and Numerical Rating Scale (NRS) before and after nerve block at 1 month and 3 months. We consider significant pain relief if reduction of NRS is >30%

Results and Discussion: Demographic characteristics; mean age 76±3 years old, 82% of women and 18% men.

The mean NRS score of 50 patients before technique was 7,8±0,3.

The mean NRS scores at 1-month were 4.3±0.7 (NRS>45% mean reduction), 34

(68%) patients had significant pain relief with mean NRS 3±0.55. At 3-month followup NRS was 5,4±0,8, from them 24 patients (48%) still had significant pain relieve with mean NRS 2.9±0.76. No adverse side effects were observed.

Results shows that SSNB may be a treatment approach for patients suffering CSP providing a significant pain relief in 68% of patients at 1-month and 48% at 3-months. SNB effect is short-lived showing an increase in mean NRS score at 3-months

Conclusions: The use of SSNB with local anesthetics and corticoids combined with PRF achieves a reduction of NRS for 12 weeks in our patients with no complications reported. However, we cannot conclude that it was the corticoid or PRF that caused the improvement. With this result we are starting a clinical assay comparing SSNB with corticoids versus PRF to conclude if we can avoid corticoid treatment to prevent its adverse effects. References:

1. Liu A, Zhang W, Sun M, Ma C, Yan S. Evidence-based Status of Pulsed Radiofrequency Treatment for Patients with Shoulder Pain: A Systematic Review of Randomized Controlled Trials. Pain Practice, 16, 4 (2016) 518-525

### 08AP02-3

## Correct site of injection for ultrasound-guided stellate ganglion block: International survey and cadaveric confirmation

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Background: The injection site of Stellate ganglion block (SGB) is diverse when ultrasound-guided SGB is performed in clinical practice.

To find out more about this situation, a survey was conducted regarding the clinical practice in Korea and Japan since these two nations commonly perform this in clinical setting. A cadaver study was conducted in order to confirm an accurate anatomical structure related.

Methods: We investigated the current clinical practice of ultrasound-guided SGB by international survey in Japan and Korea, 206 pain physicians from Korea and 97 from Japan responded to the survey. We analyzed the survey results and compared two countries. The survey contents are included final position of needle tip during ultrasound-guided SGB. Twelve halves parts of neck in six cadavers were donated to the Department of Anatomy of Wonkwang University College of Medicine by men and women who had given their written informed consent premortem to use their bodies after death for scientific and educational purposes. We dissected anterior neck to define the exact position of cervical sympathetic chain related to prevertebral fascia on C6 level. Correlation to prevertebral fascia was studied on

Results: The most common final position of needle tip during ultrasound-guided SGB were under prevertebral fascia (68.1%) in Japan and over prevertebral fascia (39.3%) in Korea, Anatomical position of cervical sympathetic chain were over prevertebral fascia at the level of C6 (100%, n=12) and under prevertebral fascia at the level of C7 (100%, n=12). The cervical sympathetic chain runs over prevertebral ascia at the level of C6 and pierces the prevertebral fascia at the level of C7 and runs under prevertebral fascia (Fig. 1).

Conclusion: Ultrasound-guided SGB was diverse in international clinical practice. Injecting above prevertebral fascia seems to be more effective for performing sympathetic block in C6 level. To be more precise, it should be called middle cervical sympathetic block rather than calling it SGB when performing block in the level of C6. Injecting under the prevertebral fascia should be more effective when performing sympathetic block in C7 level and it can be called exact "SGB".

A re-definition of what is commonly called SGB is necessary using an accurate anatomical knowledge for pain physician.

### 08AP02-4

The stellate ganglion block and plexus brachialis ethanolic neurolysis given the neoplastic brachial plexopathy (NBP) Vidas Jankus, Renata Paškevičiūtė, Geda Klimavičiūtė Klaipėda University Hospital, Anesthesiology and Intensive Care Clinic, Lithuania

Klimaviciute G.1, Jankus V.1, Paskeviciute R.1 ¹no - Klaipeda (Lithuania)

Background: Cancer multimodal treatment with optimized systemic therapy does not reach adequate pain control in 5-14 % of patients. About 8-11 % could benefit from interventional procedures. This report has been made on the severe pain case while NBP treatment with invasive interventions applied.

Case Report: A 50-year-old female has been admitted to The Thoracic Surgery Unit due to breast cancer progressed. CT scan has showed a 12x6 cm chest wall infiltration in contact with a brachial plexus. She has suffered from burning hand pain (7 points of NRS) with progressed hand swelling and motor weakness till motoric absence, hyperesthesia, allodynia. Elective chest wall tumorectomy

has been made. Histology has showed metastatic breast carcinoma. Surgery has aggravated pain to 10 points of NRS despite maximum tolerated medical treatment. Interventional pain treatment by ultrasound-guided (UG) plexus brachialis block in supraclavicular and interscallene approach with 20 mL 0,5 % bupivacaine and 40 mg methyl-prednisolone has been fulfilled by blocking three times in total. It has resulted in subsequent prolonged pain relief to 8 points with no more benefits from block repeating. The causalgia has been diagnosed under diagnostic criteria. For sympathetically maintained pain the UG stellate ganglion block (SGB) with 1 % lidocaine and 40 mg methyl-prednisolone has been applied. It has resulted in constant pain relief to 2 points and significant decrease in pain medication demand. The SGB has been repeated twice after the first block has been made. Due to pain increase and carcinoma progression UG brachial plexus neurolysis with 6 ml 60% ethanol in supraclavicular way and 1 week later with 5 ml 70 % ethanol in interscallene way has been applied. It has resulted in loss of any sensations in the whole hand and the absence of need for pain medication.

**Discussion**:Malignant invasion of brachial plexus occurs in less than 0,5% of breast cancers with 31% intractable pain. Our patient's pain decrease after brachial block has not been satisfactory due to the combined neuropathic and nociceptive origin of pain. Sympathetic blockade by SBG and brachial plexus neurolysis has been required.

#### References:

1. J.G. de Courcy. Clinical Oncology 23. 2011; 407-417.

**Learning points**: Cancer patients suffering from intractable pain should be treated using interventional procedures or the combination of them if desired pain relief has not been achieved.

## 08AP02-6

# Complications during percutaneous epidural adhesiolysis for treatment of chronic low back and lower extremity pain

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Background and Goal of Study: Percutaneous epidural adhesiolysis (PEAL) is commonly employed in patients with chronic low back (LB) and lower extremity (LE) pain. In the past, PEAL was most frequently utilized in failed back surgery syndrome (FBSS). However, there is an increasing trend of its application in non-surgical back pain patients, such as those suffering from spinal stenosis (SS) and/or lumbar radiculopathy (LR). PEAL basis is epidural lysis of adhesions and neurolysis of vertebral nerve roots, coupled with local lavage of pro-inflammatory mediators through high volume injection. The most frequent PEAL complications are: unintentional dural puncture; administration of drugs to the subarachnoid/subdural space; catheter shearing; infection; and severe hemodynamic instability during application. We aimed to investigate PEAL complications rates in patients with chronic LB and LE pain treated at our Department's One-day Surgery Clinic.

**Materials and Methods:** In this retrospective study, we reviewed medical records of 74 one-day PEAL procedures performed between January 1, 2016, and January 1, 2017.

**Results:** A total of 48 (65%) female patients, aged from 23 to 87 years (median 55), underwent one-day PEAL procedure. Occurring immediately, the procedure related complication rate of 0.04% was observed, complementary to catheter shearing in all of the reported cases. Furthermore, drug administration affiliated complication rate of 0.05%, depicted as transient partial sensomotoric deficit showing at later onset, was observed.

**Conclusion:** Despite the fact infrequent PEAL complications occur due to the procedure itself or specific drugs-related side effects, we believe minimally invasive PEAL procedure should be considered as a safe choice treatment option for patients with chronic lumbosacral radicular pain.

### 08AP02-8

# The effectiveness of one-day epidural lysis of adhesions in patients with chronic low back and lower extremity pain

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Background and Goal of Study: Epidural lysis of adhesions (LOA) is gaining popularity in treatment of chronic low back (LB) and lower extremity (LE) pain, secondary to failed back surgery syndrome, spinal stenosis, or lumbar radiculopathy. Epidural LOA technique comprises of epidural space access through the sacral hiatus, catheter advancement to site of adhesions, mapped by epidurography, and adhesiolysis via the high-volume administration. Factors contributing to enhanced LOA effectiveness are due to administration of: high volumes, hypertonic saline, hyaluronidase, and navigable catheter mechanically disrupting epidural scar tissue. Aim of our study was to evaluate short-term LOA effectiveness in patients with

chronic LB and LE pain treated at our center's outpatient Clinic.

Materials and Methods: Between January 1, 2016, and January 1, 2017, a total of seventy-four patients, with persistent/recurrent LB and/or LE pain, underwent epidural LOA. A one-day LOA protocol was instituted, with administration of hyaluronidase, local anaesthetic, and steroid through epidural catheter. Short-term efficiency outcome was defined as improvement in Visual Analog Scale pain score in rest (VASr) and Visual Analog Scale pain score in motion (VASm) one month after LOA compared to baseline.

Results: There were 48 (65%) female patients, aged from 23 to 87 years (median 55). There was statistically significant improvement in VASr pain score [med 6(3-8) vs. 4.5(0-7); P=0.025], and in VASm pain score [med 8(6-9) vs. 6(3.25-7); P=0.005] one month post-LOA, respectively.

**Conclusion:** Epidural LOA proves to be a useful treatment for the relief of chronic intractable LB and LE pain refractory to conventional therapy.

### 08AP02-9

# Contras dye spread of thoracic transforaminal epidural block in herpes zoster or PHN

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Background and Goal of Study: Thoracic transforaminal epidural block is usually used for herpes zoster or post herpetic neuralgia. In rare cases, herpes zoster manifested multiflex bilateralis or multiple segmental involvement. Therefore, appropriate injection site should be chosen with considering spread range of drug. Contrast spread correlated with contrast volume definitely. We studied contrast spreading range for thoracic transforaminal epidural block according to from 1ml to 3ml in patients with herpes zoster or postherpetic neuralgia.

Materials and Methods: The 26 patinets who had no trauma history, fracture or herniated nucleus porposus before herpes zoster or post-herpetic neuralgia developed, were enrolled this study. The thoracic levels were from T2 to T11 for study. For comparison of spreading according to contrast mount, 1ml, 2ml, 3ml of contrast was injected with 5 seconds of interval(Group 1,2,3). At lateral view, Cephalad spread of longitudinal direction was defined as one level above if the dye spread to middle portion of vertebral body or superior end plate and same level of injection vertebra if the dye spread to low end plate of vertebrae. Caudal spread of longitudinal direction estimate as same level of injection if the dye spread superior end plate of vertebra and one level below if the dye spread to middle portion of vertebral body or low end plate of vertebra.

Results and Discussion: The median cephalad spread of contrast (median [25-75%])) at lateral view was 2 [1-2] of Group 1, 2.5 [2-3] of Group 2, and 2 [2-4] of Group 3. There was significant difference in cephalad spread of contrast between Group 1 and 2, Group 2 and 3, Group 1 and 3 (P < 0.001, respectively). The median caudal spread of contras was 1 [1-2] of Group 1, 2 [2-3] of Group 2 and 2 [2-3] of Group 3. There was significant difference in caudal spread of contrast between Group 1 and 2, 2 and 3, 1 and 3 (P < 0.001, respectively). In our practice, 2ml mixed with 0.5% lidocaine and dexamesthasone is unually used. It is enough cover with four dermatorm spread cephald and caudal directions

**Conclusion**: In this study, contrast spread in cephalad direction revealed more than in caudal in all three groups. This contrast spread pattern is similar in thoracic interlaminar epidural block and in other studies of lumbar area.

## 08AP02-11

# Ultrasound Guided Erector spinae plane block (UGESPB): a safe alternative analgesic tool against chronic post-thoracotomy pain!

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Background: International Association for the Study of Pain (IASP) and recent studies, defined Chronic post-thoracotomy pain (CPTP) following thoracic surgery as "pain persisting for at least 3 months after surgery". Pain after thoracotomy may originate from both somatic and visceral afferents that lead to a cascade of neural activity which in turn contribute to the establishment of chronic pain. Possible surgical factors include posterolateral approach to thoracotomy and reduced surgical field and incisions that may span multiple dermatomes in general musclesparing approaches. Even with the increasing use of video-assisted thoracoscopic surgery the incidence of CPTP is similar. Patient factors include age below 60 years old, female gender, hypertension, lack of PCA, and chest tube drainage superior to 4 days. There are some conservative and interventional treatment options that can be chosen.

Case Report: Our case is about a 41 years old woman that developed a CPTP after a thoracotomy surgery for lobectomy. The pain has a neuropathic component in the surgical scar of the tube drainage insertion (T7 and T8 in the infra-mammary area) with irradiation to the left axillary zone. At first consultation the patient described a current numerical pain scale of 3, maximal of 8-9, minimum of 1-2, acceptable 1-2, that relief with local anaesthetic infiltration, pressure in the area of pain.

sitting position and aggravate with cough, left lateral decubitus, interfering with her quality of life. So far the pain was refractory to the medication. Intercostal blocks, paravertebral block, and acupuncture were performed, all with some improvement of pain. When an USESPB was performed at the level of T5 with triamcinolone 40 mg and ropivacaine 0.375%, a total abolition of pain was observed for three days. **Discussion:** The recently described UGESPB was a succefull treatment in this patient. Further clinical trials should be done to confirm it safety and efficacy. **References:** 

1. Hegarty D. Post Thoracotomy Pain Syndrome: what pain management options do we have?. Journal of Surgery & Transplantation Science. 2017 Sept 21;5(3):1059 2. Forero M, et all. The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. Reg Anesth Pain Med. 2016 Sep-Oct;41(5):621-7 Learning points: With this successful case we conclude that the ultrasound guided erector spinae plane block might be an effective and safe analgesic tool in the CDED.

## 08AP02-12

## Ultrasound-Guided Radiofrequency for Chronic Shoulder Pain: preliminary report

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Background and Goal of Study: Chronic shoulder pain is a frequent cause of suffering and impaired quality of life. Treatment includes multimodal analgesia, physical therapy and interventional procedures such as suprascapular nerve (SSN) block and pulsed radiofrequency (PRF) .The objective of this prospective study is to evaluate efficacy of ultrasound-guided PRF of SSN for chronic shoulder pain in a clinical setting.

Materials and Methods: After ethical approval, the following inclusion criteria were used: previous pain intensity reduction to ultrasound-guided SSN block with local anaesthetic and steroids superior to 50%. Patients were submitted to ultrasound-guided (Siemens Acuson P300, linear probe 12MHz)radiofrequency of SSN (22G 60cm needle, 2cycles, during 180seconds, temperature<42°). The primary outcome were efficacy using numerical pain rating scale registered before, immediately, 1 and 3 months after. Patient motor function (abduction, flection and extension) measured using a goniometer. The secondary outcome was patient global satisfaction.

Results and Discussion: A total of 8 patients were included, 87.5% were female, with a mean age of 59.9 years. The initial pain score (static/dynamic) was 4.4±2.0/7.8±1.5 decreasing to 3.3±2.39/3.75±2.38 after 1 month and 2.75±2.1/3.9±3.18 after 3 months. All patients presented pain relief after the procedure and after 1 and 3 months, representing a mean reduction of 69%/42%/51% and 45%/55%/54% respectively. The effects of pain reduction on shoulder range of motion increased modestly from a baseline average of 22.5±20(flexion)/40±31.7(abduction)/43.75±37.7(extension). Regarding patient satisfaction 87.5% of patients were satisfied and very satisfied and 12.5% slightly satisfied. No adverse effects were recorded. Patients presented significant pain reduction (NPRS score was reduced by at least 30%) functional improvement and high levels of satisfaction. Recently there has been a growing interest in application of ultrasonography in interventional pain management, because ultrasound provides direct and real-time visualization, without using ionizing radiation. Our study presents some limitations such as small sample size.

**Conclusion**: This study concludes that ultrasound-guided PRF of SSN is safe and effective with pain reduction for at least 3 months. Therefore this technique represent a valid analgesic alternative to the treatment of chronic shoulder pain. Future research is warranted for validating these results.

## 08AP03-2

# Serotonin 1B receptor agonist diminishes depolarizationevoked glutamate release by suppressing the adenylyl cyclase/PKA pathway in rat cerebral cortex endings

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Background and Goal of Study: Serotonin (5-HT) 1B receptors are expressed predominantly on axonal terminals and have been implicated in the involvement of several behavior and psychiatric diseases. In addition, several studies have demonstrated that 5-HT<sub>1B</sub> receptor agonists can alleviate neuropathic pain such as trigeminal neuralgia. Since neuropathic pain might be associated with excessive glutamatergic transmission in CNS, we aimed to examine the presynaptic effect of the 5-HT<sub>1B</sub> receptor agonist on the modulation of 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 CGS-12066, a 5-HT<sub>Is</sub> receptor agonist, 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**: Our results showed that CGS-12066 exhibited a concentration-dependent inhibition of 4-AP-evoked release of glutamate. In addition, this inhibition was prevented by chelating the intrasynaptosomal Ca<sup>2+</sup>

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 Ca 2.2 (N-type) and Ca 2.1 (P/Q-type) channels, but not by blocking intracellular Ca²+ release. Inhibition of Gi/Go-protein, adenylyl cyclase, and PKA also prevented the inhibitory effect of CGS-12066 on evoked glutamate release. Conclusion: These results suggest that 5-HT<sub>18</sub> receptor agonist inhibits glutamate release from rat cortical synaptosomes through the suppression of presynaptic voltage-dependent Ca²+ entry and G protein and the downstream adenylyl cylase and PKA signaling cascade. These findings may delineate the possible analgesic mechanism of 5-HT<sub>18</sub> receptor agonist.

## 08AP03-3

# Molecular mechanisms behind the rapid analgesic action of methoxyflurane

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**Background and Goal of Study**: Methoxyflurane, formerly used as an inhalational anaesthetic, is now clinically utilised in a form suitable for inhalation ("Penthrox"), to provide emergency relief in conscious patients from moderate to severe pain associated with traumatic injury and has been used for over 40 years in Australia and New Zealand To better understand the molecular mechanisms underpinning this analgesic action, we investigated the influence of methoxyflurane (~1mM) on neuronal inhibition and excitation in mouse ventrobasal (VB) thalamus, a key hub in the central pain processing pathway. Early in development (p7-13) mouse VB thalamo-cortical neurons express synaptic GABAAR receptors incorporating the  $\alpha$ 2–subunit ( $\alpha$ 2-GABAARs) and extrasynaptic GABAARs composed of  $\alpha$ 4,  $\beta$  and  $\delta$  subunits ( $\delta$ -GABAARs), which mediate phasic and tonic inhibition respectively [1]. These receptor subtypes mediate the analgesic actions of benzodiazepines and gaboxadol respectively. VB neurones additionally express inhibitory glycine receptors and their inhibition by strychnine is nociceptive.

Materials and Methods: Whole-cell voltage-clamp technique was used

Results and Discussion: Methoxyflurane greatly prolonged the decay time (tw) of miniature inhibitory postsynaptic currents (mIPSCs), mediated by synaptic d2-GABAARs (control=9±1ms; methoxyflurane=26±3ms; n=10 neurons, p<0.001), with no effect on their frequency. Additionally, methoxyflurane application induced an inward shift in the holding current, reflecting enhancement of the tonic current mediated by ambient levels of GABA activating d-GABAARs. In mouse VB (P18-24), brief (50-100ms) pipette application of glycine (300mM) induced a strychninesensitive inward current, that was ~doubled by bath application of methoxyflurane (peak amplitude, control=309±29 pA; methoxyflurane ~1mM=-609±39 pA, n=4, p<0.01). In contrast, methoxyflurane had no effect on the amplitude, time course, or frequency of VB (P18-24) spontaneous excitatory currents (sEPSCs) mediated by synaptic AMPA receptors (n=7).

 $\begin{tabular}{ll} \textbf{Conclusion:} & Methoxyflurane enhances neuronal inhibition mediated by both GABA and glycine, with no effect on glutamatergic excitation. An action to enhance the function of three analgesic targets ($\alpha$2-GABAARs, d-GABAARs, glycine receptors) may underpin the rapid pain-relieving properties of methoxyflurane. \\ \end{tabular}$ 

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### 08AP03-4

Short-term efficacy of low-dose methoxyflurane analgesia in adolescent patients presenting to the emergency department with acute trauma pain: a sub-analysis of a randomised, double-blind, placebo controlled UK study

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Background and Goal of Study: Although methoxyflurane has been used for pain relief in anaesthetic doses (administered via the Penthrox® inhaler, 3mL dose) for over 40 years, there are limited data from the ED setting, or outside Australia and New Zealand. This double-blind, randomised, placebo-controlled UK study evaluated the short-term efficacy and safety of methoxyflurane at low analgesic doses in treating adult and adolescent patients presenting to the ED with moderate to severe trauma pain. We present results of a sub-analysis of 2 pain endpoints and rescue medication use in adolescent patients aged 12-17 years (N=95).

Materials and Methods: 300 adult and adolescent patients were randomised 1:1 to receive methoxyflurane (up to 6mL) or placebo (normal saline), both inhaled as required from a Penthrox® inhaler. Rescue medication (paracetamol/opioids) was available immediately upon request. Pain relief was assessed using a 0-100 visual analogue scale (VAS; PainlogTM) at 5, 10, 15 and 20 minutes after the start of

treatment. The primary efficacy endpoint was change from baseline in VAS pain intensity, analysed using repeated measures ANCOVA. Median time to first pain relief and rescue medication use were also analysed.

Results and Discussion: The methoxyflurane subgroup (N=47) included 32 males and 15 females with a mean age of 14.4 years. The placebo subgroup (N=48) included 35 males and 13 females with a mean age of 13.5 years. Mean±SD VAS pain scores at baseline were 61.7±16.56 mm in the methoxyflurane group and 61.0±13.33 mm in the placebo group. Mean change in VAS pain intensity from baseline to 5, 10, 15 and 20 min was greater for methoxyflurane (-24.5, -28.1, -31.6 and -31.7 mm, respectively) than placebo (-14.6, -18.8, -19.2 and -23.7 mm, respectively). Overall, over the first 20 minutes of treatment, there was a highly significant treatment difference (estimated treatment effect, -9.9 mm; 95% CI: -17.4, -2.4; p=0.0104). Time to first pain relief was significantly shorter with methoxyflurane than placebo (median 1 min versus 3 min, hazard ratio: 2.35; 95% CI: 1.48, 3.76; p=0.0003). Only 2 methoxyflurane-treated patients and 3 placebo-treated patients requested rescue medication.

**Conclusion**: The results of this study show that low-dose methoxyflurane administered via the Penthrox® inhaler is a rapid-acting and effective analgesic in adolescent patients presenting with acute trauma pain.

### 08AP03-5

Subgroup analysis of the extended efficacy and safety of low-dose methoxyflurane analgesia in adolescent patients from the STOP! study with acute trauma pain

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Background and Goal of Study: Despite a large volume of published literature supporting the efficacy and safety of methoxyflurane at analgesic concentrations [1], previous studies have been mostly observational and uncontrolled. This double-blind, randomised, placebo-controlled UK study [2,3] investigated the efficacy and safety of low-dose methoxyflurane analgesia administered via the Penthrox® inhaler for the treatment of moderate to severe trauma pain in the ED. We present results of a post hoc analysis of pain relief beyond 20 minutes after the start of treatment, and safety results, in a sub-group of adolescent patients aged 12-17 years (N=95).

Materials and Methods: At triage, 300 adult and adolescent patients were randomised 1:1 to receive methoxyflurane (up to 6 mL) or placebo (normal saline), self-administered via a Penthrox® inhaler. Rescue medication (paracetamol/opioids) was available immediately upon request. Visual analogue scale (VAS) pain intensity was assessed using the PainlogTM VAS at 5, 10, 15, 20 and 30 min, then every 30 minutes until discharge (data are presented for time points where n≥2). Adverse events (AEs) were recorded from enrolment until discharge, and at safety follow-up (Day 14±2).

Results and Discussion: The methoxyflurane subgroup (N=47) included 32 males and 15 females with a mean age of 14.4 years. The placebo subgroup (N=48) included 35 males and 13 females with a mean age of 13.5 years. Mean decreases in VAS pain intensity of -33.5, -38.7, -37.8 and -42.5 mm (from a baseline mean of 61.7 mm) were observed with methoxyflurane at 20 (n=38), 30 (n=32), 60 (n=5) and 90 minutes (n=2). Mean decreases of -25.3, -30.9, -26.9 and -31.0 mm (from a baseline mean of 61.0 mm) were observed with placebo at 20 (n=35), 30 (n=26), 60 (n=7) and 90 minutes (n=2). Fifty-five AEs were reported by 24 patients (51%) in the methoxyflurane group and 35 AEs were reported by 20 patients (42%) in the placebo group. The most common AEs were headache (methoxyflurane: 26%; placebo: 23%) and dizziness (methoxyflurane: 15%; placebo: 2%). No serious or severe AEs were reported. Two patients (4%) in each group discontinued treatment due to AEs.

**Conclusion**: These results show that the reduction in pain intensity with low-dose methoxyflurane analgesia is maintained for the duration of use in adolescent patients with acute trauma pain.

### References

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### 08AP03-6

Low dose methoxyflurane analgesia in the emergency department: a subgroup analysis of inhaler use in patients with severe acute trauma pain from the STOP! study

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Background and Goal of Study: Acute pain is a frequent complaint in the ED but remains widely undertreated. STOP! was a randomised, double-blind, placebo-controlled study that investigated the efficacy and safety of low-dose methoxyflurane analgesia administered via a handheld inhaler (Penthrox®, 3mL dose) for treatment of acute pain in patients aged ≥12 years presenting to the ED with non-life-threatening trauma. Reduction in pain intensity in the first 20 minutes of treatment has previously been reported. The study included patients with moderate to severe pain (score of 4-7 on Numeric Rating Scale [NRS]). We describe patterns of inhaler use in a subgroup of adult and adolescent patients with severe pain (NRS=7) at baseline.

Materials and Methods: Patients were randomised at triage to methoxyflurane (3mL) or placebo (normal saline), both inhaled as needed from a Penthrox® inhaler. Patients could cover the diluter hole in the mouthpiece to inhale a higher concentration of study medication if required. A second inhaler and/or rescue medication (paracetamol/opioids) were provided if requested by the patient. Subgroup analyses of number of inhalations to first pain relief and inhaler use were performed.

Results and Discussion: The severe pain subgroup included 62 methoxyflurane-treated patients and 71 placebo-treated patients. The most common injury types were "other" (48.9%, mostly sprains, soft tissue injury and muscular pain), contusions (23.3%) and fractures (18.8%). Pain relief was achieved within 1-5 inhalations for 51.6% of methoxyflurane and 21.1% of placebo patients, and within 1-10 inhalations for 80.6% and 47.9% of patients, respectively. 11.3% of methoxyflurane-treated patients and 39.4% of placebo-treated patients experienced no pain relief without rescue medication.

Sixteen patients (25.8%) in the methoxyflurane group and 12 patients (16.9%) in the placebo group requested a second inhaler. Median time between dispensing of the first and second inhalers was 55.0 minutes for methoxyflurane and 37.5 minutes for placebo. A total of 21 patients (33.9%) in the methoxyflurane group and 28 patients (39.4%) in the placebo group covered the diluter hole when using the inhaler.

Conclusion: Low-dose methoxyflurane was shown to provide rapid-acting analgesia within 1-10 inhalations in the majority (80.6%) of patients with severe trauma pain.

### 08AP03-8

## Comparison of Pregabalin and Agmatine Effects on Experimental Neuropathic Pain in Mice

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Background and Goal of Study: In addition to primary analgesic agents various adjuvant agents have been used in treatment of neuropathic pain. Evidence has been gathered that drugs affecting the NMDA receptors play an important role in treatment of chronic pain. In this study the anti-nociceptive effects of agmatine were investigated and compared with pregabalin in a chronic pain model.

Materials and Methods: The neuropathic pain was induced by partial ligation of right sciatic nerve (PSL) in Balb/c mice under general anesthesia. Six groups of mice were included in the study (n=7). The groups were as follows: Group 1 Control, Group 2 Sham, Group 3 Neuropathy (PSL), Group 4 Neuropathy (PSL, 50mg/kg pregabalin.), Group 5 Neuropathy (PSL, 50mg/kg agmatine). Group 6 Neuropathy (PSL, 50mg/kg pregabalin&50mg/kg agmatine). The baseline measurements of hot plate latency (HPL) and acetone evaporation (AE) tests were performed on 14. post-surgical day and the results were recorded. The study drugs were injected intraperitoneally (i.p) during the following 14 days to groups 4, 5 and 6th. At the end of the 28th day the tests were repeated in all groups.

Results and Discussion: The significant difference between groups in baseline values for the HPL test showed the presence of neuropathic pain in mice who had PSL (p<0.05). The highest HPL values were obtained in the control group and the lowest ones were in the agmatine group. The results were similar between the other groups. On the 28th day the difference in the HPL results were not statistically significant (p>0,05). The difference between the two measurements were found to be statistically significant in all groups (p<0,05). Comparison of the baseline AE percentage and its measurement on the 28th day showed a significant difference (p<0,05). The results of the control group were lower compared to the groups with neuropathy. The results did not differ in groups receiving the study drugs. The difference of the baseline and 28th day measurement of AE test were only significant in the agmatine and pregabalin & agmatine groups (p<0,05).

**Conclusion**: Our results have shown that agmatin a NMDA receptor antagonist has remarkable antinociceptive effects in neuropathic pain and this effect is comparable to pregabalin. Addition of agmatine to treatment in neuropathic pain was more effective in relieving allodynia symptoms compared to administering only pregabalin.

## 08AP03-9

Global medication performance and safety of methoxyflurane analgesia in patients with severe acute trauma pain treated in the emergency department: a subanalysis of a randomised, double-blind, placebo-controlled UK study

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Background and Goal of Study: Low-dose methoxyflurane administered via a handheld inhaler (Penthrox®) has been used for over 40 years in Australia and New Zealand for short-term pain relief in emergency medicine. The STOP! study investigated the efficacy and safety of methoxyflurane analgesia for the treatment of acute pain in adult and adolescent patients presenting to the ED with minor trauma and moderate to severe pain (score of 4-7 on the Numeric Rating Scale [NRS]). We present a post hoc analysis of Global Medication Performance (GMP) and adverse events (AEs) in a subgroup of patients with severe pain (NRS=7) at baseline.

Materials and Methods: At triage, patients (N=300) were randomised 1:1 to receive methoxyflurane (up to 6mL) or placebo (normal saline), self-administered as required via a Penthrox® inhaler. Rescue medication (paracetamol/opioids) was available immediately upon request. The patient, treating physician and research nurse each rated GMP at ED discharge as "Poor", "Fair", "Good", "Very Good", or "Excellent". AEs were recorded from enrolment until discharge, and at safety follow up (Day 14±2).

Results and Discussion: The severe pain subgroup included 62 methoxyflurane-treated patients and 71 placebo-treated patients. The most common injury types were "other" (49%, mostly sprains, soft tissue injury and muscular pain), contusions (23%) and fractures (19%). GMP ratings by the patient, physician and nurse at ED discharge were all significantly better in the methoxyflurane group compared with the placebo group (p<0.0001 for patient and nurse ratings and p=0.0004 for physician rating). 81% of patients, 85% of treating physicians and 77% of research nurses in rated methoxyflurane treatment as "Good", "Very good" or "Excellent", compared with 41%, 51% and 35% in the placebo group. AEs were reported by 31 patients (50%) in the methoxyflurane group and 30 patients (42%) in the placebo group and were mainly mild and transient in nature. AEs reported by ≥5% of patients were dizziness (29%), headache (15%) and somnolence (6%) for methoxyflurane and headache (17%), dizziness (7%), nausea (7%), vomiting (6%) and hypotension (6%) for placebo.

Conclusion: Patient and treating physician/nurse satisfaction with low-dose methoxyflurane treatment administered via the Penthrox® inhaler was high (≥77%) for this subgroup of patients presenting to the ED with severe trauma pain (NRS=7 at baseline).

## 08AP04-1

Intra-operative celiac plexus block for open hepatobiliary surgery: our experience

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**Background**: Celiac plexus block has been commonly described as chronic pain procedure for use in patients with visceral pancreatic pain but not for acute post-operative pain. There are multiple studies describing the efficacy of various regional anaesthesia techniques (e.g. continuous epidural infusion; continuous transversus abdominis plane block) for open upper abdominal surgery. However, this is the first case series of 5 patients reporting on the use of intra-operative celiac plexus block (CPB) with continuous wound infiltration (CWI) via pre-peritoneal catheters.

Case Report: Our patients underwent open hepatobiliary surgery (2 reverse L incisions and 3 rooftop incisions) under GA. IV fentanyl and morphine were given in divided boluses throughout the surgery. They also received 1 – 1.5mg/kg/hr of lignocaine 1% infusion and IV paracetamol during surgery. 1 patient received intra-operative IV parecoxib and ketamine infusion. At the end of surgery, the surgeon performed single shot CPB under direct vision and via anterior approach for all patients. CWI was initiated by injecting 20ml Ropivacaine 0.2% into each catheter. Infusion was continued at 4ml/hour till POD5 or 6. PCA was also started for 4 out of the 5 patients. One patient received oral oxycodone instead. The VAS scores were assessed up to post-operative day (POD) 4. All patients had pain scores of 3 or less at rest. For VAS scores on movement by POD 2, dynamic VAS scores were less than 3. 3 patients were able to ambulate on POD 1 and 2 were able to do so onOD 2.

We looked for but found no evidence of diarrhea nor orthostatic hypotension. There was no ileus noted. There was no immediate hypotension post celiac plexus block intra-operatively.

**Discussion**: Our case series demonstrate that CPB, together with CWI, helped to minimise the post-operative opioid consumption and VAS of patients undergoing open hepatobiliary surgery. Patients are able to mobilise early and this is an important measure of good pain control.

References: Continuous Transversus Abdominis Plane (TAP) Block and Intraoperative Coeliac Plexus Block (CPB) for Post-Operative Analgesia Following Laparotomy: Two Case Reports - Vasanth Rao; Anesth Pain Med. 2017 Feb

**Learning points**: This is of importance as celiac plexus nerve block can be performed under direct vision intra-operatively. It is an effective and safe mean of analgesia with no major complications and can be an effective component of multimodal analgesia for open surgery.

### 08AP04-2

The correlation of pain intensity during local infiltration for spinal anesthesia and subsequent pain after cesarean section

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**Background and Goal of Study**: Local anesthetic infiltration prior to spinal anesthesia is generally performed, resulting in pain upon local injection. This study was conducted to determine the correlation between the pain intensity caused by local anesthetic infiltration in cesarean section patients and subsequent pain at 24 hours, 1 month and 3 months postoperatively.

Materials and Methods: This prospective observational cohort study was performed in 215 patients scheduled for elective cesarean section. Prior to a spinal needle insertion, 3 ml of 2% lidocaine without adrenaline was locally infiltrated via a 24G needle in 4 seconds. The patients were asked to rate their pain intensity upon local infiltration by using verbal numerical rating score (VNRS) from 0-10 where 0 = no pain and 10 = the worst possible pain. During an admission, the VNRS at rest and with movement were evaluated at 24 hours postoperatively. At 1 month and 3 months postoperatively, the patients were contacted via phone to assess the VNRS. The correlation was calculated using Spearman's correlation.

**Results and Discussion**: At 24 hours postoperatively, the positive correlation was found between the pain intensity of local anesthetic infiltration and the acute pain intensity both at rest (r = 0.554, P-value < 0.001) and with movement (r = 0.576, p-value < 0.001). The positive correlation was also found for pain at rest (r = 0.296, p-value < 0.001) and with movement (r = 0.525, p-value < 0.001) at 1 month postoperatively. At 3 months, the positive correlation was found for pain at rest (r = 0.299, p-value < 0.001) but no statistical significance for pain with movement (r = 0.076, p-value = 0.273).

**Conclusion**: Statistically significant correlations have been found between the pain intensity during local infiltration for spinal anesthesia and acute as well as chronic pain after cesarean section. The local infiltration pain may be used as a convenient predictor for acute and chronic pain after cesarean section.

## 08AP04-3

Cancer-free or overall survival rate following radical prostatectomy is not influenced by perioperative pain management. A retrospective comparison of intravenous patient-controlled analgesia vs. epidural analgesia

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**Background and Goal of Study**: There is controversial data regarding influence of anaesthetic techniques on the outcome of patients undergoing cancer surgery. In particular, whether patients benefit from the application of regional techniques is elaborately discussed. Therefore we enrolled a retrospective analysis to determine the influence of different anaesthetic techniques in patients who underwent radical prostatectomy due to prostrate cancer.

Materials and Methods: We viewed our medical record archive for patients that received radical prostatectomy between 1995 and 2005 and included 300 patients. They were divided according to their postoperative pain regime (systemic opioids vs. epidural analgesia). Recurrence-free survival was defined as the primary endpoint and overall survival as the secondary endpoint. The study period covered at least the first five post-operative years.

**Results and Discussion**: We documented no difference in recurrence-free or overall survival comparing the two analgesic regimes. However, we observed that higher body-mass-indexes (BMI) significantly correlated with a worse outcome (recurrence-free survival p=0.037, overall survival p=0.02). Other factors influencing the outcome were the Gleason score (5-6 vs. 10 p=0.016; 7 vs. 10 p=0.08) and surgical margins free of cancer (p=0.04).

**Conclusion**: In this study, different anaesthetic techniques did not influence recurrence-free or overall survival rate. Interestingly, we could identify BMI as a risk factor with potential impact on the outcome of patients undergoing radical prostatectomy. Adequately powered prospective randomized trials are required to decide on the effect of regional anaesthesia in patients who underwent radical prostatectomy.

### 08AP04-4

Continuous thoracic paravertebral block for postoperative pain management in patients undergoing minimally invasive cardiac surgery and the occurrence of chronic postsurgical pain: a propensity-score-matched analysis

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Background and Goal of Study: Chronic Postsurgical Pain (CPSP) can be characterized as pain persisting for at least 3 months after surgery which was not present before surgery and localized to the surgical site. CPSP frequently is diagnosed after thoracic surgery and the occurrence after minimally invasive cardiac surgery (MICS) is well documented. Increased post-operative pain and sympathetic tone are some of the many factors contributing to the development of CPSP and the use of regional anesthesia techniques such as thoracic paravertebral block (TPVB) have been suggested to reduce the risk of CPSP. We hypothesized that continuous TPVB may reduce the occurrence rate of CPSP after MICS.

Materials and Methods: Áfter institutional review board approval, we performed a retrospective record based review of all patients who underwent MICS at our center between March 2011 and October 2016. The occurrence of CPSP was defined as the presence of pain after at least 3-months post MICS after ruling out other possible causes of pain. A total of 91 patients were included for analysis. Patients were grouped to either, the general anesthesia group (GA group; n=20) or the continuous TPVB group (n=71). Data collection included; patient characteristics, length of surgery, and postoperative analgesic consumption. Due to the imbalance in group size and potential bias related factors such as female sex, age, and length of surgery, we matched between groups with a 1:1 ratio using a propensity score based method. The matching yielded a final cohort of a total of 38 patients with 19 patients from each group. Values were compared using Student's t-test for continuous variables and chi-square test for categorical variables, p<0.05 was considered statistically significant.

Results and Discussion: CPSP occurred in a total of 24 (26.4%) cases. After matching the rate of CPSP was 47.4% (n=9) for the GA group was and 26.3% (n=5) for theTPVB group. The occurrence CPSP did not significantly differ between groups (Odds ratio 2.5, 95%confidence interval 0.65 - 10.0, p=0.18). Postoperative morphine consumption was significantly reduced between the GA group and TPVB group, 10.4±1.4 and 6.7±1.4 mg, respectively (p=0.035). There were no complications related to the use of TPVB.

**Conclusion**: While the use of TPVB significantly reduce the need for postoperative analgesia with opioids, the use of TPVB did not reduced the occurrence of CPSP in patients undergoing MICS.

### 08AP04-5

# Efficacy of transversus abdominis plane block in laparoscopic colorectal resection

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**Background and Goal of Study**: The Transversus abdominis plane (TAP) block provides a pain and opioid consumption reduction after several laparoscopic procedures. The aim of this study is to evaluate the TAP block analgesic effects during the laparoscopic colorectal resection intra and postoperative period.

Materials and Methods: Retrospective observational comparative study during January-November 2017. Data collected from clinical records of ASA ≤3 patients who have undergone elective laparoscopic colorectal resection. TAP group: bilateral echo guided TAP with Ropivacaine 0.5% (20ml in each side), after anaesthetic induction, plus conventional analgesia; NTAP group: conventional analgesia. Anaesthetic induction performed with fentanyl, propofol and rocuronium and desflurane maintenance. Conventional analgesic: Parecoxib 40mg and Paracetamol 1gr. Evaluated variables: demographic characteristics; intra and postoperative, until 24h after surgery, opioid consumption, pain at rest and in movement until 24h, time spent in post anesthetic care unit (PACU), time until first rescue analgesia was requested in PACU, nausea and vomiting and conscience level.

Statistical analysis: SPPS 20. Fischer test used for categorical variables, and Mann-Whitney test used for continuous variables. P value <0.05 considered as statistical significative.

Results and Discussion: 39 patients, 13 TAP and 26 NTAP. The groups were comparable concerning demographic and surgical data. It was observed lower mean intraoperative fentanyl consumption in TAP group (0,165mg) compared to NTAP (0,300mg), p<0.001. On average TAP group stayed more 14 minutes in PACU (p<0,007), but it took more time to request morphine in this unit, 18 vs 11minutes NTAP (p<0.03). It was observed no difference between the 2 groups concerning pain at 4 and 24h after surgery. No statistical difference was found in the remaining variables.

**Conclusion**: TAP block performance didn't result in a superior pain control. However it allowed to reduce the opioid consumption which, considering the immunosuppressive effects of these drugs, can bring an additional benefit in the Oncological field. More studies are needed to evaluate the long-term impact of this perioperative reduction in opioid consumption in these patients.

1. Eur J Anaesthesiol 2016: 33:725–730

### 08AP04-6

Postoperative Analgesic Efficiency of Ultrasound Guided Transversus Abdominis Plane Block Using Different Concentrations of Bupivacaine in Inguinal Hernia Repair

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Background and Goal of Study: Effective postoperative analgesia is very important in reducing postoperative morbidity, accelarating recovery and avoding chronic postoperative pain. Ultrasound guided transversus abdominis plane (TAP) block is done as a part of multimodal analgesia for pain relief after surgeries. This study was conducted to evaluate postoperative analgesic efficacy of unilateral TAP Block using different concentration of bupivacaine in patients undergoing inguinal hernia surgeries.

Materials and Methods: After ethical approval and patient informed consent, seventy-five patients scheduled for inguinal hernia repair surgery were divided into three equal groups. Group-I (GI) TAP block with 20ml 0.25% bupivacaine, Group-II(GII) TAP block with 20ml 0.125% bupivacaine and Group-III(GIII) no TAP block. After standart induction, anesthesia was maintained with general anesthesia. TAP Blocks were performed with ultrasound guidance. 20ml 0.25% or 0.125% bupivacaine applied between internal oblique and transversus abdominis muscles before the surgery start. Postoperative pain scores were evaluated with visual analog scale (VAS) at 30th and 60th min on recovery room, at 2nd,4th,8th,12th and 24th hour in the ward. An additional and a rescue analgesics were applied when VAS scores≥4.First analgesic application time, the number of additional and rescue analgesic, postoperative nausea-vomiting and patient satisfaction were recorded.

Results and Discussion: The postoperative pain scores were statistically lower in GI and GII than GIII in recovery room and in the ward(P<0.05). The first analgesic application time was longer in GI and GII compared with GIII(P<0.05). The total number of additional analgesic was significantly higher in GIII than GI and GII(P<0.05). The number of rescue analgesic was nonsignificantly higher in GIII compared to GI and GII. There was no difference in the incidence of nauseavomiting. The patients in the GIII were less satisfacted than the GI and GII(P<0.05). All parameters were similar in GI and GII(P>0.05).

Conclusion: TAP Block performed under ultrasound guidance before the surgical incision provided effective and prolonged postoperative analgesia. Using different concentrations (0.125% and 0.25%) of bupivacaine produced similar postoperative pain scores, incidence of nausea-vomiting, higher patient satisfaction and provided considerable reduction of postoperative analgesic requirements.

### 08AP04-7

# Ultrasound-guided paravertebral catheter for postoperative multimodal-analgesia in video-assisted thoracoscopy surgery

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Background and Goal of Study: Post-thoracotomy pain is considered one of the most intense types of postoperative pain. Thoracotomy incision involves multiple muscle layers and possible rib injury .The use of continuous thoracic Paravertebral block (PVB) for the management of acute postsurgical pain after thoracotomy has proven to be safer and affect hemodynamic less than the epidural blockade. (1,2) At our centre, we have been using this technique for more than twenty years, but its advantages in video-assisted thoracoscopy surgery (VATS) have been poorly explored.

**Materials and Methods**: Our aim was to review the analgesic effect of continuous PVB after video-assisted thoracoscopic surgery (VATS). We conducted a retrospective observational study of postoperative pain among patients who underwent primary lung cancer surgery, between January to November 2016.

Results and Discussion: All patients received combined anaesthesia technique (general anaesthesia and continuous PVB). Paravertebral catheter was placed ultrasound-guided technique before the surgery and a bolus of 20 ml of ppivacaine 0,375% was administered. Multimodal analgesia was achieved by 0.375% Ropivacaine infusion during the first three days after surgery (pump rate 7 ml/hour patient-controlled rescue bolus of 3 ml every 20 min) combined with nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids (i.v. morphine) as needed. Quality of analgesia was recorded by a Verbal Numerical Rating Scale (VNRS) registered at first, second and third day after surgery. We also reviewed the medium opioid rescue needed in the first 24 hours (i.v. morphine, milligrams). We recorded 26 patients (66% Male, 35 % female) who underwent VATS surgery. The mean age was 64 years. VNRS mean values were 4 +/- SD 1,23 on the first day after surgery 1,5 +/- 1,79 SD on the second day, and 0,43 +/- 0,66 on the third day. In all cases multimodal analgesia with continuous PVB was used. All patients needed an opioid rescue, being the medium dose of 8.6 mg (SD 5,8) of intravenous morphine during the first 24 hours. No complications were found.

**Conclusion**: Multimodal analgesia aprouch with ultrasound-guided paravertebral catheter for postoperative pain control in VATS technique provided good pain relief. **References**:

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## 08AP04-8

The efficacy and safety of epidural oxycodone in pain management after gynaecologic laparoscopy

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Background and Goal of Study: Early pain after laparoscopic surgery is often moderate to severe (1). Epidural oxycodone penetrates readily into cerebrospinal fluid and may be more potent than intravenous (i.v.) oxycodone (2). In this randomised, double blind clinical trial, we have assessed the analgesic efficacy of epidural oxycodone after gynaecologic laparoscopy.

Materials and Methods: We enrolled 60 women, aged 23-71 years, undergoing elective gynaecologic laparoscopy under standardized general anaesthesia. Postoperatively, the patients were administrated either i.v. saline and epidural oxycodone 0.1 mg·kg-1 (EPI-group, n=31) or i.v. oxycodone 0.1 mg·kg-1 and epidural saline (IV-group, n=29). For background analgesia the subjects received i.v. paracetamol and dexketoprofen. The primary outcome was the amount of i.v. fentanyl for rescue analgesia during the first four postoperative hours. Analysis of data was performed with independent samples t-test. Data is presented as number of cases or median (minimum – maximum).

**Results and Discussion**: The median amount of fentanyl for rescue analgesia during the first four postoperative hours was 50 (0-450) µg in the EPI-group and 100 (0-550) µg in the IV-group, p=0.025. More patients had pruritus in the EPI-group than in the IV-group, 17 vs. 8, respectively, p=0.032.

**Conclusion**: Analgesic efficacy of epidural oxycodone was superior compared to that of i.v. administration in early pain management after laparoscopic surgery. **References**:

- 1. Sjövall S, Kokki M, Kokki H. Laparoscopic surgery: a narrative review of pharmacotherapy in pain management. Drugs 2015;75:1867-89.
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### 08AP04-9

### Unintended subdural block: a clinical case

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**Background**: Subdural block is a known complication of neuroaxial anesthesia, although poorly understood and often mistaken for other causes, with a wide range of clinical presentations. We report a case of a patient in whom hemodynamic instability and tonic-clonic seizure developed following a test dose epidural administration

Case report: A female 93 year-old patient, with 40 kg, ASA III status (arterial hypertension and dementia) was submitted to gamma nail due to pertrochanteric fracture. The procedure went uneventfully under combined spinal epidural technique. We administered 10 mg of levobupivacaine plus 2.5 mcg of sufentanil intrathecally, and the epidural catheter was not used during the procedure. Upon arrival to PACU, after reversal of motor block and negative aspiration for blood or CSF through the epidural catheter, we tested it with 4 mL of ropivacaine 0.2%. 10 minutes thereafter, a focal facial seizure ensued, followed by subsequent generalization, accompanied by bradycardia (25 bpm) and hypotension. We administered immediately 1 mg atropine, 10 mg ephedrine and 20 mg propofol, oxygen by facial mask and a bolus of 20 mL/kg balanced solution. We observed prompt hemodynamic response and cessation of seizures. About 30 minutes after, the neurological status was coincidental with the pre-operative one, without focal neurological deficits or significant motor block. The epidural catheter was removed and the patient was kept under close observation in the PACU for 12 hours.

Discussion: We interpreted the seizures in this case as consequence of cerebral hypoperfusion due to local anesthetic administration in the subdural space. The focus was support therapy with maintenance of adequate ventilation and hemodynamic status. Radiological confirmation of subdural placement with contrast CT was not considered, as it would not change the clinical approach and no benefit is reported on literature [3]. Other diagnosis were excluded due to absence of motor block (total spinal block), hemodynamic instability without respiratory or cutaneous changes (anaphylatic reaction). LA systemic toxicity was also excluded due to the low dose administered.

**Learning points:** A high suspicion level is crucial for the correct diagnosis and appropriate manage-ment of subdural catheterization. Close surveillance, avoidance of further injections of LA and institution of support therapy are mandatory to avoid critical complications, such as cardiopulmonary arrest and death.

### 08AP04-10

Perioperative goal-directed fluid therapy related reduction in postoperative epidural 0.1% Bupivacaine consumption using PCEA infusion in total hip arthroplasty patients

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**Background and Goal of Study**: Impact of perioperative goal-directed fluid administration on postoperative consumption of analgesics is not clear. Study protocol was part of a bigger RCT<sup>1</sup>.

Materials and Methods: Intervention group patients (*n*=39) undergoing THA received perioperative goal-directed fluid management guided by haemodynamic and microcirculation related parameters using mVLT method¹. Controls (*n*=40) received non-goal-directed fluid management. All subjects received 24 h postoperative patient controlled epidural analgesia (PCEA) with 0.1% Bupivacaine. Basal infusion was 5 ml/h and 5 ml rescue boluses were followed by 30 min refractory period.

**Results and Discussion**: Pain scores and patient satisfaction were similar in both groups, but mean hourly and total 24-h consumption of bupivacaine (mg) in intervention group was lower than in controls: 6.637+/-1.51 vs. 7.591+/-1.64 (p=0.01), and 133.811+/-33.13 vs. 151.661+/-32.03 (p=0.02), respectively. We speculate that optimised fluid status may have reduced the stress response to surgery and therefore pain was less pronounced in the intervention group.

Conclusion: Postoperative pain management in patients who received goal-directed fluid administration was achieved with lesser dose of epidural bupivacaine.

References:

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### 08AP04-11

Single shot bilateral quadratus lumborum block, a suboptimal alternative when neuroaxial or perineural catheterization are hazardous

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**Background**: In open abdominal surgery, advantages of the epidural catheter in postoperative analgesia are recognized, although there are relative/absolute contraindications. Bilateral single-shot quadratus lumborum block (QLB) produces sensitive block from T6-L1 which promotes visceral and somatic pain relief for several hours.<sup>12</sup>

Case Report: Female patient, 41 years old, ASA III, with Charcot's disease, ascites, hyperthermia and leucocytosis. The patient underwent laparotomy for bilateral anexectomy, hysterectomy, appendectomy and omentectomy, in the context of left ovarian tumor. Regarding the patient's morphological alterations of the spine and the probable infection, no epidural catheter was placed. A general anesthesia was performed, with multimodal analgesia in the intraoperative period. In the PACU, the patient presented NRS 9/10 pain. A QLB type 2 was performed with ropivacaine 0.375%, 18 ml, ultrasound guided. Immediately after block the patient reported pain EN 0/10, without requirement of aditional analgesic therapy during 20 hours. By this time NRS started to increase, parecoxib 40mg 2id and tramadol 75mg 3id were added to the analgesic regimen. Up to 48h post-operatively the patient needed 5mg of morphine iv as rescue.

**Discussion**: Epidural analgesia isn't always applicable and postoperative pain control in patients undergoing open abdominal surgery is very difficult without using high doses of opioids. The bilateral QLB allows the use of high doses of LA and a long duration of the block (without catheter placement that could suffer from bacterial colonization in this patient if epidural catheter or bilateral QLB catheters were used). Theoretically, risk of hypotension exists because LA enters paravertebral space, therefore strict and extended surveillance is necessary in PACU<sup>2</sup>.

### References:

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**Learning points:** This case suggests the effectiveness of Bilateral Single-shot Quadratus Lumborum Block in the control of intense postoperative pain, allowing good pain control and decreasing the use of intravenous analgesia.

### 08AP04-12

# What makes for GOOD outcomes in women undergoing Caesarean Section – findings from PAIN OUT

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Background and Goal of Study: Caesarean Section (CS) is a common surgical procedure. Findings from a large international database, indicate that Patient Reported Outcomes (PROs) are poor and that they and clinical practices vary between hospitals. We sought to understand which clinical practices are associated with GOOD vs. POOR outcomes.

**Methods:** Clinicians collected PROs and clinical practices on the first day after CS, using methodology provided by the perioperative pain registry, PAIN OUT (www. pain–out.eu). Most PROs were assessed using 11-point numerical rating scales (NRS 0-10). We used four PROs to define 'GOOD' outcome: worst pain NRS  $\leq$  4; interference of pain with movement in and out of bed  $\leq$  4; nausea  $\leq$  4; wish for more medication=NO. We assessed the proportion of patients fulfilling these criteria in each ward, created a summary score, and ranked the wards from the highest to lowest score

Results and Discussion: Between 01-2010 and 02-2017, clinicians from 16 wards collected findings from 4,082 women in Europe, SE Asia and Africa (mean 250/ward). The ward with the highest ranking was defined as 'GOOD' and four wards with the lowest rankings as 'POOR'. 91% and 98% of patients in the 'POOR' and 'GOOD' wards, respectively, received spinal anaesthesia. The groups differed in the medications administered. In the 'GOOD' ward, 71% of patients received spinal morphine in addition to local anaesthetics; in the 'POOR' wards, 79% of patients received spinal fentanyl in addition to local anaesthetics. Wound infiltration was performed in 18% of patients on the 'GOOD' ward and in 2% of patients in the 'POOR' wards, 75% of patients in the 'GOOD' and 8% of patients in the 'POOR' wards, received a non-opioid during surgery. Once back on the ward, 97% of patients in the 'GOOD' ward received a non-opioid, whereas, 81% of patients received a non-opioid in the 'POOR' wards.

Conclusion: Our findings from the clinical routine indicate that, 'GOOD' outcomes after CS are associated with patients receiving spinal morphine and bupivacaine, with a non-opioid administered during surgery and on the ward; 20% of patients also received wound infiltration. 'POOR' outcomes were associated with spinal fentanyl and bupivacaine, no non-opioids administered during surgery and no wound infiltration.

## 08AP05-1

# Impact of the tapentadol therapy in the management of either moderate neuropathic or nociceptive cancer pain

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Background and Goal of Study: Tapentadol (TP) is a centrally analgesics acting with 2 mechanisms of action: mu-opioid receptor agonism and norepinephrine reuptake inhibition. TP has been developed for the management of chronic pain. Therefore, we presented TP was effective and well tolerated in the management of cancer pain (1). The present study was performed to compare the effects of TP therapy in the management of either moderate neuropathic or nociceptive cancer pain.

Materials and Methods: The patients with cancer pain to whom TP was prescribed within 2 years were enrolled. TP was prescribed to treat either moderate nociceptive pain or neuropathic component based on imaging examination and/or a character of pain. The patients were divided into 2 groups: either nociceptive or neuropathic pain group. The TP doses were calculated from the previous opioid consumption, with a conversion ratio with oxycodone of 5.0. Pain intensity was evaluated using numerical rating scale (NRS; 0-10) before and after administering TP. The NRS scores and the duration to achieve satisfactory pain relief were compared between the groups.

Results and Discussion: Ninety-five patients were enrolled and TP, initial dose was 50-400 mg/day, was prescribed. Eight patients were excluded due to oral intake failure within a few days. Thirty-four patients, whose pain mechanisms were considered as mixed (both nociceptive and neuropathic pain), were also excluded. Either pure neuropathic or nociceptive pain mechanism was observed in 32 and 21 patients, respectively. The pain relief could be achieved within 1-13 and 1-11 days following TP administration in the neuropathic and nociceptive pain groups, respectively. The median NRS scores were 7 and 2 before and after TP treatment in the neuropathic pain group. The median NRS scores were 6 and 2 before and after TP treatment in the nociceptive pain group. TP related nausea was observed 1 patient in each group. Two patients in the neuropathic pain group were not responded to TP therapy.

Conclusion: The incidence of both TP responders and TP related nausea were not different between the groups. There were no significant differences between the groups regarding the NRS decreases and the duration to achieve satisfactory pain relief. We conclude that TP was effective and well tolerated in the management of either moderate neuropathic or nociceptive cancer pain.

## 1. ESA 2016;10AP03-3

References:

### 08AP05-2

210

# A high prevalence of hypovitaminosis D in adults with postherpetic neuralgia

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Background and Goal of Study: This retrospective study is aimed to determine the prevalence of hypovitaminosis D in adults with postherpetic neuralgia (PHN). Materials and Methods: The major circulating form of vitamin D is serum 25-hydroxyvitamin D (250HD). Demographics and serum 250HD concentrations were examined routinely in PHN adults who visited pain clinic of a medical center in Taiwan. A total of 92 PHN adults, 48 males (52.2%) and 44 females (47.8%), were extracted from the computerized database. Hypovitaminosis D (low vitamin D) were defined as serum 250HD <30 ng/ml.

Results and Discussion: The mean age in PHN adults was 70.12 ± 10.49, with 65 patients (70.7%) aged ≧65 and 27 patients (29.3%) aged < 65. The mean 250HD in PHN adults was 30.6 ± 8.4 ng/ml. Among 92 PHN adults, 47 patients (51.1%) had hypovitaminosis D. The prevalence of hypovitaminosis D in PHN patients aged < 65 was significantly greater than that in PHN patients aged≧65 (74.1% vs 41.5%, P=0.004). Compared to males, there was a marginal increased prevalence of hypovitaminosis D in female PHN patients (P=0.059).

**Conclusion**: There was a high prevalence of hypovitaminosis D in all PHN adults, in particular in those aged < 65. Further studies are warranted to elucidate the association between the risk of PHN and hypovitaminosis D in shingles patients.

### 08AP05-3

# Menthol gel for the management of neuropathic pain after hand surgery – a case report

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**Background**: The prevalence of neuropathic pain varies between 1.3% and 18% (1). Complex regional pain syndrome (CRPS) is one of the most severe neuropathic pain conditions. Up to 26% of patients with surgical treatment of traumatic hand injuries may develop CRPS (1).

Menthol has been used for analgesia since ancient times. Recent interest in menthol for pain management has risen since 2002 when the menthol sensing channel transient receptor potential melastatin 8 was identified (2, 3). Since, menthol has been shown to be effective in management of several acute, inflammatory and neuropathic pain.

Here we present a case report where menthol was used in the treatment of refractory CRPS after traumatic hand injury and surgery.

Case Report: A 39-year-old healthy male had traumatic complete tear of the distal biceps tendon. Two days later the tendon was surgically reattached to the bone. After surgery, he developed severe lancinating neuropathic pain at the elbow. Pain was worse at night-time, NRS 7-8/10 and he could sleep 3-4 h/night. Paracetamol-codeine and tizanidine were ineffective, gabapentin had some effect, but serious adverse effects. Four weeks after the primary injury he was prescribed mentholgel (IcePower®, Fysioline Ltd., Tampere, Finland) for day-time use and menthol patches at night on the elbow. Starting the first night, he could sleep 6-7 h a night, pain rating decreased to 3-5/10, he returned to work and after 4 weeks he could stop the menthol use. Six months after injury, the muscle function has been restored. He sometimes has some muscle aches a few nights a week, which are relieved with menthol gel. During the day, he has no pain or other symptoms.

**Discussion**: Menthol could be highly potent in persistent postoperative/ posttraumatic pain management.

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**Learning points**: Menthol could be highly potent in posttraumatic neuropathic pain.

### 08AP05-4

# Systems biology based approach to identify unique and shared genetic pathways for chronic postoperative pain and anxiety

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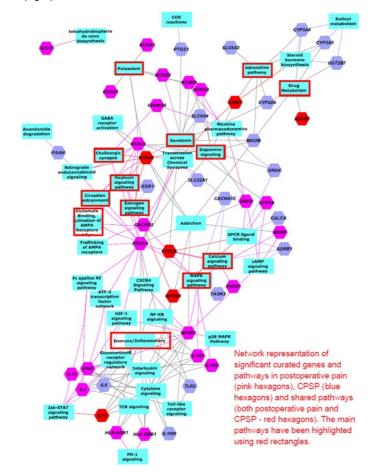
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Background and Goal of Study: Anxiety is a predisposing factor for poor pain coping and transition to chronic postsurgical pain (CPSP). Despite hereditary components, a genetic basis for CPSP and anxiety predisposition has been elusive due to lack of replicability of genetic association studies. A systems biology approach integrates genetic-level data with biologic processes, pathways and networks thereby overcoming pitfalls of hypothesis-driven candidate association studies. Our goal was to use systems biology to identify unique/shared genetic pathways involved in CPSP and anxiety.

Materials and Methods: A systematic review of literature (01/01/1997 - 10/31/2017) was performed to identify genes associated with postoperative pain and CPSP in humans; gene sets associated with anxiety- related responses (Mouse phenotype – knockout studies) were also curated. The identified genes were then used to perform a systems biology-based integrative computational analysis using ToppGene Suite (https://toppgene.cchmc.org), a comprehensive machine learning based platform for functional enrichment analyses. We then compared the top 100 processes/pathways associated with the three phenotypes.

Results and Discussion: Systematic review identified training sets of 22 genes associated with postoperative pain, 23 genes with CPSP and 5 genes common to both, which were used together for enrichment. Significant enrichment (p-value 0.05; Benjamini-Hochberg correction) was found for known and novel biologic processes

(Fig. 1)



We identified 23 biological pathways common to postoperative pain and CPSP, 33 unique to CPSP and 10 unique to postoperative pain. For anxiety, we found 122 genes associated with low anxiety, 169 with high anxiety and 30 genes with both low and high anxiety. We found 40-50% overlap among the genes enriched in pain and anxiety, and common pathways involving seven genes (DRD2, HTR2A, IL1R1, BDNF, COMT, HTR1A, OPRM1).

**Conclusion**: Using a systems biology-based approach, we identified unique and shared biological processes involved in CPSP and anxiety. This information provides a framework for future research in mechanistic processes and personalized CPSP therapies.

### 08AP05-5

### Chronic postoperative pain in cardiac surgery

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Background and Goal of Study: The number of cardio surgical interventions in the world is increasing every year, leading to a disability and a decrease in the quality of life [1,2]. The incidence of chronic postoperative pain (CPOP) after thoracotomy and sternotomy is 5-65%, indicating severe pain in 10% of all CPOP patients [3]. This study aims to analyze the incidence of CPOP in cardiac surgery.

Materials and Methods: 107 case histories of patients, operated in Jan. 2015 – Jun. 2016, were retrospectively analyzed. According to the surgery type, all the patients were divided into following groups: bypass surgeries, aorta and cardiac valve replacements, Bentall procedures and combined surgeries. We contacted the patients via phone calls in terms of ischemic/anginal pain in the surgical approach area.

Results and Discussion: The majority of participants were men (79,4%). The mean age was 59,6 years. 37 (34,58%) respondents reported CPOP: 19 (37.25%) in the bypass group, 4 (26.7%) – with aorta and cardiac valve replacement, 8 (33.3%) – with Bentall procedures, 6 (35.3%) in the group of combined operations. The patient's age, duration of hospitalization and surgery didn't show any statistical significance according to the Mann-Whitney criterion in the development of CPOP. Conclusion: The incidence of CPOP in cardiac surgery is 34.58% that represents a coincidence with the current world literature data. Considering the importance of CPOP prevention, future studies of its predisposing factors are needed.

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### 08AP05-6

# Incidence of pain at 3 month follow up in elderly surgical patients

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**Background and Goal of Study**: Postoperative pain is one of the main factors associated with the increase of postoperative complications. Pain control may therefore accelerate recovery and increase quality of life (QoL). The aim of this study was to evaluate the incidence of pain after surgery at 3 months of follow up, its impact in the patients QoL and possible risk factors.

Materials and Methods: After study approval by the Institution Ethics Committee, an observational prospective study was conducted. Patients aged >60 years. submitted to elective surgery, admitted in the Post Anesthetic Care Unit, from May to July 2017 were included. Pre-operatively (T0) was recorded the Quality of Recovery 15 item score (QoR), the Health-related Quality of Life (EQ-5D-5L), the World Health Organization Disability Assessment Schedule 2.0 (WHODAS), the Lawton Instrumental Activities of Daily Living (IADL) Scale. These scores were then repeated 3 months (T1) after surgery. We studied the group of patients having more problems (PMP) with pain at T1 compared to T0 recorded at the EQ-5D-5L. The Chi-square, Fischer's exact or Mann-Whitney U tests were used for comparisons. Results and Discussion: A total of 226 patients were included. The incidence of PMP was 21%. Regarding the patient medical condition, the diagnosis of metastatic neoplasm (p=0.011) and chronic obstructive pulmonary disease (p=0.039) were more frequent in the PMP. Concerning the perioperative data, hypothermia and the use of antiemetic drugs intraoperatively were less frequent in the PMP (p=0.042 and p=0.024 respectively). PMP had higher WHODAS score (p<0.001), more dependency in IADL (p=0.02), and more problems at every dimensions of EQ-5D-5L at T1 (p<0.001). There were no differences in gender, age, ASA physical status, Body Mass Index, type and length of anesthesia, length of hospital stay.

**Conclusion(s)**: In this study the PMP had a poor QoL 3 months after surgery. The clinical conditions associated with worse pain control, were metastatic neoplasm and pulmonary disease. Postoperative inadvertent hypothermia and the use of antiemetic drugs given intraoperatively appears to be a protector factor for the increase of pain 3 months after surgery.

### 08AP05-10

# Upper limb acute phantom pain - a case of difficult pain control

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**Background**: Phantom pain is present in more than 70% of amputees, and often progresses to chronic pain.¹ Its control is challenging due to multiple somatic and neuropathic mechanisms, with no optimal pharmacological management.² We present a case of difficult phantom pain control in spite of analgesic multimodal therapy to identify better approaches in the future.

Case Report: A 23-year-old female, ASA III, 45kg, was proposed for left inter-scapular-thoracic amputation due to a humeral metastasis, with good pain control with transdermal fentanyl 75 μg/day. Pre-operatively, she expected the limb might not be amputated. She had a balanced general anaesthesia with fentanyl (3 μg/kg) and a ketamine infusion (4 μg/kg/min). Before limb removal, the supraclavicular brachial plexus was infiltrated with ropivacaine 0.75% (10mL). A perineural catheter was placed under direct visualization. Intraoperative analgesia included paracetamol 1g, metamizole 2g, ketorolac 30 mg and morphine 5 mg. She woke up referring severe (10/10) phantom pain, poorly (8/10) relieved after rescue analgesia with IV morphine and perineural ropivacaine 0.2%.

Post-operative multimodal analgesia was early initiated. Even though, she had persistent uncontrolled phantom pain, requiring therapeutic adjustments over several days, up to maximum doses of paracetamol 1g 4id, metamizol 1g 3id, duloxetine 30 mg bid, pregabalin 250 mg daily, ketamine infusion 9 µg/kg/min, ropivacaine 0.375% 10 mL boluses 6id, morphine PCA 2 mg/h with 1mg bolus. Non-pharmacological measures - psychological support and hypnosis, were started on postoperative (PO) day 8.

The first significant reduction in pain scores happened on PO day 10, (pain score<3), with downward therapy titration.

**Discussion**: Phantom pain is multifactorial but still poorly understood and its treatment is often complex. Morphine, gabapentin and ketamine are evidence-based short term treatments.<sup>2</sup> Pharmacological management is often not enough, as verified in our case. Perioperative psychological factors seem to have been determinant to our patient.

### References:

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**Learning points:** Prevention and treatment of post-amputation pain with targeted interventions should remain a key goal for anaesthesiologists. Pre-emptive analgesia, pre-operative psychological support and alternative therapies such as hypnosis should be early adopted.

# 08AP06-1

# Continuity of multimodal analgesia for postsurgical pain control

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**Background and Goal of Study**: Aim of the study was to assess the quality and continuity of the post-operative analgesia.

**Materials and Methods**: After bioethical approval, a prospective analysis of 106 patients (pts), who underwent elective surgery in Departments of surgery, urology, plastic and reconstructive surgery of HLUHS in July, 2016 was performed. The data of the prescription and nursing sheets including the range, dosage of analgesics, methods of administration, pain scores (VAS 0-10) were analysed. Data are presented as ratio, no (%) of cases, mean  $\pm$  SD, median, range. SPSS 23.0 was used for statistic calculations, with p < 0.05 regarded as statistically significant.

Results and Discussion: Median pain intensity assessed in PACU in 94/106 (88.6%) of cases was 1.2, ranging from 0 to 6 scores. Pain intensity was neither assessed nor documented in surgical units (SU). Paracetamol i/v, median dose 2g, was prescribed after surgery by the anesthesiologist to 41/106 (38.7 %) pts, given to 34/41(82.9 %) pts in PACU, and continued in 2/41 (4.9 %) of cases in SU. Ketoprofen i/v, median dose 100 mg, was recommended in 36/106 (33.9 %) cases, prescribed to 30/36 (83.3%) pts in PACU, followed in 5/36 (13.9 %) of cases in SU. Pethidine i/m, median dose 50 mg, was prescribed by the anesthesiologist to 77/106 (72.6 %) pts, given to 75/77 (97.4%) pts in PACU, continued in 40/77 (51.9%) of cases in SU. Most common prescriptions, % of cases, in departments of surgery were as follows: ketorolac 40.6, diclofenac 29.2 and dexketoprofen 14.2, respectively. Pain relief recommendations were not observed in all SU, and no statistically significant differences were found.

Dose of first 24 hr	Paracetamol (g)	Pethidine (mg)	Ketoprofen (mg)
Mean ±SD	1.73 ± 1.3	79.0 ± 74.7	177.4 ± 108.0

M	1	50	200
Dose of 72 hr in SU			
Mean ±SD	$0.03 \pm 0.2$	81.6 ± 100.8	138.68 ±238.1
М	0	50	0

**Conclusion**: Pain intensity assessed in majority of pts during the stay in PACU, is treated according to the anestesiologist's recommendations with non-opioids in <50% of cases. Adherence to the recommendations of postoperative analgesia in SU is low: pain intensity is neither assessed nor recorded in medical documentation.

### 08AP06-2

# Predictor factors of postoperative pain in total hip and knee arthroplasties

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**Background and Goal of Study:** Major orthopedic surgeries are associated with postoperative pain (POP). The purpose of this study was to identify predictor factors of POP associated with the total knee (TKA) and total hip (THA) arthroplasties.

Materials and Methods: Prospective cohort study approved by the Ethics Committee. Written informed consent was obtained for all patients. Adult patients submitted to elective TKA and THA were eligible to the study, during 4 months period of time. Preoperative questionnaire was carried out up to 24 hours before surgery, aiming to identify demographic variables, ASA physical status, type of arthroplasty, preoperative chronic pain, depression diagnosis, depressive profile and medication for depression. The postoperative questionnaire obtained at 48 hours after surgery, aimed to evaluate the POP, using the *Brief Pain Inventory*. Descriptive analysis of variables was performed and non-parametric tests (Mann-Whitney and Kruskal-Wallis) were used in the analysis of POP levels. It was performed a multiple linear regression to determine the significant predictors of the minimum medium maximum and at the time POP

Results and Discussion: 95 patients were included 58 of which underwent TKA and 37 to THA. Women had average (4.84±1.59) and maximum (6.97±2.19) pain higher (p=0.002;p=0.005). Patients undergoing TKA had medium (5.05±1.42) and maximum (7.12±2) pain scores higher (p=0.02;p=0.01). Women and young people who underwent TKA showed average (5.17±1.39;4.9±1.27) and maximum (7.36±2;6.94±1.88) pain higher (p=0.025;p=0.035 and p=0.029,p=0.032), than women and young people who underwent THA. Patients with depression had higher maximum pain (7.47±2.27) and lower pain at the time (1.94±2.5) (p=0.003:p=0.048). Patients with chronic pain had an average pain (4.89±1.63) and pain at the time (3.09±2.66) higher (p=0.003;p=0.007). There were no changes in the POP regarding the depressive profile, medication for depression and ASA physical status (p>0,05). Multiple linear regression showed that TKA, BMI>35, absence of depression and chronic pain predict the intensity of the POP. These factors, when identified, will allow the establishment of individualized perioperative analgesia, reducing the presence of pain and increasing the satisfaction of patients undergoing TKA and THA.

**Conclusions:** Type of surgery, BMI, presence of chronic pain and absence of depression were identified as pain predictors after TKA and THA.

# 08AP06-3

# Relationship between postoperative pain in major orthopedic surgery and patient's sociocultural level

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**Background and Goal of Study:** Total knee (TKA) and total hip (THA) arthroplasties are associated with moderate to severe postoperative pain (POP). This study aims to identify a relationship between POP associated with THA and TKA and sociocultural level of the patient.

Materials and Methods: After approval by the Ethics Committee, a prospective cohort study was conducted, between September and December 2014. Written informed consent was obtained for all patients. The study population consisted of adult patients admitted to elective THA and TKA. Preoperative questionnaire was carried out up to 24 hours before surgery, aiming to identify the variables that are related to the sociocultural level of the patient: ethnicity, geographical distribution, schooling (no studies, 1st Cycle Basic Education (CEB), 2nd CEB, 3nd CEB, secondary, graduation, masters, doctorate), profession (employee, unemployed, retired), satisfaction with the profession (not satisfied, little satisfied, satisfied, very satisfied, totally satisfied), desired profession and lifestyles (sports practice, frequency of sports practice). The postoperative questionnaire was obtained at 48 hours after surgery and aimed to evaluate the intensity of POP, using the *Brief Pain Inventory*. Descriptive analysis of variables was performed and non-parametric

tests (Mann-Whitney and Kruskal-Wallis) were used in the analysis of POP levels. It was performed a multiple linear regression to determine the significant predictors of the minimum, medium, maximum and at the time POP.

**Results and Discussion:** We included 95 patients, all caucasian, 58 of which underwent TKA and 37 to THA. Regarding the variables ethnicity, geographical distribution, desired profession and lifestyles there were no changes in the intensity of the POP (p>0.05). Retirees with  $1^{\rm st}$  CEB had higher levels of minimum pain (2,15±1,87) (p=0.004). Patients not satisfied with the profession had medium (6±0) and maximum (8±0) pain scores higher (p=0,002;p=0,003). Totally satisfied patients had lower levels of maximum pain than very satisfied patients (p=0.002), and totally satisfied patients had lower levels of minimum pain than satisfied (p=0,025) and than very satisfied patients (p=0,016), according to the multivariate regression. Patients with these factors may benefit from individualized perioperative analgesia schemes for better pain relief.

Conclusions: Professional satisfaction was identified as a predictor factor of pain after TKA and THA.

### 08AP06-4

## The overview of current regimens of postoperative patientcontrolled analgesia

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Background and Goal of Study: The postoperative pain control in our country is currently dependent on IV PCA, but there is still a remarkable difference from complete pain relief. While it is nearly hard to determine the efficacy of the PCA regimens employed by all hospitals, we carried out extensive nationwide survey regarding the current regimens of postoperative PCA in major hospitals to look into the major lines of PCA, and then eventually, to investigate the possibility of recommending well-organized and standard regimen(s) of PCA.

Materials and Methods: 65 major hospitals, including university hospitals and general hospitals, answered the questionnaires composed of 17 fixed questions: PCA regimens (numbers), route of administration, opioid type and amount/dose, local anaesthetic type/amount, etc.

Results and Discussion: The total number of PCA regimens was 711. The IV PCA was the most employed entry route by a significant number of 587. The others reported were 115 epidural PCA, 4 perineural PCA, 3 nerve block and 1 for each of intraarticular and surgical area regimens. The IV PCA regimens consisted of 23 different combinations of opioids and NSAIDs, and fentanyl was a major line of opioid for IV PCA. The range of fentanyl dose was wide, from about 2 to 40 ug/hr. The total 17 different combinations in epidural PCA regimens used mostly opioids and local anaesthetics as their combination. Fentanyl and Ropivacaine was the major combination for epidural PCA. There was a variety in the number of PCA regimens that the individual institute used, from 1 to 62 regimens. Of the 65 institutes that participated in the survey, 3 hospitals were using over 50 regimens, and one thirds (33%) of the hospitals were employing more than 10 regimens. In response to the investigation about the use of varying doses depending on the type of surgery, 21 institutes reported in affirmative.

**Conclusion**: Although the regimens may differ for every hospital, there is a need to decrease the number of regimens rather than to increase its numbers and make the regimens overly varied. The quality and preciseness of the dose and regimen of pain killers being given to the patients are considered to be low, and there are no set rules that are followed. It should be noted that there was no correlation between the numbers of the regimens and the size of the institutes, although data on this are not recorded here.

# 08AP06-5

# Does daylight have an effect on perioperative pain sensation?

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Background and Goal of Study: Preliminary studies indicate a significant connection between the exposition to daylight and pain sensation in humans. Furthermore, the influence of dynamic changes of light on humans has given rise to several therapeutic attempts. Despite this, the question of daylight intensity and its impact on physical, emotional and mental perception of acute pain remains open. Therefore, we aimed to characterize the potential impact of light intensity on patients' pain sensation in the perioperative setting.

Materials and Methods: In the context of the German multicenter registry QUIPS, we investigated the effects of ambient light intensity on postoperative pain sensation. We collected the patients' outcomes concerning pain and side effects, demographics, perioperative pain medication, and measured the light intensity in their rooms on the first postoperative day. Primary endpoint was maximal pain rated on the numerical rating scale (NRS) of 0 to 10 (0= no pain, 10 = worst pain imaginable). Secondary endpoints were pain on movement, mood, nausea, tiredness and satisfaction. Measurement of light intensity was done with a calibrated light meter. For analysis, we used linear and log-linear regression models with age, gender, pre-existing chonic pain, ASA status, and logarithmized light intensity as independent variables.

**Results and Discussion**: In total, the data of 539 surgical patients of nine hospitals was collected. For the primary endpoint maximal pain (p = 0,71) as well as for the secondary endpoints of pain on movement (p = 0,77, Cl: 0,59 -1,47), satisfaction (p = 0,347, Cl: 0,72 -2,52) and tiredness (p= 0,79, Cl: 0,72 -2,52), no significant effect of light intensity was found. However, a strong positive correlation between nausea and light intensity (Exp (B) = 2,63 p<0.05, Cl: 1,62 - 4,26) could be observed.

**Conclusion**: No connection of light intensity and maximal pain values was found, but the data showed a strong positive association of light intensity and the secondary endpoint nausea. The probability of a patient suffering from nausea rises by a factor of 2,6 per logarithmic light intensity value, while the chances of nausea occurrence rises up to 160 % in accordance with higher light intensity value. As no efforts have been made yet to discover a link between light and nausea, the clinical importance of day light exposure on nausea should be further investigated.

### 08AP06-8

# Practicies for managing pain after Caesarean Section - findings from PAIN OUT

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Background and Goal of Study: Caesarean Section (CS) is a common surgical procedure. Sufficient pain control after CS is crucial for recovery and positive long-term outcome for mother and baby, yet quality of routine perioperative pain management after CS is rarely assessed. Here analgesia and Patient Reported Outcomes (PROs) were evaluated in women after CS.

Methods: Clinicians collected PROs and management practices on the first day after CS, using methodology provided by PAIN OUT (www.pain-out.eu). Most PROs were assessed using 11-point numerical rating scales (0=null, 10=worst possible). Quality indicators recommended by the Royal (UK) College of Anaesthetists [1] were used to evaluate care and outcomes.

Results and Discussion: From 01-2010 and 02-2017, clinicians from 16 wards collected findings from 4,082 women in Europe, SE Asia and Africa (mean 250\ ward). Quality indicator 1: Assess and document pain in all patients. On average, pain was assessed in 16.5% of the patients; in 6 wards 100% coverage was achieved, in 5 wards it was <10%. Quality indicator 2: Moderate to severe pain will be reported by <5% of patients. None of the wards met this criterion. On average, 70.4% of women reported worst pain of ≥6/10 (range 19 - 91%\ward), Quality indicator 3: There will be no consecutive events of moderate to severe pain in a 24 hour period. None of the wards achieved this criterion. 90% of patients spent 20-100% of the first 24 hours after CS in severe pain. Quality indicator 4: >95% of women will be satisfied. On average, 52% of women (range 47-79%\ward) reported scores of ≥8. Quality indicator 5: 100% women will receive subarachnoid or epidural opioids if CS is performed by regional anaesthesia, 91% of the women received spinal or epidural analgesia; in 96% of cases they received an opioid, in most cases it was fentanyl. Quality indicator 6: Unless contraindicated, 100% women will be prescribed a non-opioid, on a regular basis. 85% of women received a non-opioid (range 67 – 100%\ward); typically, not on a regular basis.

Conclusion: Data from a large sample of women after CS in hospitals, internationally, report severe pain and that management practices vary considerably.

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## 08AP06-9

The influence of anxiety and depression on pain severity in the early postoperative period in patients operated for internal carotid arteries pathological kinking

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Background and Goal of Study: Among the unsolved issues of the postoperative period, the problem of postoperative pain becomes increasingly important [1,2]. Materials and Methods: The prospective randomized study included 78 patients. Hospital Anxiety and Depression Scale(HADS) was used to evaluate anxiety and depression, considering depression or anxiety if the score was≥10.Evaluation was performed prior to internal carotid arteries(ICA) pathological kinking(PK) surgery, on days 1 and 7. According to HADS, patients were divided into 2 groups − 1st group, considering as a control one, included 23 patients without signs of anxiety-depressive disorders and 2d group − 55 people with anxiety and depression. Pain intensity was assessed using a Visual Analogue Scale (VAS) at day 1 and 7 after surgery. The study was conducted in 2016-2017.

Results and Discussion: 2d group showed significantly higher scores on both HADS subscales' indicators and VAS. In terms of HADS scores at the 1st day of operation the anxiety and depression level in the 1st group was 7.1±1.2 and 1.6±0.4 while in 2d group the level was 17.1±3.1 and 17.0±4.2 respectively. At the 7th day studied level for 1st group corresponded to 4.9±1.1 and 2.9±0.6 points whereas for group 2 the results were 15.2±2.3 and 13.7±1.9. VAS results in1st group were significantly lower than in 2d group. The studied criteria in 1st group was 4.1±0.9 and 2.8±0.6 points on days 1 and 7 while in group 2 the scores amounted to 6.7±1.8 and 4.9±1.1 respectively.

**Conclusion**: Anxiety and depression cause higher pain descriptors in the early postoperative period in patients operated on for ICA PK. **References**:

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### 08AP06-10

# The Peri-operative Pain Managment of Total Abdominal Hysterectomy Patients at an Academic Hospital

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Background and Goal of Study: Acute postoperative pain is a large problem worldwide, as it is not being adequately recognised or managed appropriately. The majority of patients following an operation (between 50% to over 80%) will report unsatisfactory pain levels. There is a paucity of identifiable and published data that accurately highlights the extent of the problem in the South African setting, in terms of acute post-operative pain management and levels of patient satisfaction with the care offered. The aim of this study was to describe the peri-operative pain management of TAH patients at RMMCH using the PAIN-OUT Questionnaire.

Materials and Methods: A consecutive, convenience sampling method was used to include all post-TAH patients operated on in a three month period at Rahima Moosa Mother and Child Hospital. Patients completed the PAIN OUT patient questionaire between 6 and 24 hours after surgery. The PAIN OUT process questionnaire was completed at the same time.

Results and Discussion: 76 patients were recruited into the study from September to November 2015. The average age of the sample population was 46.14 years (SD 8.82), ages ranged from 31 to 80 years. The majority of cases had volatile general anaesthetics. Eleven patients were anaesthetised using target-controlled infusions (TCIs) or intravenous anaesthetics, with Propofol and Remifentanil. In 50% of cases transversus abdominus plane (TAP) blocks were performed intraoperatively. Forty (52.63%) of the patients received a combination of Fentanyl and Morphine intraoperatively. Seventeen (22.37%) patients had a combination of Sufentanil and Morphine while four patients (5.26%) received Alfentanil and Morphine. The use of non-opioid analgesics varied. Post-operatively, the maximum pain score of 10 was chosen by 17 of the patients (22.36%). The lowest score given was 1, selected twice (2.63%). There was a median score rating of 8.

Conclusion: This study highlighted the unacceptably high levels of post-operative pain reported by patients. It also showed that analgesic medication administration was not prioritised by the staff in the post-operative ward by the time the patients were interviewed on the first post-operative day. Improvements in delivery of prescribed analgesic medication post-operatively needs to be adequately ensured and staff trained in the importance of managing pain appropriately.

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## 08AP07-1

# Challenging and controversial vaso-occlusive pain management of complicated sickle cell disease

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**Background**: Vaso-occlusive crisis is the most common complication of sickle cell disease (SCD) and manifests as acute severe pain. There are no international evidence-based guidelines for the pain treatment of these episodes. We present a case of complicated SCD, which was a challenge for anaesthesiologists, haematologists and intensivists.

Case Report: A 28-year-old black male patient with SCD associated to frequent hospitalizations was admitted in the emergency department with an acute SCD episode. He complained of excruciating pain of sudden onset in the knee joints, upper limbs, chest and lumbar region. Pain was initially treated with intravenous morphine infusion, meperidine, paracetamol and non-steroidal anti-inflammatory drugs (NSAID) without satisfactory relief. After Acute Pain Unit team evaluation, the chosen strategy was morphine patient controlled analgesia (PCA) supplemented with sublingual fentanyl. After 5 days, the patient had an acute chest syndrome and started experiencing breakthrough pain. Because of frequent dose adjustments, excessive side effects and lack of information by the professionals how to manage a PCA, it was replaced by transdermal fentanyl. After controlled pain, at the 10th day he was transferred to Intensive Care due to a stroke. Eleven days after, he was discharged with opioids.

**Discussion:** Although opioids and NSAID are mainstay treatment in this type of pain, they were not effective in this patient. Meperidine was initially the only opioid

used with pain relief despite its non-recommendation due its neurotoxicity. PCA was not used early due to patient monitoring needs and lack of information by the professionals. Fentanyl has been used successfully in the management of chronic pain in SCD.<sup>2</sup> In this case, fentanyl patch was an effective choice and allowed patient stabilization.

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 National Heart, Lung, and Blood Institute. Evidence-Based Management of Sickle Cell Disease: Expert Panel Report. 2014.

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Learning points: SCD pain management have to start early since admission with a multidisciplinary team. Knowledge, communication and homogeneity are important to establish a patient-adjusted pain management plan. Anaesthesiology department must create protocols and teach other professionals about this subject.

### 08AP07-2

# Review of Korean Medical Dispute Mediation and Arbitration Agency cases related to Pain Medicine

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Background: Pain intervention procedures are widely practiced and highly associated with adverse events and complications. Many adverse events including complications can occur which are preventable or not. And therefore pain physicians are often involved in these disputes and considered it their destiny during clinical practice. Up to now medical-dispute cases related to pain medicine in Korea has not been well reviewed. This study analyzed the judicial precedents cases to figure out the details of the incidents, economic losses, and the settlement of damages and liabilities were resolved. These reports will be a good reference for pain physicians who are facing the medical dispute related to pain management.

**Methods**: Data is based on the cases report by Korea Medical Dispute Mediation and Arbitration Agency from year of 2012 to 2016. 210 cases were disclosed to the public and cases related to pain management were 36 cases among 210 cases. Some cases were limited in patient personal informations (sex, age, medical subject) due to the public information act.

Results: Seven cases were related to death, loss of consciousness, and brain death. Lumbar spine and upper / lower limbs were the most common area involved with 13 cases, and 18 cases accounted for 50% of total cases. Average time required to legal procedure was 17.7 months. (6 months to 60 months) The highest charged cost was 490,000,000 won with case related to death and lowest were 800,000 wont with case related to misdiagnosis.

Conclusion: From the results of the qualitative analysis, the major cause is that medical professionals do not consider patient's symptom sensitively. The adverse events and harmness to patients can be prevented, if medical professionals examinate immediately when patients complain. The major cause of the systemic factor is the lack of the communication and cooperation between the process of treatment. Putting the above-results together, future studies to determine root causes of medical accidents should be done to plan against repeat malpractice. Changes in the overall system and procedures will be essential to consistent effort towards building a safer medical environment.

### 08AP07-3

# Intravenous lidocaine infusion for refractory pain in a pediatric patient

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**Background:** Despite recent advances, management of chronic pain remains a daily challenge for clinicians and patients. Continuous inflammatory stimulation results in hyper-excitability and remodeling in the peripheral and central nervous system, mediated by the increase in the N-methyl-D-aspartic acid (NMDA) receptor activity, the activation of microglia and astrocyte cells in the dorsal horn of spinal cord (1). Intravenous lidocaine infusions have been used for pain management in adults, but their analgesic utility in pediatric population is limited and so is the evidence for their efficacy and safety.

Case report: A 10-year-old male patient with a right giant intracranial arteriovenous malformation with aplasia cutis congenita suffered from headache and hallucinations. Intravenous lidocaine infusion during 48-hour (0.5 mg/kg/h) after an iv bolus (1mg/kg) was decided after refractory treatment (anticonvulsants, opioids, beta blocker). Pain relief was observed for two months, then bolus and a 48-hour lidocaine infusion was repeated and the improvement was observed in the following checkups. During treatment, pain score was recorded by NCCPC-R every 6 hours (non-communicating children's pain checklist revised) and VAS (visual analogue scale) (table 1). Lidocaine plasmatic levels were collected during the first infusion treatment at 24-hour and 48-hour infusion (table 2).

**Discussion:** The goal is to report the successful treatment of severe pain in a pediatric patient with intravenous lidocaine infusion. The analgesic effect of lidocaine seems to be the results of a continuous active biological response, obtained by modulating the ectopic neuronal discharges (1). It seems that administration of repeated doses of intravenous lidocaine may result in a longer-term effect. It is reported a 76% pain relief after series of lidocaine infusion in 15 young patients. (2). **References:** 

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- Mooney JJ, Pagel PS, Kundu A. Safety, tolerability and short-term efficacy of intravenous lidocaine infusions for the treatment of chronic pain in adolescents and young adults: a preliminary report. Pain Med. 2014;15(5):820-5

**Learning points:** Selected pediatric patients with different pain syndromes may benefit from intravenous lidocaine infusion therapy. More trials should be done to demonstrate this benefit.

### 08AP07-4

# The efficacy of mindfulness therapy and in comparison with invasive pain management techniques in cervicogenic headaches treatment

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**Background and Goal of Study**: Headaches of cervicogenic location are 11.3-40% of all presenting symptoms in primary healthcare structure. [1] Cervicogenic headaches' (CH) prevalence in population is 1-12%. [2]

Materials and Methods: Double blinded placebo controlled study, approved by the Institutional Review Board, involved 60amateur athletes with CH. Patients, who attended the clinic in Sept.2016—Aug.2017, were divided into three groups (20patients each) by the sealed envelope method. All patients received venlafaxitine 75mg/day and tizanidine 4mg/day during 12 and 4 weeks respectively. Mindfulness group was additionally educated with mindfulness meditation techniques (weekly 2-hour group sessions with following daily outside preparation and individual session for every participant), invasive pain management techniques group received 0.5% lidocaine injections in trapezius muscle trigger points (10injections with 2day intervals). The treatment effectiveness was evaluated prior to, 3 and 12 months after the treatment by pain attacks frequency and severity with the Visual Analog Scale (VAS) and Pain Catastrophizing Scale (PCS).

Results and Discussion: The mean age was 38.5±9.1, 41.5±8.4 and 42±7.6 in the mindfulness, injections and control group, respectively. Most of respondents were females (65%, 74%, 79% respectively). The pretreatment VAS score was 6.2±1.1, 5.9±1.5 and 4.9±1.8 points and pain attack frequency – 19.2±5.4, 16.6±4.9 and 22.1±7.2 per month, total PCS score – 21.1±9.1, 19.4±8.7 and 20.7±6.9 points in mindfulness, injections and control group, respectively. After the 3-months treatment, VAS score was significantly lower in the injections group (1.1±0.3) than in mindfulness (2.7±0.2) and control groups (2.5±0.8; p<0.05), as well as total PCS score (10.2±8.1; 15.5±9.2; 16.3±10.6 respectively, p<0.05). But after the 12-months treatment pain intensity was the lowest in the mindfulness group (1.2±0.4) comparing to injections (2.7±0.4) and control (3.1±0.6, p<0.05) groups, as well as total PCS score (7.5±6.1: 15.1±9.6: 14.8±7.4 respectively, p<0.05).

Conclusion: Mindfulness therapy can significantly improve pain states in patients with CH

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- 1. Osipova V. Cephalalgia.2016;36(S1):72.
- 2. Zagorulko O. Rus J Pain 2017;1(52):90-91.

### 08AP07-5

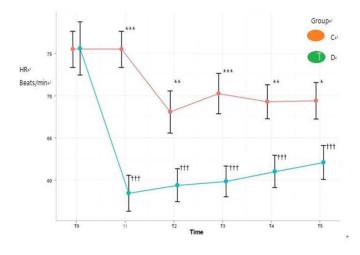
# Facial pain due to calcification in periodontoid tissue: Crowned dens syndrome

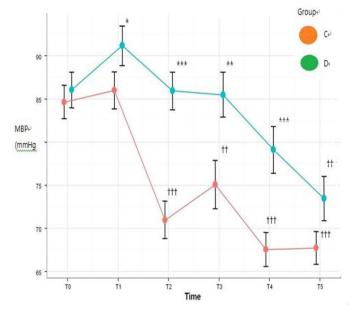
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**Background:** The crowned dens syndrome (CDS) is a cause of neck pain characterized by crystalline deposition in periodontoid articular tissues. It is typified clinically by severe cervical pain and stiffness, often in conjunction with fever and raised inflammatory markers. We report a case of crowned dens syndrome misdiagnosed as eagle's syndrome.

Case report: A 48-year-old woman presented to our pain clinic with a 1-week history of acute onset right facial, neckl pain markedly provoked by neck motion, with fever of 37.9°C. There was no history of trauma and medical illness. Under the suspicion of Eagles' syndrome, the patient was given an peristyloid injection with 1% Lidocaine 50mg and betamethasone 2mg, and prescribed NSAIDs and gabapentin. Facial CT for differential diagnosis showed 1.3cm calcified mass near odontoid process and right C1-2 facet joint. At the 2<sup>nd</sup> visit 1 week later, the right occipital pain was remained but other symptoms were improved. Greater occipital nerve block was performed with 1% Lidocaine 50mg and betamethasone 2mg. At the 3<sup>nd</sup> visit a week later, the occipital pain was resolved.

**Discussion:** Acute pseudogout of the neck, also known as the crowned dens syndrome, is a rare disease with only 35 cases hitherto described in the English literature. However, clinicians should be aware of clinical feature of CDS for avoiding unnecessary lumbar puncture or biopsy, and cutting down hospitalization period in patients with febrile neck pain. CT scan is necessary for diagnosis. The prognosis of CDS is excellent, with the majority of patients fully recovering within a week of NSAID, corticosteroid or combination therapy.





#### 08AP07-6

### Comparison of three types of communication on pain during peripheral intravenous catheterization: the KTHYPE

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Background and Goal of Study: Traditionally caregivers warn patients for pain before peripheral intravenous catheterization (PIVC). Common belief is that this practice is helpful. However, warning the patients in terms of pain or undesirable experiences resulted in greater pain and anxiety (1). The use of gentle words improves pain perception and subjective patient experience. Studies suggested that positive suggestive interventions involving hypnotic communication could reduce postoperative pain (2). Moreover, benefit of hypnosis has been long shown, however high level of evidence clinical studies are lacking. Therefore, we aimed to compare the effects of three types of communication on pain, comfort and anxiety in patients during PIVC.

Materials and Methods: The KTHYPE trial is a prospective, randomised, parallel simple-blind, multicentre study of 300 patients undergoing PIVC on the dorsal face of the hand before surgery. Patients will be randomly allocated to one of the 3 groups: peripheral intravenous catheterization will be perform with hypnotic and a short confusion technique (hypnosis group), or negative connotation (nocebo group) or with neutral connotation (neutral group). The primary outcome measure was the occurrence of pain just after PIVC. Secondary objectives were the perception of comfort and anxiety before and after peripheral intravenous catheterization. Pain. comfort and anxiety were measured with a 0 to 10 verbal numerical rating scale Statistical analysis was performed with SAS software.

Results and Discussion: Two hundred and seventy two patients were randomized (hypnosis n = 89; nocebo n = 92; neutral n = 91). Pain after PIVC was significantly lower in hypnosis group (1.5  $\pm$  1.9 [0-9]) compare with neutral (3.5  $\pm$  2.3 [0-9]; p < 0.0001) and nocebo groups (3.8  $\pm$  2.5 [0-10] ; p < 0.0001). Anxiety after PIVC was significantly lower in hypnosis group (2.3  $\pm$  2.5 [0-9]) compare with neutral and nocebo groups combined (3.3 ± 2.8 [0-10 ; p < 0.01). Comfort after PIVC was significantly higher in hypnosis group  $(8.5 \pm 1.7 [2-10])$  compare with neutral and nocebo groups combined  $(7.4 \pm 2.1[1-10]; p < 0.0001)$ .

Conclusion: This is one of the first well-designed randomised study showing a significant benefit of hypnotic communication with a short confusion technique during a common simple act such as PIVC. The results of our study will help implementing hypnosis in daily care.

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#### 08AP07-7

#### Mindfulness therapy in patients with chronic tension-type headaches

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Background and Goal of Study: Chronic tension-type headache (CTTH) is the most prevalent headache disorder in the general population, ranging from 20% to

Materials and Methods: The study, approved by the Institutional Review Board, was double blinded placebo controlled and involved 58 amateur athletes with CTTH. The diagnose met International Classification of Headache Disorders criteria. Patients, who attended the clinic in Sept.2016-Aug.2017, were divided into two groups (29patients each) by the sealed envelope method. Both groups received venlafaxitine 75 mg/day and tizanidine 4 mg/day during 12 and 4 weeks respectively, control group additionally was educated with mindfulness meditation techniques (weekly 2-hour group sessions with following daily outside preparation and individual session for every participant). The treatment effectiveness was evaluated prior to and 12 weeks after the treatment by pain attacks frequency and severity with the Visual Analog Scale (VAS) and Pain Catastrophizing Scale (PCS). Results and Discussion: The mean age was 38.5±9.1 and 51.5±8.4 in the study and control group, respectively. Most of respondents were females (32 and 26). The pretreatment VAS score was 6.2±1.1 and 5.9±1.5 points and pain attack frequency 19.2±5.4 and 22.1±7.2 per month, total PCS score – 21.1±9.1 and 19.4±8.7 points in the study and control groups, respectively. After the 3-months treatment,  $\mbox{VAS}$ score was significantly lower in the study group (1.1±0.3) than in control group (2.5±0.8; p<0.05), as well as total PCS score (10.2±8.1; 16.3±10.6 respectively p < 0.05

Conclusion: Mindfulness therapy can significantly improve pain states in CTTH

#### References

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#### 08AP07-8

Myofascial trigger point acupuncture treatment in athletes with chronic nonspecific low back pain

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Background and Goal of Study: Athletic activities are associated with repetitive injuries and overload training, which in turn are associated with myofascial trigger points (MTrPs) formation[1-3]

Materials and Methods: Randomized double blinded placebo controlled study, approved by the Institutional Review Board, involved 48 amateur athletes with chronic nonspecific low back pain (CNLBP) with MTrPs activity, who attended the clinic in Sept 2016-Aug 2017 and were divided into two groups (24patients each) by the sealed envelope method. The study group completed a classic acupuncture treatment course (15sessions every other day), the control-a sham-acupuncture course using the same characteristics but with needles placed not deep enough. The treatment effectiveness criteria included pain severity by visual analogue scale (VAS), the pain attack frequency and duration, evaluated prior to and 3 months after treatment. The data was analyzed with IBM SPSS Statistics and MS Excel software. Results and Discussion: The mean age was 30.2±9.1 and 27.5±8.4 in the study and control group, respectively. The majority of participants were men (22 and 20, respectively). At admission the VAS score was 7.3±1.9 and 6.7±1.6 points, pain attack frequency was 6.4±2.1 and 6.8±1.9 days per month with its duration 23.6±7.7 and 19.9±6.2 hours in the study and control groups, respectively. After the 3-months treatment pain severity (1.8±0.4 and 4.9 ±0.7 VAS points in the study and control groups respectively, p<0.05), the pain attack frequency (2.2±0.7 and 6.1±1.2 attacks; p<0.05) decreased as well as its duration (5.6±1.6 and 16.3±4.1

Conclusion: Acupuncture treatment is beneficial to athletes with CNLBP

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#### Acute Pain Unit management of non-surgical acute pain - a seven-year audit

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Background and Goal of Study: Acute pain management is a main concern of the anesthesiologist, usually in the postoperative period. Other causes of acute pain include chronic pain agudization, acute pathology, or sudden pain due to trauma. Health professionals often undertreat acute pain due to misjudgement, lack of training and inexperience with opioid usage.

Acute pain units (APU) formed by anesthesiologists with experience in pain treatment can expand their range of action beyond the postoperative period, by supporting other clinicians in the management of non-surgical acute pain.

The goal of this study is to audit the support of the APU of the Divino Espírito Santo Hospital (DESH) in the management of non-surgical acute pain, from the creation of the APU in January 2011 to August 2017.

Materials and Methods: Retrospective descriptive study based on the Excel APU

Results and Discussion: During the mentioned period, the APU followed 11788 patients, 71 (0,6%) for non-surgical acute pain, of which 49 were males (69%) and 22 females (31%). Average patient age was 63,4 years (15 - 91). Referring specialties were General Surgery (36%), Vascular Surgery (36%), Intensive Care Unit (ICU) (15%), Urology (6%), Orthopedics (4%) and Gastroenterology (1%).

67% of patients were observed in wards, 26% in the ICU and 7% in the urgency department. The most frequent pain causes were rib fractures (35%), lower limb ischemia (33%), acute pancreatitis (14%), polytrauma (4%), and lower limb vascular ulcers (3%). The most used analgesic modality was epidural analgesia (75%), followed by conventional multimodal analgesia (21%), and single cases of superficial cervical plexus block, morphine PCA and conventional plus epidural analgesia. To achieve pain control, 24% of patients had 3 or fewer visits by the APU, 31% had 4 to 6 visits, and 45% had more than 6 visits.

Conclusions: Non-surgical pain is an important cause of acute pain, and severe cases may justify management by anesthesiologists, particularly through APU. In our institution, non-surgical pain represents a small percentage of cases followed by the APU. The most used analgesic modality was epidural analgesia, including in

the most frequent causes for referral: rib fractures. lower limb ischemia and acute pancreatitis.

#### 08AP07-10

Gender Differences in Safety and Efficacy of the Sufentanil Sublingual Tablet 30 mcg for Treatment of Acute Moderateto-Severe Pain

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Background and Goal of Study: Following completion of a comprehensive clinical program, a Marketing Authorisation Application is currently under review for the Sufentanil Sublingual Tablet 30 mcg (SST 30 mcg). Four late-phase trials were conducted; two randomized and placebo-controlled and two open-label. The proposed indication is management of moderate-to-severe acute pain in medically monitored settings, such as short-stay surgery and emergency medicine (EM). SST 30 mcg is dispensed only by a healthcare professional and appears well-suited for short duration acute pain management because it acts rapidly, does not require an invasive route of delivery and possesses a predictable off-set

Materials and Methods: Two studies were randomized and placebo-controlled in post-operative patients following bunionectomy or abdominal surgery and two studies were open-label and single-arm intended to evaluate SST 30 mcg in EM and in older, post-operative patients, many with comorbidities. Efficacy was assessed by patient reports of pain intensity on a numerical rating scale (0-10) with the primary variable of time-weighted summed pain intensity difference to baseline over 12-hours (SPID12) for post-op studies and 1-hour (SPID1) for the EM study. Safety assessments included spontaneously reported adverse events (AEs), vital signs and oxygen saturation values. An a priori efficacy and safety subgroup analysis by gender was additionally performed to assess for potential differences.

Results and Discussion: A total of 437 patients were enrolled; 244 females and 193 males. In the largest RCT, SST 30 mcg demonstrated superiority over placebo for the SPID12 endpoint for both female (p < 0.001) and male (p=0.085) patients. Results from the open-label studies provided additional support for SST 30 mcg efficacy across both genders. AEs were experienced by 53.0% and 33.3% of female and male SST 30 mcg patients, respectively. There were no statistical differences in occurrence rates for any AE between active and placebo patients of either gender. Nausea was the most commonly reported AE for both female (32.8%) and male (24.2%) patients, followed by headache (12.1%) for females and vomiting (7.3%) for males

Conclusion: SST 30 mcg has shown benefit across female and male postoperative and trauma patients as a non-invasive analgesic modality for short-term management of acute moderate-to-severe pain.

#### 08AP07-11

#### Pain management in a low income setting

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Background: Pain relief is a human right, as stated by the International Association for the Study of Pain (IASP) in 2004 (1). Nevertheless, in a low income setting, the majority of people do not receive appropriate treatment for pain - and the problem is not strictly related to costs. Our project "Pain management in low income setting", has been carried out in a rural area of south Kolkata, West Bengal, in April and May 2017, in collaboration with Project for People and Institute for Indian Mother and Child (IIMC) with the aim of investigating chronic pain and introducing a chronic pain management system.

Methods: The project was: educational (through lessons to health workers and the development of algorithms for clinical practice); on the field (aiding in daily practice with patients affected by chronic pain); scientific (gathering epidemiological patients' data)

Results and Discussion: We report preliminary data from the first mission, aimed at establishing the project. We assessed a sample of 40 out of thousands patients consulting our outdoor clinic in Kolkata, the majority of which were female (75%). The mean age was 50 (range 18-104); Osteoarthritis and non-specific articular pain where the most represented causes of pain. Average Numeric Rating Scale for pain was 6,9 with moderate to severe functional reduction (mean quality of life scale was 5,4). Pain was usually endured for several months or years (up to ten years). They were treated according to the WHO model of cancer pain management, but with the limitation of the locally available drugs (NSAID, paracetamol, pregabalin and dexamethasone); opioid were not used in this setting. Intramuscular and oral were the preferred route of administration; we also recommended physical therapy and behavioral changes.

Conclusions: Pain is an important problem in all countries, including areas with limited accessibility to health care, and can severely affect patient's quality of life. People in low income setting have little or no palliative care or pain relief. Conditions such as malnutrition, infections, and parasitic diseases are prevalent, and pain is often not considered a priority of health care policies. Ensuring access to medicines as well as adequate training of health personnel are among the main objectives for achieving adequate pain management also in low income settings References

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#### 08AP08-1

Sympathetic lumbar plexus block with botulinum toxin in the treatment of ischemic pain

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Background: The thromboangiitis obliterans is an inflammatory peripheral arteriopathy and cause of unknown, related to smoking. O involvement of small and medium arteries calibres of the upper and lower limbs with ischemic pain, a type of intense mixed pain and limitation, whose pharmacological treatment has a limited, and in this pathology there is no surgical treatment.

Case Report: A. B. J., 59 years old, male, with complaint of daily chronic ischemic pain in lower limbs by thromboangiitis obliterans. The patient was submitted on 06/18/16 to a plexus test block sympathetic lumbar bilateral with Ropiyacaine. guided by radioscopy, with positive response. In 01/03/2017, definitive plexus block was performed bilateral lumbar sympathectomy with total injection (half on each side) of 10ml Ropivacaine 0.375% (37.5mg) and 100IU of botulinum toxin, guided by radioscopy, without intercurrences. For the treatment of transdermal patch of Fentanyl 25mcg/h and orally: Morphine LC 320mg/day (dose total oral Morphine equivalent: 380mg/day), Dipyrone 9000mg/day, Gabapentin 1200mg/day and Amitriptyline 50mg/day. The mean pre-procedure pain was 6.5 per EVN, ranging from 4 to 9. The pain immediately procedure was 9 and, after the procedure, the patient reported improvement of 60% of the pain, ranging from 2-4. After 30 days of the procedure, the patient persistence of pain, but with less intensity: was 5, ranging from 1 to 6, with functional limitation. However, it continued to require high doses of opioids and adjuvants: transdermal patch of Fentanyl 25mcg/h and Morphine LC 290mg/day (total dose of Oral Morphine equivalent: 350mg/day). Dipyrone 8000mg/day, Gabapentin 1200mg/day and Amitriptyline 50mg/day. According to the patient, there was an improvement of 70% of the pain.

Discussion: Lumbar sympathetic block reduces vasoconstriction and improves circulation peripheral neuropathy, thus improving pain in patients with peripheral vascular diseases. Due to its action mechanism by blocking release pre-synaptic acetylcholine, botulinum toxin could act as a long acting sympathetic blocking. **Learning points**: The use of botulinum toxin to control pain in specific cases is

already established and is now a possibility to be considered as a therapeutic alternative in difficult to control, requiring more studies that corroborate its efficacy

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#### 08AP08-3

#### Clinical audit of interventional procedures in a Chronic Pain Unit

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Background and Goal of Study: Interventional procedures consist in several minimally invasive techniques to reduce pain aligned with a multimodal approach in chronic pain management. The American Society of Interventional Pain Physicians has developed evidence-based guidelines for interventional pain procedures in order to improve quality of pain management. The aim of this retrospective audit was to monitor the quality of interventional procedures and to ensure the safety, efficacy and patient satisfaction at the Chronic Pain Unit in our institution.

Materials and Methods: Between 30th September 2015 and 30 November 2017, a retrospective clinical audit to examine the quality of interventional pain management procedures was performed in our institution. A questionnaire (including immediate pain relief discomfort pain and anxiety during the procedure) was provided to each patient after the procedure. Efficacy of each procedure was evaluated, using the Numerical Pain Rating Scale (NPRS) registered before, immediately after, 48h and 1month later. In order to avoid complications most of the procedures were ultrasound guided and patient's vital signs were monitored.

Results and Discussion: A total of 178 procedures were performed, 140 patients participated in the survey (38 were excluded due to illiteracy, refuse and loss of follow-up data), 75.7% female and 24.3% male, with a mean age of 62.6 years. Several procedures were performed (table 1). All patients presented pain relief after procedure, 78% presented a NPRS reduction superior to 30%. Mean pain score was 7,31±2,08 before, 3±2,55 after procedure, 3,16±2,08 48hours and 4,18±2,06 1month later. Regarding patient satisfaction, 75% were very satisfied and satisfied, 24,3% slightly satisfied and 0,7% were dissatisfied. There were no major complications or adverse effects. A good quality interventional chronic pain management should include high efficacy, low complication rates and high patient satisfaction. As standardly accepted, a response is considered clinically relevant if the NPRS score was reduced by at least 30%. Patients with a higher level of pain reduction tended to be more satisfied with the procedure. Patient satisfaction is good indicator of quality of health care.

Conclusion: Our study concludes that these interventional procedures lead to patient satisfaction due to pain relief and very low complication rates, so they are a valid technic to reduce chronic pain

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#### 08AP08-4

## Blocking celiac plexus with botulinum toxin in the treatment of pain for chronic pancreatitis - case report

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**Background**: The main initial complaint of chronic pancreatitis is continuous and deep pain in epigastric region, frequently with irradiation to the back, which initially may be intermittent, but it becomes disease progression. The pain can be triggered by the ingestion of any food, especially the greasy ones and nauseas and vomits are common complaints, and there may be dehydration, malnutrition and the inability to take analgesics oral.

Case report: K. H. Š., 47 years old, female, with complaint of abdominal pain due to chronic pancreatitis by hypertriglyceridemia. Nociceptive abdominal pain and the hypogastrium, right hypochondrium, and left and right iliac fossa. For the treatment of pain were used orally: Tramadol 200mg/day, Methadone 15mg/day when needed, Gabapentin 1200mg/day, Amitriptyline 25mg/day. The patient was submitted on 04/24/17 to a bilateral celiac plexus block with total injection of 40ml of Ropivacaine 0.25% (100mg) and 200IU of botulinum toxin, guided by ultrasonography, with a duration of approximately 60 minutes and without intercurrences. The average pain pre-procedure was 7 by the numerical visual scale (EVN), ranging from 6 to 8. Pain immediately procedure was 6 and, after the procedure, reported improvement of pain 100% (EVN = 0). In a telephone interview 3 months after, the patient related pain recurrence same characteristic, location and intensity, but less frequent (1-2 times per week), requiring Tramadol 200mg/day. According to the patient, there was an improvement of 60% of the pain after the procedure. DISCUSSION: Celiac plexus blocks with local anesthetics have been carried out for diagnostic purposes, but also as the primary treatment of pain in the chronic pancreatitis when associated with the use of corticosteroids. Neurolithic blockages of the plexus celiac are made with alcohol or phenol, but this modality is controversial as treatment of non-oncologic pancreatic pain, especially for the apparently short duration of the effect, which requires the repetition of the every 2 to 6 months

**Learning points**: The use of botulinum toxin for the control of pain in is already established and is now an important possibility to be considered as an alternative therapy in difficult-to-control painful conditions, need further studies to support their effectiveness and safety.

## References: 1. Jabbari, B., Machado, D. Treatment of Refractory Pain with Botulinum Toxins An Evidence-Based Review. Pain Medicine Journal, 2011; 12: 1594-1606

#### 08AP08-5

References:

## Pain relief with sphenopalatine ganglion block of chronic headache and orofacial posttraumatic pain: a case report

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**Background**: Chronic headache and orofacial posttraumatic pain is a common and disabling problem in patients with head injury or trauma and may be accompanied by autonomic, motor or sensory signs. Conventional treatments may fail or cause intolerable side effects. The sphenopalatine ganglion (SPG) block is a reasonable target for the treatment of these disorders. (1)

Case Report: A 37-year-old-female, whose background history included dentofacial dysmorphia, maxillary hyperplasia, mandibular hypoplasia and a LeFort I osteotomy in 2012. In 2013, patient was referred to Chronic Pain Unit with chronic headache and orofacial pain. First evaluation: patient referred left hemicraneal pain, with onset in the ipsilateral temporomandibular area. Pain was persistent, and it was associated with spontaneous and evoked pain sensations, such as burning and electric shock. DN4 questionnaire (Douleur Neurophatique 4) was applied for assessment of symptoms and signs of neuropathic pain. During follow-up, several treatments were performed (gabapentinoids, weak opioids, antidepressants acupuncture, topical treatment with capsaicin 8% and lidocaine 5%), with minimal pain relief. After multidisciplinary discussion, Sluder's Neuralgia of the SPG was considered, whereby SPG block with local anaesthetic (Ropivacaine 7.5%) was decided. After first block, patient reported substantial pain relief (≥ 50%) for 3 days, corroborating the role of the SPG in the ethology of this pain. Weekly, SPG blocks were performed, with increased duration of pain relief. In the last 2 blocks. methylprednisolone was added to the local anaesthetic. Longer effect (more than 4 weeks) was observed, with a significant decrease in analgesic needs. Totally. 5 blocks were performed.

**Discussion**: In chronic headache and orofacial pain, nerves carrying these pain signals pass through the SPG, with some making connections to the autonomic nerves. The SPG is the main source of cranial and facial parasympathetics. Proposed theory is that SPG blocks interfere with the parasympathetic outflow from the SPG and that is the main mechanisms for the pain relief.

#### Oomen, KPQ et al; Sluder's Neuralgia: A trigeminal autonomic cephalalgia?; Cephalalgia, 2010, 30(3)360-364;

**Learning points**: The SPG may be an important contributor to the pathogenesis of several headache and orofacial disorders. The SPG block is a safe and well tolerated technique.

#### 08AP08-8

## Control local infection and vascular ulcers pain with topical sevoflurane. Series cases report

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Background: Pain management at wound dressing-related procedures can be a challenge, despite the use of opioids and other analgesics, specially in patients with Martorell's ulcer. In the recent years, topical sevoflurane has been used as a compassionate use drug for pain control during wound dressing changes of leg ulcers (1.2). Clinical cases report: We present a series of 6 clinical cases with baseline EVA score of 10/10. After getting approval of hospital commission for the compassionate use of drugs, patients informed consent forms were signed. All patients presented with deep leg ulcers, mainly Martorell's ulcer, and uncontrolled pain despite opioids and NSAIDs. Topical sevoflurane was applied 1 ml/cm2 over the wound size. The maximum dose administered did not exceed 10 ml in any case. After sevoflurane application, an outstanding reduction in the EVA score (less than 2/10 score) was observed in less than 5 minutes. The duration of pain control was variable, with an average of 2-3 days. Morphine dosis were reduced for all patients and, except for two oncological patients, the opioid treatment could be discontinued. Treatment sessions were repeated once or twice per week. In addition, it was observed angionesis, signs of decreased bioburden (odor and exudation reduction), and initiation of re-epithelialization. Subsequently, the ulcers of four patients were successfully punch-grafted. The only adverse effects observed were short-term pruritus. burning sensation and erythema over the periwound skin.

**Discussion:** Direct application of sevoflurane onto leg ulcers resulted in an intense and long-lasting analgesia and was associated with a progressive reduction of ulcer size. All patients had significant reduction in overall pain, daily opioid use, and ulcer size. Clinical trials are needed so that the analgesic and bactericidal effects of topical sevoflurane in leg ulcers can be confirmed. Topical sevoflurane could be a good option for pain control, opioid dose reduction, decrease in bacterial load due to its potential bactericidal effect, and angiogenesis enhancement considering its anti-inflammatory and vasodilator effect in leg ulcers.

#### References

1 Damaso Fernandez-Gines et al. Am J Health Syst Pharm. 2017;74:e176-e182. 2 Imbernon Moya A et al.Int Wound J. 2017;14:1323-1326.

Learning points. Topical sevoflurane irrigation could have intense and long-lasting analgesia effects in vascular ulcers.

#### 08AP08-9

# The difference of intravascular injection rate during cervical transforaminal epidural block using blunt needle compared to sharp needle

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Background and Goal of Study: Cervical transforaminal epidural block (CTEB) is a useful option in the diagnosis and treatment of cervical radicular pain. However, inadvertent intravascular injection can lead to severe neurologic complications. To reduce complications of intravascular injection, use of blunt needle was suggested. Blunt needle was considered to tend to displaces blood vessels instead of penetration due to its dull needle tip. In this study, we investigated whether there is a difference between blunt needle and sharp needle in the intravascular injection during CTEB.

Materials and Methods: After Institutional Review Board approval, 108 participants undergoing CTEB for a radicular pain from spinal stenosis and herniated nucleus pulposus were randomly assigned to one of two needle groups (blunt needle or sharp needle). The needle position was confirmed using biplanar fluoroscopy and 2 ml of nonionic contrast media was injected to detect intravascular injection. Intravascular injection was defined as contrast media spreading out through the vascular channel during injection of contrast media under real time fluoroscopy.

Results and Discussion: The intravascular injection rate in the blunt needle group was not different compared to the sharp needle group (35.2 % vs 33.3%, p>0.05). And, longer needling time was spent in the blunt needle group compared to the sharp needle group (101.00 ± 12.36 seconds vs 56.67 ± 8.34 seconds, p=0.000). Conclusion:In the present study, blunt tip needle did not reduce the rate of intravascular injection during CTEB, compared to sharp needle. And, the use of blunt tip needle increases the needling time relative to the use of sharp needle.

### Intensive Care Medicine

#### 09AP01-1

## Re-audit on "Capnography in the Intensive Care Units BHR Hospitals NHS Trust"

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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 and raised particular concerns about complications of airway management in the 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. 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. Audit on the use of capnography in the intensive care unit in our trust was completed and presented in 2013, showed only 20% had continuous monitoring with either oral endotracheal intubation or tracheostomy

**Method**: A prospective re-audit was undertaken over 5 days period from 24th March -29th March 2017. We recorded whether patient was intubated or had a tracheostomy and if continuous capnography monitoring was present.

**Results**: 24 patients were ventilated (14 ETT & 10 Tracheotomy tubes) in the intensive care unit. All the 24 ventilated patients with oral endotracheal intubation or tracheostomy tubes had continuous capnography monitoring present.

Conclusion: We fully comply with the Intensive Care Society (UK) / AAGBI recommendations.

#### References:

- http://www.aagbi.org/publications/guidelines/docs/ standardsofmonitoring07.pdf
   Recommendations for standards of monitoring during anaesthesia and recovery
   4th edition\_AAGRI 2007
- 2. NAP 4- chapter 9- Capnography monitoring in ICU
- 3. Intensive Care Society Guidelines- Capnography
- 4. AAGBI recommendations- Capnography

Cook TM, Woodall N, Harper J, Benger J.Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society.

#### 09AP01-2

# Retrospective, single-center case-series analysis of respiratory ECMO for life-threatening presentations of vasculitis

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Background and Goal of Study: Vasculitis is one of most common causes of acute, life-threatening, diffuse alveolar haemorrhage1. The survival rate in those patients who are ventilated because of pulmonary vasculitis is 24% in some studies and remains unchanged in this group despite the introduction of rituximab and plasmapheresis1. We aimed to review survival rate of patients supported with ECMO in the context of vasculitis-induced respiratory failure.

Materials and Methods: We performed a retrospective, single-center observational review of patients admitted between December 2011 and March 2017 and supported with ECMO while presenting with one of the diagnoses listed in the 2012 Nomenclature of Vasculitides. Aside from standard demographics, we recorded survival rate until discharge from ICU and 180-day after discharge and measured the change in compliance and PaO2/FiO2 ratio throughout the period they were supported with ECMO. Diagnoses were confirmed by the detection of the relevant antibodies

Results and Discussion: We identified five patients. Mean time of treatment in ICU was 19 days. Apart from standard treatment with steroids, antibiotics and antifungals two patients were treated with rituximab and plasmapheresis. The average time on ECMO support was 14 days. Survival rate until discharge as well as 180-day survival rate was 100%. There was a mean increase in compliance of 2,36 and mean increase in PFR of 4,5 throughout ECMO support. Among complications, there were 2 cases of cardiac arrest during treatment, both successfully resuscitated. In comparison, we calculated survival rate in general

respiratory ECMO population from the studied period, and found, that 72 % of those patients survived until discharge from ICU, and 180-day survival rate was 65%.

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Conclusion: ECMO is a promising supportive therapy in patients with acute pulmonary deteriorations of vasculitis. ECMO may increase chances of survival as well as chances of functional recovery of lungs in this group of patients. To our knowledge, this is the largest case-series analysis of adults supported with respiratory ECMO, who were diagnosed with severe respiratory failure caused by vasculitis.

#### References

1.Quadrelli S, Dubinsky D, Solis M et al. Immune diffuse alveolar hemorrhage: Clinical presentation and outcome. Respir Med. 2017 Aug;129:59-66.

Acknowledgement: This research was conducted thanks to 2016 ESA trainee exchange programme.

#### 09AP01-3

# Effects of spontaneous breathing activity on regional and global lung inflammation at different PEEP levels in experimental moderate ARDS

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Background and Goal of Study: Spontaneous breathing (SB) activity in acute respiratory distress syndrome can further aggravate the lung injury. Positive end-expiratory pressure (PEEP) has the potential to stabilize the lungs and prevent damage. We hypothesized that in experimental moderate ARDS SB activity combined with inadequate low PEEP increases inflammation in dependent lung areas.

Materials and Methods: In total, twenty-four pigs were anesthetized, and lung injury was induced with multiple saline lung lavage followed by injurious ventilation (double-hit). For assessment of transpulmonary pressure intrapleural pressure sensors were placed in ventral, dorsal and caudal regions of the left thorax. Animals were ventilated with low tidal volumes (V<sub>1</sub>=6ml/kg) in airway pressure release ventilation (APRV) mode. Best PEEP (PEEPb) was defined as the level needed to reach a positive end-expiratory transpulmonary pressure in all lung regions. Animals were randomized to one of four groups (n=6/group): 1) no SB activity and PEEP=PEEPb-4 cmH<sub>2</sub>O (APRV/Clow); 2) no SB activity and PEEP= PEEPb+4 cmH<sub>2</sub>O (APRV/SBlow); 4) SB activity and PEEP=PEEPb+4 cmH<sub>2</sub>O (APRV/SBlow); Bactivity and PEEP=PEEPb+4 cmH<sub>2</sub>O (APRV/SBlow); 2) uptake as well as perfusion using 68Ga-labeled microspheres were assessed by positron emission tomography after 12 hours. The specific 18FJFDG uptake rate (Kis) was calculated and lung aeration determined by static computed tomography.

Results and Discussion: At low PEEP, global Kis [median (25% percentile – 75% percentile)], increased both with [0.032(0.028-0.043) vs. 0.057(0.042-0.075) min-1, P=0.016] and without SB activity [0.029(0.027-0.030) vs. 0.044(0.041-0.065) min-1, P=0.004] compared with high PEEP. SB activity did not increase global lung inflammation, regardless of PEEP level. Nevertheless, transpulmonary driving pressure resulting from SB activity correlated with regional Kis at low (r=0.850, P=0.032) but not high PEEP (r=0.018, P=0.972). In addition, the distribution of regional transpulmonary pressures at end-expiration across the gravity gradient was more homogeneous with high PEEP, and the centers of aeration and perfusion were shifted towards dependent lung regions in APRV/SBhigh compared with APRV/SBlow.

 $\textbf{Conclusion:} \ \textbf{SB} \ \text{activity at inadequate low levels of PEEP correlates with dorsal lung inflammation in moderate ARDS.}$ 

#### 09AP01-4

## Ultrasound diagnosis of Transfusion-related acute lung injury (TRALI) related to obstetrical hemorrhage

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1 - Valladolid (Spain)

**Background:** Obstetrical hemorrhage is the primary cause of maternal death. It often requires transfusion. Transfusion-related acute lung injury (TRALI) is a major complication and it is the first cause of morbimortality related to transfusion. We present a case report of a primiparous woman who suffered from obstetrical hemorrhage due to a uterine atony.

Case report: A 27 years old woman with personal history of tobacco use and gestacional diabetes underwent a cesarean section because of no labor progression. 2 hours later, a continuous bleeding and an abrupt reduction in hemoglobine concentration were observed. A surgical review was performed under general anesthesia with hemodynamic stability. 4 red blood cells concentrates were transfused.

The patient remained intubated and conected to mechanical ventilation at ICU admission. Bibasal lung crackels with good oxygen saturation were noticed in pulmonary auscultation. 3 hours later, an eppisode of taquipnea occurred with increase of crackels through all pulmonary parenchyma. Chest radiography,

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complete analysis (with gasometry, troponin and BNP levels) as well as a chest ultrasound (US) were ordered. The relevant results were hipoxia and cottony and diffuse intersticial infiltrates. No alteration in heart US was found but we found B lines in both hemithorax (more than 4 per area in 4 quadrants of both hemithorax) (image 1). This would suggest a pulmonary oedema. TRALI diagnosis was suspected. We treated her with lung protection parameters. 2 days after this episode, infiltrates dissapeared and gasometry improved. Patient was extubated without incidences and was discharged from ICU.

Discussion: TRALI is a syndrome that usually occurs in the first 6 hours after blood derivates transfusion and whose characteristics are acute hypoxemia with respiratory failure and/or non cardiogenic pulmonary oedema. This is one of the most severe complications related to transfusion. Clinical features are hypoxemia. tachypnea, cyanosis, disnea and fever. Physical examination shows decrease in vesicular murmur and scattered bilateral crackling.

There is no specific test for TRALI diagnosis although imaging test (such us pulmonary US) may help. There is no specific treatment. Lung protective ventilation

Learning points: It is essential to suspect TRALI when respiratory failure is established after blood transfussion.

Ultrasound imaging will be an essential diagnosis technique in the future.

#### 09AP01-5

#### Early diagnosis of a ventilator-associated pneumonia: role of bedside lung ultrasound

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Background: Ventilator-associated pneumonia (VAP) is the most frequent intensive care unit (ICU)-acquired infection associated with a 90-day mortality rate approaching 50%. Early diagnosis leading to early adequate antibiotic treatment is crucial. A case of an early diagnosis of a VAP by lung ultrasound is reported. A potential role of lung ultrasound (LUS) in the early diagnosis of VAP is suggested.

Case Report: A 84-years-old male presented with hypoxemic respiratory insufficiency and inferior MI. Patient was intubated and bilateral infiltration is shown in the chest X-ray. Subpleural consolidation and dynamic linear air bronchogram was observed in the bedside LUS. No leukocytosis nor fever nor purulent tracheal secretions were presented on first day. Given the findings on the LUS, tracheal secretions were cultivated and amoxicillin/ clavulanate was started. 24h later patient had a raise in leukocytosis and worsing of oxygenation. 48 h later Klebsiella pneumoniae was observed in the tracheal secretions and blood cultures. Hence, antibiotic was changed to piperacilin/tazobactam. Inflammatory markers and gas exchange improved and patient was extubated 48h later. Six days later patient was discharged home

Discussion: Early diagnosis of VAP remains a challenge to the intensivist. Classic clinical signs have poor specificity and may lead to overuse of antibiotics, which only increases the prevalence of multidrug-resistant bacteria and the strategy to wait for positive cultures may delay starting antibiotics, resulting in increased mortality. The use of LUS may increase specificity for early diagnosis of VAP, in patients who are clinically suspicious of pneumonia, avoiding overuse and underuse of antibiotics. Specificity of CXR for VAP is very poor. Many critically ill patients have preexisting lung infiltrates often related to noninfectious causes, preventing accurate detection of new infiltrates due to VAP. Consolidation observed by LUS may be caused by atelectasis and pulmonary infarct. However, consolidations with a dynamic linear air bronchogram or subpleural consolidations are more specific of pneumonia and therefore more useful for the early diagnosis of VAP.

#### References:

1. Zagli G, et al. Diagnosis of VAP: a pilot, exploratory analysis of a new score based on procalcitonin and chest echography. Chest. 2014; 146(6): 1578-1585. Learning points: The use of LUS may increase specificity to the clinical signs for

#### 09AP01-6

A new way of monitoring airways during mechanical ventilation; repeated non invasive measurement of particle flow from the small airways during different ventilation modes using a new method of measurement

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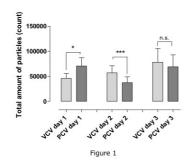
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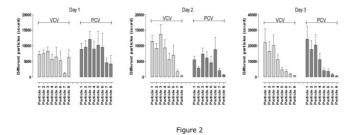
Background: Airway monitoring today is by pressure, volume and airflow. Monitoring airways none invasive by online analyzing different particle flow from the small airways is never done before. This study uses a new method with mass spectrometric analysis of exhaled particles, particle flow and size distribution with PExA (Particle in Exhaled Air).

Materials and Methods: Particle flow was monitored none invasive in 6 pigs under general anaesthesia for 3 days, they underwent abdominal surgery to mimic a clinical situation in ICU. Monitoring during both VCV (Volume Controlled Ventilation) and PCV (Pressure Controlled Ventilation) were done with a short lung recruitment

Results: Total accumulated particles day 1: VCV 46002±7505 and PCV 70548±13310, particles in VCV were significantly lower than in PCV (p=0,0317). Day 2; VCV 57050±11309, and PCV 37297±9477, particles VCV were significantly higher than in PCV (p=0,0003). Day 3; VCV 78143±21799 and PCV 82710±21323, VCV and PCV showed no significant difference (p=0,4052) (Fig1). The particle size were between 0.48 μm and 3.37 μm. The particles were also divided into 8 different size groups according to their mean diameter. (Fig2).

Conclusion: At day 1 the particle flow was significantly larger during PCV than VCV, at day 2 the exact opposite occurred and at day 3 no differences could be seen. Dividing the particles into 8 different sizes, the particle flow pattern between the 3 days changed over the days but was interestingly similar between the 2 modes. One could just speculate if a large particle flow or a low particle flow is more beneficial for protection of the lung from ventilation injuries. We believe this technology will be useful for monitoring mechanically ventilated patients to optimise ventilation and preserve the lung quality and has a high potential to detect new markers in exhaled air.





#### 09AP01-7

Phernic nerve stimulation as a technique of respiratory physiotherapy in the critical patient in respiratory weaning

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Background and Goal of Study: Recovery in critical patients is directly conditioned by muscle weakness. Respiratory muscles disfunction has increasingly been found to be a frequent event that complicates the medical history of patients in Intensive Care. The problem normally affects more serious cases and presents as muscular weakness leading to flaccid paralysis and difficulty in weaning patients off mechanical ventilation. Diaphragmatic dysfunction slows down the process of respiratory weaning. Currently, manual physiotherapy is the main therapy received by ICU patients to encourage their muscular rehabilitation. Different studies have proposed phrenic stimulation as a safe and effective way to reduce assisted ventilation dependence in patients wih spinal cord injuries and central

Materials and Methods: A comparative study was carried out in patients with diaphragmatic weakness (decreased US diaphragmatic thickness fraction) in the ICU under ventilation invasive mechanics (support pressure mode) in the process of weaning. At the moment, we have described 5 patients undergoing to conventional manual therapy and other 5 patients adding US-guided cervical transcutaneous stimulation of bilateral phrenic nerves. Patients were under sedation (RASS -2) and hemodynamic monitoring. Titration ventilatory support to maintain norma evels of inspiratory effort was evaluated before and after 30 min of therapy, and at 24 h. Diaphragm thickness and contractile activity (quantified by the inspiratory thickening fraction) were measured daily by ultrasound (US).

Results and Discussion: Phrenic therapy group reached an increase of 20 % in tidal volume at 30 min and non-inferiority in ventilatory support at 24 h. US diaphramgmatic thickness fraction was also improved (> 30 %). No adverse effects were evidenced. In conventional therapy grup, there was no significant increase in ventilatory mechanics after therapy.

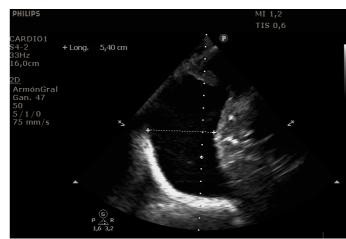
Conclusion: Phrenic nerve transcutaneous stimulation in weaning patient failure may have a decisive role in ICU patient acquired weakness. Low diaphragm contractile activity was associated with rapid decreases in diaphragm thickness, whereas high contractile activity was associated with increases in diaphragm thickness. Multimodal rehabilitation patient approach is essential to permit an early discharge, being promoted as a very cost-effective therapy

#### 09AP01-8

#### Point-of-care pleural effusion ultrasound in critically ill patients

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Background and Goal of Study: Point-of-care ultrasound (PoCUS) is increasingly being used by the physicians to complement the findings of physical examination in the intensive care units (ICU). PoCUS lung is non-invasive, devoid of radiation exposure and can be performed rapidly and repeatedly as needed at bedside. It is a more sensitive means than both chest radiography and computed tomography for identifying pleural effusions and can detect accumulations as low as 10 mL. We describe the way of detecting and measuring and two different clinic cases.

Materials and Methods: Pleural effusion is best detected by placing a curvilinear or phased array probe in the midaxillary line, yielding an image in the coronal plane. The liver or spleen and diaphragm should be identified.

Results and Discussion: When present, fluid will be seen as an anechoic area superior to the diaphragm. With larger amounts of fluid, atelectatic lung tissue may be seen moving within the anechoic fluid (figure 1). Ultrasonography can be used to quantify the amount of fluid (figure 2) with the probe turns in transverse plane: we measure the distance between lung and posterior chest wall: if this distance is superior to 50 mm, the predictive volume is more than 500 ml. There is a published formula effusion volume(ml) = 20 × distance between lung and posterior chest wall (mm) but we believe that knowledge of the exact amount of fluid has limited usefulness in clinical practice, we prefer a qualitative approach.

Conclusion: PoCUS may represent an accurate diagnostic approach to the patient with pleural effusion in the ICU with the probe in coronal plane, and when the effusion is detected, it must be turned to transverse view for measure, PoCUS lung helps in deciding thoracentesis and it provides visual guidance for it and if we don't do it, we can measure effusion everyday and see the evolution

#### 09AP01-9

Have reintubation in Intensive Care Unit more technical difficulty and complications in comparison with first intubation? A prospective, observational study

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Background and Goal of Study: Endotracheal intubation is a common intervention in Intensive Care Unit (ICU) associated with a high incidence of difficult intubation and complications. We hypothesized that reintubations in ICU would be associated with more technical difficulty and complications compared with first intubation.

Materials and Methods: We prospectively evaluated during 34 months all patients that were intubated using a direct laryngoscopy and posteriorly reintubated in the ICU. The purpose of this study was to compare first time success rate, number of attempts, need for adjuncts to direct laryngoscopy, glottic visualization using the modified Cormack-Lehane grade, and the incidence of complications during intubation (hypotension, hypoxia and oesophageal intubation).

Results and Discussion: A total of 340 patients were intubated in ICU, of which 48 (14%) were reintubated posteriorly. Results data are presents in table 1. No difference in the number of attempts of intubation were observed between the first intubation and the reintubation. Reintubation was associated with worse glottic visualization, with more use of gum-elastic bougie, and more complications compared with first intubation.

Conclusions: Compared with first intubation in ICU, reintubation using a direct lalyngoscopy was associated with worse glottic views, an increase of the technical difficulty of intubation and the incidence of complications. Further studies are required to confirm these findings. References:

1. Elmer et al. Reintubation in critically ill patients: procedural complications and implications for care. Critical Care 2015; 19.112-18.

able 1:	Intubation	Reintubation	
Intubation attempts	(n=48)	(n=48)	P valu
		42 (87,5%)	ns
1	44 (91,7%)		
		5 (10,4%)	ns
2	4 (8,3%)		
		1 (2%)	ns
≥3			
Adjunct to DL used (gum-elastic bougie)	3 (6,25%)	9 (18,7%)	<0,05
Modified Cormack-Lehane			
1		20 (41,6%)	
	24 (50%)		
2a		5 (10,4%)	
	12 (25%)		<0,05
2b		16 (33%)	
	12 (25%)		
3		7 (14,6%)	
4			

Complications	12 (25%)	20 (41,6%)	
Hypotension <80mmHg	11 (22,9%)	16 (33%)	
Hypotension <65mmHg	5 (10,4%)	10 (20,8%)	<0,05
Hypoxia <90%	5 (10,4%)	7 (14,6%)	
Hypoxia <80%	2 (4,1%)	1 (2%)	
Oesophageal intubation			

#### 09AP01-10

## Acute respiratory failure after cesarean section in patient with SLE due to myasthenia gravis

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**Background**: Myasthenia gravis (MG) is autoimunne disease caused by production of antibodies against acetylcholine receptors resulting in skeletal muscle weakness. It can be rearly associated with other autoimmune diseases like Systemic lupus erythematosus (SLE). Myastenia gravis presented as isolated respiratory failure as the first sign of the disease is very rare.

Case Report: We present a case of a 22 years old caucasian women with previosly diagnosed SLE who was admitted in our ICU from another hospital because of acute respiratory failure. The woman delivered her baby with cesarean section under general anaesthesia eight days before. After prolonged aweakening period she was extubated but in the next days she developed muscle weakeness which led to respiratory insufficiency. She wasn't taking any medication for SLE during her pregnancy. She was transported in our ICU after she was intubated. On the admitton she was GCS 15, intubated, on the CPAP mode of ventilation, with no evidence of upper and lower extremities weakness. The chest computed tomography (CT) scan showed no evidence of pulmonary thromboembolism or thymic hyperplasia and thymoma. Prostigmin test was positive so therapy with pyridostigmine bromide, prednisone and plasmaferesis started. The anti–acetylcholine receptor (AChR) antibody came back elevated. After 2nd plasmaferesis she was breathing sufficiently so she was extubated. She was dissmised full recovered.

**Discussion**: Myasthenia gravis (MG) and Sistemic lupus erythematosus (SLE) are both autoimmune diseases with different cause and course of the disease but they can preceed or coexist.1 This coexistence may cause more severe myastenic course compared to MG alone.2 Acute respiratory failure usually develops in late stage of the disease. However, in some patients respiratory failure is the initial presenting symptom.

#### References

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**Learning points**: Myasthenia gravis associated with other autoimmune diseases like Systemic lupus erythematosus is rearly reported but it may coexist and can have more severe course.

#### 09AP01-12

#### A new approach of airway burns in severely burned adults

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Background and Goal of Study: Severe burns are the most complex form of trauma in humans. Associated airway burns have a poor outcome, with increased mortality. A burned patient, as a consequence of smoke and hot air inhalation, is at increased risk of pulmonary infections. New procedures could improve outcome. Materials and Methods: During a 7-month period (April 1st – November 1st 2017) 16 severely burned patients with airway burns documented by bronchoscopy assessment at admission were included in the study. Cultures of bronchial secretions revealed germs sensitive to Colistin (polymyxin E). Colistin was instilled in 8 patients via the bronchoscope in the trachea and the main bronchi – 1000000 IU diluted in 20 ml saline solution, followed by suction 5 – 6 seconds later; 8 patients represent the control sample (without Colistin).

Results and Discussion: In our patients, the initial lesions included tracheobronchial mucosal hyperemia and edema, viscous mucus, highly adherent to the airway wall, saturated with soot, necrosis of the tracheal carina or bronchial bifurcation with mucosal denudation. Various studies have shown that Colistin is absent in the lung after intravenous treatment, whilst nebulization ensures efficient concentrations. Topical administration can improve progress of the mucosal injury. Bronchoscopic assessment done 48 hours after topical administration of Colistin showed a clearly favorable progress of lesions without puss or slough vs those in the control sample.

**Conclusion**: In a world with increasing antibiotic resistance, severely burned patients have serious immunosuppression and an increased risk of infections. Our study showed that topical tracheo-bronchial "old" Colistin in airway injury of severely burned patients can contribute to the resolution of lesions and improve outcome.

#### 09AP02-1

bound CD14

#### Magnesium sulfate decreases binding of lipopolysaccharide to macrophages by reducing membrane

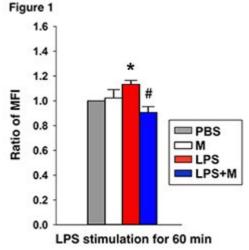
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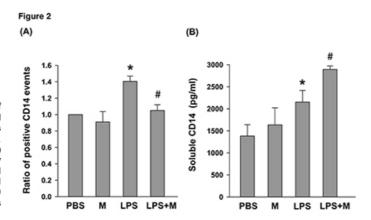
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Background and Goal of Study: Binding of lipopolysaccharide (LPS) to Toll-like receptor 4, mediated by cluster of differentiation 14 (CD14), elicits intracellular inflammatory cascades. CD14 exists as either a membrane bound protein on the cell surface or as a soluble protein in supernatants. Shedding of CD14 caused by proteolytic cleavage leads to reduced expression of membrane bound CD14 (mCD14), followed by hypo-responsiveness to LPS. Magnesium sulfate (MgSO4) has anti-inflammatory effects and reduces LPS-induced cytokine release. However, the role of MgSO4 in LPS recognition remains unstudied. We conducted this study to elucidate the effects of MgSO4 on LPS-macrophage binding and CD14 expression.

Materials and Methods: THP-1 cells were treated with LPS (1μg/ml) or LPS plus MgSO4 (20mM) (denoted as the LPS and LPS+M groups, respectively) to facilitate investigation. To assay LPS binding to THP-1 cells, cells were incubated with FITC-LPS for 60 min. The levels of LPS-macrophage binding and mCD14 were measured by flow cytometry. The concentration of soluble CD14 (sCD14) in supernatants was measured by enzyme-linked immunosorbent assay.

Results and Discussion: After LPS stimulation, the signal intensities of FITC-LPS binding to cells and mCD14 expression in the LPS+M group were lower than the LPS group (Fig.1 & 2A).





Correspondingly, the concentration of sCD14 in the LPS+M group was higher than the LPS group (Fig.2B). The increase of sCD14 in supernatants facilitated by MgSO4 treatment is suggested derived from mCD14 shedding. Previous observation that dietary magnesium deficiency relates to high CD14 levels seems to support our results.

Conclusion(s): MgSO4 decreases binding of LPS to macrophages, resulting from reduced mCD14 expression. The effects of MgSO4 on CD14 may involve enhanced proteolytic cleavage.

#### 09AP02-2

Monitoring energy demand in the multiple trauma critically ill patient with sepsis based on indirect calorimetry. A prospective observational monocentric study

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Background and Goal of Study: The critically ill polytrauma patient with sepsis presents with variable energetic necessities characterized by a pro-inflammatory, pro-oxidative and hypermetabolic status. One of the challenges the ICU doctor faces is adapting the nutritional therapy based on the individual needs of each patient. Through this paper we wish to highlight the trend of energy needs in the case of critically ill polytrauma patients with sepsis by using noninvasive monitoring of respiratory gases based on indirect calorimetry (GE Healthcare, Helsinki, Finland). Materials and Methods: This is a prospective observational study carried out in the Anesthesia and Intensive Care Unit "Casa Austria", Emergency County Hospital "Pius Brinzeu", Timisoara, Romania. We monitored VO2, VCO2, energy demand (ED), and specific clinical and paraclinical data. We measured energy demand values monitored by directocalorimetry with values calculated based on standard formulas.

**Results and Discussion**: 21 values have been recorded in the study. The mean VO2 was  $3.3 \pm 0.4$  ml/min/kg, the mean VCO2 was  $2.3 \pm 0.3$  ml/min/kg. In regard with energy demand, the mean ED obtained through direct calorimetry was 2393.2  $\pm$  912.9 kcal/day, and those obtained by using mathematic formulas were 1988.6  $\pm$ 1100 kcal/day (p < 0.05). Moreover, statistically significant differences have been observed regarding the mean difference between energy demand determined using indirect calorimetry and that determined mathematically, respectively between the enteral and parenteral administered ED.

**Conclusion**: Continuous monitoring of the energy demand in critically ill patients with sepsis can bring important benefits in regard with the clinical prognosis of these patients through the individualization and adaption of intensive therapy for each patient.

#### 09AP02-3

## Procalcitonin and CRP: predictors of severe acute pancreatitis?

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Background and Goal of Study: Precociously know the severity of acute pancreatitis, a quarter of which are considered severe, optimizes the treatment and refer the patient to specialized care units. Abdominal CT scan with injection of contrast remains the reference examination prognosis, but it is feasible to see 48 to 72 hours after onset of pain. The plasmatic procalcitonin and CRP are indicated as biomarkers of inflammation. Our goal is to assess their interest in the prognosis of acute pancreatitis stage E?

Materials and Methods: Our retrospective study involved 68 patients admitted to intensive care for severe acute pancreatitis E scannographic stage, between January 2010 and September 2015. Incomplete applications were excluded. The Procalcitonin, CRP was gathered together at admission and during the first seven days of hospitalization to monitor the kinetics of these inflammatory markers and report to the prognosis of the disease. The reference value of procalcitonin is 0.5 ng /ml and CRP of 150mg /l.

**Results and Discussion**: In our study, the mean age was 60.13 years, the sex ratio is 0.45, BMI is 27,03kg / m². 51 patients (75%) had a favorable evolution et17 patients (25%) died in connection with multiple organ failure. Patients with acute pancreatitis who had an unfavorable change in serum T PC and CRP at 24 hours of admission, significantly higher (p <0.05) in subjects with a good evolution during the period 'study. Daily measurements of CRP in patients who have well advanced are correlated with different degrees of disease severity with sensitivity 84% and specificity of 82%, those of the PCT had a sensitivity of 90% and specificity 65% **Conclusion**: Serum procalcitoninémie may be useful for predicting the severity of

**Conclusion**: Serum procalcitoninémie may be useful for predicting the severity of acute pancreatitis and the risk of developing infected pancreatic necrosis, it can be a useful complement to the stratification of conventional gravity and be a guide to the progress of the disease.

**References**: Reza Mofidi et al. The value of procalcitonin at predicting the severity of acute pancreatitis and development of infected pancreatic necrosis: Systematic review. Surgery.2009.14:72–81.

#### 09AP02-4

## Mobilization of CD34/133 positive stem cells in surgical patients with complicated intra abdominal infection

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Background and Goal: of Study: Sepsis is a frequent cause of mortality in patients undergoing major abdominal surgery (AS) with complicated intra-abdominal infection (IAC). We currently lack of informations regarding the endothelial stem cells surgical patients. The aim of the study is to evaluate the time course level of circulating CD34/133 positive endothelial stem cells in AS-IAC patients.

Materials and Methods: Consecutive AS patients were enrolled at University Hospital of Foggia. Blood samples were collected at baseline and 1-3-7-10 days postoperatively to perform CD34/133 cells quantitative analysis. The outcome was also recorded. The data are presented as median [IQR].

Results and Discussion: Of 46 AS patients, 28 AS patients developed IAC and septic shock. 16 of 28 AS-IAC septic shock patients died within 15 days postoperatively. CD34/133 cells number progressively increased in AS patients at 7 vs 1 postoperative day (1,05 cells/mcl [0-3,1] vs 0 cells/mcl [0-1,2], respectively; NS) and in survivors AS-IAC septic shock patients (7 vs 1 postoperative day: 2,5 cells/mcl [0-6,8] vs 0,4 cells/mcl [0-1,5]; p=0,04). Differently, in non survivors AS-IAC septic shock patients CD34/133 stem cells increased at 3 days vs baseline (0,9 cells/mcl [0-2,4] vs 0,2 cells/mcl [0-2,3]; NS) and progressively decreased at 10 days (0 cells/mcl [0-1,2]).

Conclusion: The presented preliminary findings indicate an increased level of the circulating CD34/CD133 stem cells in the blood of AS patients, likely due to an adaptive response to surgical stress. Moreover it appears that AS-IAC septic shock patients mobilizing CD34/133 stem cells exhibit a better outcome. The preliminary data encourage the continuation of the research project on a larger sample size of patients to better understand if and how stem cells are involved in the surgical patients with septic shock.

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#### 09AP02-5

# Adherence to a procalcitonin-protocol and effects on duration of antibiotic treatment and clinical outcomes in septic ICU patients

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**Background:** In randomised controlled trials, procalcitonin (PCT)-guided antibiotic treatment has been proven to significantly reduce length of antibiotic therapy in critically ill patients. However, concern was raised on low protocol adherence and high rates of over-ruling in prospective studies and the value in real clinical life remains unclear. In this study, we analysed adherence to a procalcitonin-guided antibiotic treatment protocol and the effect on clinical outcomes in patients with severe sepsis and septic shock.

**Methods:** The local PCT protocol recommended discontinuation of antibiotics with a PCT level <0.5 ng/mL or a decrease from peak level to 10% or less. Patients with a suitable PCT measurement series were identified and underwent further analysis. Clinical outcomes in patients with an antibiotic stop directive according to the local PCT protocol were compared to those without PCT stop directive. Furthermore, patients treated adherently to the PCT protocol were compared to not adherently treated patients.

Results: From 2012 to 2014, 81 patients with severe sepsis and septic shock were identified. Fourteen patients were excluded from the further analysis due to treatment restriction or a short stay in the ICU. Final analysis was performed of 67 patients. According to our definition, 42 patients (62.7%) had PCT measurement series suitable for analysis. Of these 42 patients, 26 patients had an antibiotic stop directive but only in 8 (30.8%) patients, antibiotics were discontinued adherently to the protocol. Patients treated adherently to the protocol were comparable to non-adherent patients with respect to age, SAPS II score, maximum SOFA score but had a higher rate of abdominal sepsis compared to the non-adherent group (88% [95%-CI 47, 100] vs. 44% [95%-CI 22, 69]). However, patients with antibiotic discontinuation adherent to the PCT stop directive had a shorter first episode of antibiotic treatment (7d [IQR 6, 9] vs. 12d [IQR 9,16]), a comparable length of stay in ICU and hospital, and a lower in-hospital mortality (13% [95%-CI 0, 53] vs. 33% [95%-CI 13, 59]).

**Conclusion:** In this retrospective cohort study in surgical septic ICU patients, adherence to a local PCT protocol was low in real clinical life. Highest adherence was observed for patients with abdominal sepsis. Patients with an antibiotic stop directive who were treated according to the PCT protocol, had a shorter duration of antibiotic treatment and no worse clinical outcomes.

#### 09AP02-6

Protective roles of anti-hyperlipidemia agents, statins, for critical patients from adverse outcomes: A nationwide population-based retrospective cohort study

Chen T. L.1

Background and Goal of Study: Anti-hyperlipidemia agents, statins, were noted to reduce risks of pneumonia and sepsis for critical patients. It's comprehensive features of protection for patients in the intensive care unit (ICU) are not completely understood. This study evaluated the ICU complication and mortality rates among patients receiving statins or not.

Materials and Methods: Using the reimbursement claims from Taiwan National Health Insurance Research Database from in 2006-2013, 148,641 ICU patients using anti-hyperlipidemia agents, statins, within 12-month period before the index admission were identified. Under the method of propensity score-matching in patients' age, sex, low income or not, hospital size, pre-existing medical conditions such as hypertension, diabetes, ischemic heart disease, mental disorders, COPD, cancer, stroke, fracture, asthma, congestive heart failure, liver disease, renal dialysis, Parkinsonism, atrial fibrillation, and traumatic brain injury, the complications in ICU such as septicaemia, pneumonia, stroke, urinary tract infection, deep wound infection, pulmonary embolism, acute renal failure, postoperative bleeding, AMI and overall in-hospital mortality were analysed with another 148,641 ICU patients without using statins for comparison. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) associated with ICU complications and mortality were evaluated under the multivariate logistic regressions model between patients with or without using statins.

Results and Discussion: Compared with the controls, patients using statins significantly reduced risks for septicaemia (OR 0.92, 95% CI 0.91-0.94), pneumonia (OR 0.80, 95% CI 0.78-0.81), stroke (OR 0.83, 95% CI 0.81-0.86), urinary tract infection (OR 0.89, 95% CI 0.86-0.91), deep wound infection (OR 0.65, 95% CI 0.58-0.74) and overall ICU mortality (OR 0.94, 95% CI 0.92-0.96). No statistical difference was noted in risks of pulmonary embolism, acute renal failure, postoperative bleeding, or AMI between ICU patients using statins or not. The anti-inflammatory effect of statins might contribute its role of protection from adverse outcomes of ICU patients.

**Conclusion**: This study showed the comprehensive effects of anti-hyperlipidemia agents, statins, for ICU patients in various in-hospital complications and overall mortality. Further prospective study is needed to validate the mechanisms for its protective effects.

#### 09AP02-7

#### The Effects of Melanocortin Rc agonist BMS-470539 on Endotoxin induced Neutrophil Activation and Mortality in Septic mouse

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Background and Goal of Study: Despite advances in the management of sepsis, the mortality rate remains high. Over-activation of inflammatory cells involving macrophages and neutrophils are associated with multiple organ failure under those conditions. Thus, nontoxic molecules that regulate inflammatory cells may provide a novel therapeutic strategy. This study was performed to evaluate the effects of Melanocortin Rc agonist BMS-470539 on immune-inflammatory response in septic neutrophil and mortality in septic mouse.

Materials and Methods: To assess possible interactions between BMS-470539 and lipopolysaccharide (LPS) on neutrophil activation, neutrophils from human blood were incubated with various concentrations of BMS-470539 (0, 1, 10 and 100 nM) and LPS (100 ng/ml). The protein levels for interleukin (IL)-6, IL-1B and tumor necrosis factor (TNF)-α were measured using ELISA after 4 hr incubation period. To elucidate the intracellular signaling pathway, the levels of phosphorylation of p38 mitogen activated protein kinases (p38), extracelluar signal-regulated kinase (ERK)1/2 and c-Jun amino-terminal kinases (JNK) were measured using western blot analysis and nuclear levels of nuclear factor (NF)-κB were measured using electrophoretic mobility shift assays (EMSA). We also examined the effect of BMS-470539 on mortality of a murine model of cecal ligation and puncture (CLP) to determine whether these effects of BMS-470539 also have in vivo significance.

**Results and Discussion**: BMS-470539 attenuated LPS induced neutrophil activation including expression of ERK1/2, NF-κB, IL-6, IL-1B and TNF-α. BMS-470539 also improved mortality of CLP induced septic mouse.

Conclusion: BMS-470539 can improve mortality of CLP induced septic mouse via the attenuation of neutrophil activation caused by LPS

#### 09AP02-8

Effects of 250.000 IU vitamin D enteral supplementation on hepcidin and iron in septic shock patients: preliminary results

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Background and Goal of Study: Hepcidin is up-regulated in inflammatory conditions and leads to iron-sequestration anaemia. Hepcidin levels decrease in response to high-dose vitamin D administration in critically ill patients<sup>1</sup>. We hypothesized that enteral vitamin D supplementation in patients with sepsis would lower hepcidin levels and allow iron to be available for erythropoiesis.

Materials and Methods: Ethical approval was obtained ("Iuliu Hatieganu" University of Medicine and Pharmacy, 434/24.11.2016, and Clinical Emergency County Hospital Cluj-Napoca, 21833/24.10.2016) and patients or the next of kin signed the informed consent forms. Ten patients with septic shock (peritonitis 3, bronchopneumonia 6, urinary tract infection 1) were randomly assigned to receive or not 250.000IU vitamin D enteral supplementation. None of the patients received blood transfusions and intravenous iron supplementation during the study. Vitamin D, hepcidin and serum iron ratios were calculated as the levels measured one week after intervention divided by the baseline levels.

Results and Discussion: Patients receiving vitamin D presented a significant increase in vitamin D levels compared to those who did not (Table). Mean hepcidin ratio was lower and mean serum iron ratio was higher in patients who received vitamin D. but the differences between the two groups were not significant.

			Patients who did not receive vita- min D (N=5)	
Vitamin D r	atio	0.99±0.10	1.66±0.30	0.012
Hepcidin ratio		3.85±5.58	3.01±2.16	0.5287
Serum ratio	iron	1.93±1.35	3.01±2.16	1

Table. Vitamin D, hepcidin and serum iron ratios in patients who received vitamin D supplementation and those who did not (mean values±standard deviation, p-values for U Mann-Whitney test).

**Conclusion**: Enteral vitamin D supplementation seems to reduce hepcidin levels and increase serum iron levels in septic patients with iron-restriction anaemia and might be used as adjuvant therapy in patient blood management programmes, larger studies being further required.

#### References:

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 Acknowledgements: Data from NCT03001687. This work was performed within the European Society of Anaesthesiology (ESA) Mentorship Programme 2016-2018.

#### 09AP03-1

#### Effectiveness of using Pre-hospital Aspirin and Anti-Inflammatory Drugs on Mortality and Morbidity in ARDS Patients Followed at Intensive Care Unit

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**Background and Goal of Study**: In this study, we aimed to investigate the efficiency of pre-hospital usage of aspirin and anti-inflammatory agents in patients with ARDS and mortality in critically ill patients, by retrospectively screening ARDS natients treated in ICI I

Materials and Methods: Demographic data, length of ICU stay, intensive care unit Apache-II score, presence of comorbidity and mortality, procalcitonin and CRP levels, neutrophil / lymphocyte (N/L) rates, Berlin Criteria, the use of aspirin and anti-inflammatory drugs, and the presence of infection findings from the files of ARDS patients followed from January 2016 to January 2017.

The Berli Criteria

Period ARDS development is 7 days

XRay

Bilateral infiltrate on chest X-Ray that can not be explained by effusion, collapsed lung or lung nodule

Edema If the risk factor can not be identified, futher evaluation, such as, echocardiography, is needed to be performed

Oxygenezation

Mild 200 <PaO2/FiO2 ratio <300+PEEP or CPAP≥5 cmH2O

Moderate 100 <PaO2/FiO2 ratio <200+PEEP ≥5 cmH2O

Severe PaO2/FiO2 ratio ≤100+PEEP ≥5 cmH2O

**Results and Discussion**: Forty of the 43 ARDS patients were included in the study. Nineteen patients (95%) had worsen in the first week, 15 (75%) had chest X-ray pathology, 12 had (60%) pulmonary edema and 13 had (65%) need of oxygen. Statistically significant difference was found in these Berlin Criteria (p < 0.05). In addition, there were significant differences between the first and last procalcitonin values, CRP values, leukocyte counts, N / L ratios, hospitalization times and APACHE II scores (p < 0.05).

Conclusion: Pre-hospital aspirin and antiinflammatory drugs seemed to prevent morbidity and mortality in intensive care unit, our study showed statistically significance in the results. However, further research is needed to confirm the results.

#### 09AP03-2

# Cerebral tissue oxygen saturation during switch from conventional mechanical ventilation to High Frequency Percussive Ventilation: an observational study

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Background and Goal of Study: High Frequency Percussive Ventilation (HFPV) is a respiratory rescue therapy in patients with acute respiratory failure, refractory to conventional mechanical ventilation. HFPV enhances CO<sub>2</sub> washout by convection. As its impact on cerebral perfusion is unknown, there is hesitation to use this ventilation strategy in patients with increased intracranial pressures. We therefore investigated the influence of HFPV on cerebral tissue oxygen saturation (SctO<sub>2</sub>), a surrogate parameter of cerebral perfusion in patients without increased intracranial pressure.

Materials and Methods: Between July 2015 and August 2016, patients who were refractory to conventional mechanical ventilation were transferred to HFPV and enrolled in this study. Cerebral tissue oxygen saturation was measured in all patients using Near-Infrared Spectroscopy (NIRS) technology (FORE-SIGHT ELITE™, CAS Medical systems, Branford, CT, USA). NIRS sensors were applied one hour before the switch to HFPV and remained in place for 24 hours. Likewise, a blood gas analysis was performed before the switch and at hour 12 and 24 afterwards. Hemodynamic data and SctO₂ values were captured with a 2sec time interval. Mean values of mean arterial pressure (MAP), peripheral oxygen saturation (SpO₂) and SctO₂ were calculated one hour before and after the switch, and were compared with a Wilcoxon signed ranked test. Statistical significance was set at p<0.05. Data are presented as medians and IQR.

Results and Discussion: Twelve patients were included. The switch to HFPV induced no change in MAP (Before: 75 mmHg (64-89) vs. After: 66 mmHg (58-86); p=0.248). While SpO<sub>2</sub> increased after applying HFPV (Before: 94% (88-98) vs. After: 95% (94-99); p=0.037), a 21% decrease in PaCO<sub>2</sub> was observed (Before: 42mmHg (35-49) vs. After: 33mmHg (28-37); p=0.010). Likewise, the SctO2 decreased by 6% after switching to HFPV (Before: 68% (66-74) vs. After: 64% (61-71); p=0.034). Compared to PaCO<sub>2</sub> at one hour after the switch (33mmHg (28-37), PaCO<sub>2</sub> remained stable at hour 12 (37mmHg (29-44) and hour 24 (37mmHg (32-39); p=0.117 and p=0.308, respectively).

Conclusion: This study shows that HFPV promotes CO<sub>2</sub> washout, which induced

**Conclusion**: This study shows that HFPV promotes  $\mathrm{CO}_2$  washout, which induced a concomitant mild drop in  $\mathrm{SctO}_2$ . Nevertheless,  $\mathrm{SctO}_2$  remained above critical desaturation thresholds. This ventilation strategy appears tolerable for patients without increased intracranial pressure.

#### 09AP03-3

## Spitting images of COPD: The salivary microbiome discriminates between respiratory diseases

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Background and Goal of Study: The microbiome is recognised as contributing to human health, responsiveness to drugs and as an aid in rapid diagnosis of respiratory disease. This could influence anaesthetic strategies in critically ill patients with chronic obstructive pulmonary disease (COPD). We here describe the salivary microbiome as an indicator of chronic respiratory disease.

Materials and Methods: Following approval by NHS Research Ethics Committee (Wales REC 7) and trial registration (16/WA/0036), 74 patients were enrolled into 3 groups from February to August 2016.

Group A: 19 healthy controls from relatives of patients attending our secondary care smoking cessation service, with no symptoms of or unknown diagnoses of lung disease

Group B: 47 patients diagnosed with COPD (according to current criteria - age > 40 years, ex or current smokers of at least 10-pack years, post bronchodilator

FEV1/FVC < 0.70 and FEV1 < 80% predicted).

Group B1: Baseline COPD with 40 patients
Group B2: Exacerbation ECOPD with 7 patients

Group C: 8 patients with Non-small cell lung cancer (NSCLC).

Saliva samples were collected and total genomic DNA was extracted from 50µl of using the FastDNA Spin Kit. Sequencing of the 16S rRNA gene with PCR amplification of the V3 and V4 region. Specific "barcode" primers were used for each and sequenced on Illumina MiSeq platform. Derived data were assessed following European Nucleotide Archive (ENA) pipelines for metagenomic analysis to identify bacterial constituents.

Results and Discussion: Salivary microbiomes contained Cyanobacteria, Actinobacteria, Bacteriodetes, Acidobacteria, Firmicutes, Synergistetes, Spirochaetes and Proteobacteria. These differed in abundance between the 3 patient groups. Most prominently, Cyanobacteria were detected only in Group A whilst Bacteriodetes (which include pathogens), were seen only in Group B. Firmacutes and Proteobacteria. Euryarcaetoa was absent only in Group B. No microbiomic change could be linked to Group B1 vs Group B2 patients. Planctomycetes were found only in Group C. These bacterial changes in microbiome are likely to reflect changes in pathogenic and pro-inflammatory potential and abilities to metabolise drugs.

**Conclusion**: The results of our study reveal the importance of salivary microbiome in respiratory disease with possible significant clinical implications in terms of diagnosis and treatment.

#### 09AP03-5

Sedation with dexmedetomidine is safe, increasing success rate of noninvasive positive pressure ventilation in awake, uncooperative patients with acute respiratory failure

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Background and Goal of Study: Very limited data are available about safety and efficacy of sedation during NIPPV. Care for uncooperative patients with ARF can be challenging, leading to high rate of potentially preventable intubations. Goal of study was to assess safety and efficacy of dexmedetomidine sedation during NIPPV in awake uncooperative patients with ARF in ICU settings.

Materials and Methods: 67 adults (18-82 years, mean 64,4±19,7 years), admitted to ICU due to respiratory failure (PaO2<80 mm Hg OR SpO2<90% on room air OR PaCO2>50 mm Hg) were enrolled. Other inclusion criteria were: wakefulness (Glasgow Coma Scale (GCS) score>13), lack of cooperation or agitation (RASS) score >+2) prior to initiation or immediately after initiation of NIPPV. Leading causes of respiratory failure were community-acquired pneumonia (n=32, 47,8%), COPD exacerbation (n=27, 40,3%) and other (n=8, 11,9%). Patients were randomized either to dexmedetomidine sedation (n=36) or control (n=31) group. Investigators were not blinded. Primary endpoint was an intubation rate. Secondary end-points were ICU length of stay (LOS), gas exchange variables (PaO2, PaCO2), new onset hemodynamic instability, vomiting or gastric aspiration events. Study subjects were observed for 72 hours and followed up to the hospital discharge. Study has been approved by an Institutional Review Board. Binary outcomes were compared with Chi-square test and quantitative outcomes were compared with two-sample T-test. Results and Discussion: Intubation rate was significantly lower in sedation group (n=5, 13,9%) than in control group (n-11, 35,8%), with absolute risk reduction 21.9% (p=.038). NNT=4.6. Main reasons for intubation were patient intolerance, non-resolving or progressing respiratory failure, undesired consciousness level decrease. Mean LOS in study group was 4,9±1,1 days vs. 7,3±2,4 days in control group (p<.0001). Hemodynamic instability, vomiting or aspiration and gas exchange did not varied significantly between groups. Due to small number of patients and their significant heterogeneity subgroup analysis was not performed.

**Conclusion**: Our data shows that sedating uncooperative patients during NIPPV with dexmedetomidine is a reasonably safe practice that leads to improvement of NIPPV success rate and decreased ICU LOS. However, we were unable to demonstrate improvement of a specific disease outcome and further research are required.

#### 09AP03-6

Ceftolozane-Tazobactam for the treatment of nosocomial pneumonia caused by extremely resistant Pseudomonas aeruginosa

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Background and Goal of Study: Infections caused by extremely resistant Pseudomonas aeruginosa (XDR) are a clinical concern due to the lack of effective and saefty therapeutic options. In this scenario, Ceftolozane-Tazobactam (CFT-TZB), a new drug with high bactericidal activity against P.aeruginosa (including XDR strains) which has been recently approved for the treatment of complicated

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intra-abdominal and urinary tract infections, could be useful.

The aim of the study is to describe our experience with the use of CFT-TZB in patients with postoperative pneumonia (POP) due to XDR P.aeruginosa during their admission in a surgical intensive care unit (SICU).

Materials and Methods: We retrospectively analyzed all the patients (January/16-November/17), with diagnosis of POP caused by XDR P.aeruginosa and treated with CFT-TZB during their admission in the SICU. Variables analyzed were: type of sample, antibiotic susceptibility, regimen of treatment (dose, duration, combination of drugs), side effects, efficacy and development of antibiotic resistance.

Results and Discussion: A total of 6 patients were analyzed. Respiratory samples were obtained in all cases (5 BAS / 1 sputum). Antibiograms showed similar patterns of microbial resistance: the pathogen was sensitive to colistin (MIC <0.5-2mg / dL) and presented variable sensitivity to amikacin (MIC <8 - >32mg/dL) and meropenem (MIC 8 - >32mg/dL).

Salvage therapy with CFT-TZB was used in all cases due to poor clinical evolution after treatment with colistin ev and after assure pathogens sensitivity to the drug. CFT-TZB was administered ev in a 30 minute bolus. Doses of the drugs were 1g/8h (4 patients) and 2g/8h (2 patients), for at least 2 weeks in all cases. Combination therapy was performed in the majority of cases: CFT-TZB + nebulized colistin, CFT-TZB + colistin ev + nebulized colistin, CFT-TZB + meropenem ev. Patients achieved clinical cure. Just one patient presented persistent colonization by XDR P.aeruginosa.

**Conclusions:** CFT-TZB could be an effective option for the treatment of respiratory infections by XDR P.aeruginosa, however, further studies are needed.

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#### 09AP03-7

### Positive end expiratory pressure test can predict fluid responsiveness in patients with septic shock

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Background and Goal of Study: The transient increase of positive end expiratory pressure (PEEP test) is a promising bedside approach to assess the response of fluid resuscitation, however requiring further validation in different clinical situations. The goal of our study was to assess whether PEEP test predicts fluid responsiveness in patients with septic shock.

**Materials and Methods**: Seventeen adult patients with septic shock were enrolled into an ongoing prospective observational study. All the patients received vasopressor support pressure-controlled ventilation with tidal volume of 8 mL/kg and standardised PEEP 8 cm H<sub>2</sub>O, and sedation with continuous infusion of propofol. The PEEP test consisted of a transient increase of PEEP from 8 to 20 cm H<sub>2</sub>O during 5 min. Thereafter, all patients received fluid challenge (7 ml/kg of crystalloids during 10 min). Systolic arterial pressure (SAP), mean arterial pressure (MAP), pulse pressure variations (PPV), thermodilution cardiac index (CI), and CI determined with pulse contour analysis (PCCI) were measured using PiCCO<sub>2</sub> monitor (Pulsion Medical System, Germany) before, during, and after PEEP test, as well as two minutes after the fluid load. The patients with an increase in CI by  $\geq$  15 % after fluid challenge were defined as fluid responders. The statistical analysis was performed using Mann—Whitney U-test, Wilcoxon test and ROC analysis. Data are presented as median (25th–75th percentiles).

**Results and Discussion**: In both responders and non-responders, PEEP test resulted in a significant decrease in SAP within the first 30 seconds only (p < 0.05), while in the responders the decrement of SAP persisted until the end of the test. To 3 min after the start of PEEP test, SAP reduced by 18 (4–24) mm Hg in responders, but increased by 11 (-7–15) mm Hg in non-responders (p = 0.03). The decrease of SAP exceeding 14 mm Hg identified fluid responders with area under the curve (AUC) 0.85, sensitivity 58% and specificity 100% (p = 0.03). During PEEP-test, PPV, MAP, and PCCI decreased without significant differences between the responders and non-responders. ROC analysis revealed that the decrease in CI  $\geq$  0.5 L/min/m² from the first to the fifth minute of the test predicted responders to fluid load with AUC 0.89, sensitivity 80 % and specificity 100% (p = 0.015).

**Conclusion**: In septic shock, the PEEP test can be used to predict fluid responsiveness but requires thorough hemodynamic monitoring.

#### 09AP03-8

## Perioperative risk factors for determining the unplanned admission to an Intensive Care Unit after surgery

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Background: Unplanned admission to ICU can significantly effect on perioperative morbidity, mortality and prolonged hospital stay. Also it could be contribute increased medical expenses because of concentration of medical facilities and personnel. The objective of this study was to identify the incidence and perioperative risk factors that may lead to the unplanned admission to ICU.

Materials and Methods: We reviewed the medical records of adult patients

undergone an elective operation from January, 2015 to December, 2016 and been in the ICU within 24 hours. Emergency cases or surgery, which usually involves intensive care unit after surgery (cardiac, neurosurgery, etc) was excluded.

Patient demographics, ASA physical status, preoperative comorbidities, type and duration of anesthesia and surgery, length of hospital and ICU stay, intraoperative adverse events, transfusion, perioperative laboratory results, mortality, social history and APACHE score were recorded.

In order to identify significant independent predictors of unplanned admission to ICU, univariate and multivariate logistic regression analyses were used. For the univariate analysis, patient demographics, ASA physical status, preoperative comorbidities, type and duration of anesthesia and surgery, whether important intraoperative events occurred, transfusion and perioperative laboratory results were evaluated by chi-square or Fisher's exact test

Results and Discussion: The incidence of unplanned admission to ICU was 68.3% (97/142). In unplanned admission group, hospital (39.2 days) and ICU (4.8 days) stay were longer than planned admission group (33.6 and 3.3 days, respectively). Mortality was 10.3% (unplanned) and 6.7% (planned), respectively. Most common cause of admission to ICU in both group was an uncontrolled hypotension. Univariate analysis showed the unplanned admission to ICU was significantly associated with age, BMI, type of surgery, pre/postoperative hemoglobin, and duration of anesthesia/surgery, preoperative cardiac disease and history of alcohol use. Preoperative hemoglobin (OR 0.83), history of alcohol use (OR 3.22) were significant independent risk factors of the unplanned admission to ICU postoperatively.

**Conclusion:** Unplanned admission to ICU showed relatively higher mortality and prolonged hospital stay. Clinicians should be more interested in control the perioperative risk factors that affect unplanned ICU admissions.

#### 09AP03-9

## Mortality and physical status at hospital discharge in elderly critically ill patients

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Background and Goal of Study: Because there is ongoing population aging, the age of patients admitted to the intensive care unit (ICU) is also higher. However, the evidence about outcomes in elderly patients is insufficient. We hypothesized that in-hospital mortality and physical function at hospital discharge in elderly patients might be worse compared with younger individuals. Therefore, we conducted a single center retrospective study.

Materials and Methods: The study participants were consecutive patients who were admitted to our ICU and received mechanical ventilation for more than 24 hours. We divided the patients into two groups, according to age. Patients in group A were 74 years old or younger, and those in group B were 75 years old or older. The major outcome was in-hospital mortality, and secondary outcomes were the proportion of patients who were discharged home and good physical status at hospital discharge. We defined good physical status as walking and poor physical status as sitting and bed rest. We assessed each of these parameters using the non-paired t test, Mann-Whitney U test and chi-square test. P-values less than 0.05 were considered statistically significant. Data were reported as median [interquartile range] or percentage.

Results and Discussion: Two hundred and twenty patients met the inclusion criteria. There were 118 patients in group A and 102 patients in group B. The median age in both groups were 65 [55, 69] and 80 [77, 84] years (p < 0.0001). The length of ICU and hospital stay were not significantly different between the groups (5 [4, 9] vs. 7 [4, 10] days, p = 0.09; 36 [23, 55] vs. 39 [24, 58] days, p = 0.24, respectively). The overall hospital mortality in both groups were similar (19 vs. 25 %, p = 0.23). The proportion of patients who were discharged home and had good physical status at hospital discharge in group A were significantly higher than that in group B (72 vs. 37 %, p < 0.0001; 91 vs. 74 %, p = 0.004, respectively).

**Conclusion:** Although in-hospital mortality was similar between inpatients aged 75 years or older and those younger than 75 years, the elderly population were associated with a two-fold increase in the risk of discharged not to the home compared with others.

#### 09AP03-10

## The relationship of hemodynamic parameters and clinical outcome in critically ill patients

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Background and Goal of Study: Cardiac index (CI) and mean arterial pressure (MAP) are two key determinants of circulation, influencing global and regional blood flow. However, it is not clear if we should use either CI or MAP or both as the goal for hemodynamic optimization in ICU patients. The aim of our study was to assess the effects of hypotension, low CI and their combination on metabolic state and clinical outcome in critically ill patients.

Materials and Methods: We performed a retrospective analysis of five prospective multiple-stage studies with parallel registration of invasive MAP, thermodilution CI, and 28-day survival. We estimated an incidence of low MAP (< 65 mmHg), low CI (< 2.5 L/min/m<sup>2</sup>) and distribution of four hemodynamic pairs (low MAP-low CI: MAP-CI,; low MAP–normal or high CI: MAP, –CI, normal or high MAP–low CI: MAP, CI, normal or high MAP-normal or high CI: MAP<sub>NH</sub>CI<sub>NH</sub>) depending on clinical outcome. In addition, we assessed plasma lactate concentration and incidence of lactic acidosis in the hemodynamic groups. Data are presented as median (25th-75th percentile) or percentage. We analyzed data using Kruskal-Wallis test followed by Mann-Whitney *U*-test or using chi-square test. For all tests p < 0.05 was significant Results and Discussion: Totally, we received 730 pairs of data from 106 patients with sepsis and acute respiratory distress syndrome. Low MAP was found in 15% of any stage in non-survivors and in 6% of any stages in survivors (p<0.01). Low CI was revealed in 14% of any stages in non-survivors and in 5% of any stages in survivors (p<0.01). Despite these similar results, the incidence of non-optimal hemodynamics (MAP-CI pairs with low MAP or low CI or both) was 10% in survivors and 25% in non-survivors (p<0.01). Moreover, lactate level and incidence of lactic acidosis were 10 (8-13) mmol/L and 86% in MAP,-CI, subset, 3 (2-8) mmol/L and 52% in MAP CI subset, 3 (2–7) mmol/L and 43% in MAP CI subset and 2 (1–3) mmol/L and 27% in MAP SH-CI subset and 2 (1–3) mmol/L and 27% in MAP SH-CI subset ( $\rho$ <0.01 for MAP CI SH  $\nu$ S. all other

**Conclusions**: The combination of mean arterial pressure > 65 mmHg and cardiac index > 2.5 L/min/m² in critically ill patients provides optimal metabolic state and better clinical outcome. Prolonged cumulative unstable hemodynamics (hypotension or low cardiac index or both) is associated with worse clinical outcome.

#### 09AP04-1

### Importance of purine metabolites in preeclampsia and acute cerebral stroke

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Background and Goal of Study: Along with the classic triad edema, proteinuria, hypertension, more than a quarter century, many clinicians as an indicator of preeclampsia using the high content of uric acid in blood serum hyperuricemia. It was also found that the hypoxanthine, xanthine and uric acid (UA) are present in the brain, and their content is changed after ischemia, UA is the end product of purine degradation in the brain, xanthine oxidase is also present in the brain, it catalyzes the oxidation of hypoxanthine to xanthine, and then in UA and can be a source of free radicals, inhibition of xanthine oxidase and exogenous administration of UA accompanied by explicit antiischemic and neuroprotective effects in the experiment and clinic, while the endogenous increased its production, with the "side" synthesis of xanthine oxidase oxygen free radicals, reflects the severity of ischemic and reperfusion injury. We also know that most fatal path pathogenesis (and tanatogenesis) in preeclampsia the development of cerebral stroke. Our attention was attracted by a comparative assessment of the features of purine metabolism in women with preeclampsia and acute cerebral stroke.

Materials and Methods: The study involved 33 patients with preeclampsia and 350 patients in the acute period of cerebral stroke, in which, in addition to conventional laboratory parameters were determined in the blood and cerebrospinal fluid of guanine, hypoxanthine, adenine, xanthine and uric acid direct spectrophotometry. Results and Discussion: It was established that between preeclampsia and cerebral stroke, there are clinical and pathobiochemical parallels, including according to the characteristics of purine metabolism. Hyperuricemia the most famous and at the same time the most pronounced adverse metabolic factor (marker, predictor) for preeclampsia, and for cerebral stroke. High value content oxypurines (hypoxanthine, xanthine and uric acid) in the cerebrospinal fluid a good sign for a stroke, and low for preeclampsia.

**Conclusion**: Liquor can be seen not only as a medium of administration of drugs for spinal anesthesia, but also and a source of valuable diagnostic (and predictive) information, including in preeclampsia. The level of uric acid and other purine both patients with preeclampsia, and cerebral stroke, it is desirable to investigate not only in serum but when possible, and in cerebrospinal fluid.

#### 09AP04-2

## Stroke patterns of postmortem purines in blood and cerebrospinal fluid

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Background and Goal of Study: Diagnostic and prognostic value of the intravital parameters of purine metabolism in acute cerebral pathology, including stroke, is studied in detail. Meanwhile, a study of postmortem biochemical processes may provide additional scientific information on the diagnostic value of the parameters of purine metabolism in neurointensive care. We investigated the postmortem parameters purine metabolism in stroke.

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Materials and Methods: In 50 adult ICU stroke patients, in the first 2 hours after the fact of biological death, the samples of cerebrospinal fluid (CSF) and venous blood on the were performed spectrophotometric determination of the concentration of adenine, guanine, hypoxanthine, xanthine, uric acid,malondialdehyde as a marker of free radical oxidation.

Results and Discussion: Postmortem CSF levels of uric acid and malondialdehyde significantly higher in male patients than in female; uric acid in CSF significantly lower in the presence of intravital arterial hypertension, heart failure, pneumonia. Pneumonia is also associated with a higher postmortem blood concentration of malondialdehyde, and multiple organ failure with a higher concentration of uric acid and malondialdehyde in CSF. The ratio of the CSF concentrations of uric acid / xanthine higher in ischemic, than in hemorrhagic stroke. The ratio of the concentrations of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine was significantly lower in the presence of pneumonia in patients with stroke.

**Conclusion:** Oxypurines significantly associated not only with gender, arterial hypertension or stroke type, but also such lifethreatening conditions as pneumonia, heart and multiple organ failure. Possibly, the mandatory inclusion of purines in the vital panel of monitored biochemical parameters will improve the results of neurointensive care

#### 09AP04-3

### Dexmedetomidine preserves the endothelial glycocalyx and improves survival in a rat heatstroke model

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Background and Goal of Study: Dexmedetomidine has been reported to exhibit an anti-inflammatory effect and improve survival in a rat sepsis model. Furthermore, the endothelial glycocalyx, which is an important component of the endothelial surface layer, is known to be disrupted in severe sepsis. However, there has been little investigation concerning the effect of dexmedetomidine on the endothelial glycocalyx in heatstroke. We examined whether dexmedetomidine improved survival and preserved the endothelial glycocalyx in a rat heatstroke model.

Materials and Methods: Anesthetized rats were randomly assigned into three groups. The DEX group (n=9) was treated with dexmedetomidine (infusion at 5 µg/ kg/h) and continuous 0.9% saline infusion (10 ml/kg/h) during the heat exposure The NSS group (n=9) was administered 0.9% saline during the heat exposure. The SHAM group (n=9) was administered 0.9% saline alone, without heat exposure. The same 0.9% saline infusion rate was used for all groups. Heatstroke was induced by exposure to an ambient temperature of 40°C in a temperature-controlled chambe with relative humidity of 60%. During heat exposure, systolic blood pressure, heart rate and rectal temperature were recorded. The survival rate was assessed up to 2 hours after the start of heat exposure. In another experiment, plasma levels of interleukin-6 (IL-6) and syndecan-1, a marker of endothelial glycocalyx damage. were measured when the systolic blood pressure became less than 80 mmHg after the onset of heat exposure. For the statistical analyses, the Kaplan-Meier method and the Logrank test were used for the survival rate and the t-test and the one-way ANOVA and Tukey-Kramer methods were used for the other measures. P-values <0.05 were regarded as significant.

Results and Discussion: The highest rectal temperature was 43.1±0.7°C in the DEX group and 42.5±1.0°C in the NSS group; there was no significant difference. The survival, 2 hours after heat exposure was significantly improved in the DEX group compared to the NSS group (89%, 22% and 100% for the DEX, NSS, SHAM groups, respectively). Blood levels of IL-6 and syndecan-1 were significantly lower in the DEX group compared with the NSS group. Dexmedetomidine might exhibit an anti-inflammatory effect and preserve the endothelial glycocalyx.

**Conclusions:** Dexmedetomidine improved survival and exhibited an inhibitory effect on the inflammatory response and shedding of the endothelial glycocalyx during heat stroke.

#### 09AP04-4

## Lung injury does not aggravate early cerebral inflammation or apoptosis in an animal model

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Background and Goal of Study: The acute respiratory distress syndrome is not only associated with a high mortality, but also goes along with cognitive impairment in survivors. The cause for this cognitive impairment is still not clear. One possible mechanism could be cerebral inflammation as result of a "lung-brain-crosstalk". Even mechanical ventilation itself can induce cerebral inflammation. We hypothesized, that an acute lung injury aggravates the cerebral inflammation induced by mechanical ventilation itself and leads to neuronal damage.

Materials and Methods: After approval of the institutional and state animal care committee 20 pigs were randomized to one of three groups: lung injury by central venous injection of oleic acid (n=8), lung injury by bronchoalveolar lavage (n=8) or control (n=6). Brain tissue of 4 native animals from a different study served as native group. After 6 hours the animals were killed and the brains were harvested for histological (number of neurons and microglia) and molecularbiologic (TNFalpha, IL-18, and IL-6) examinations.

**Results and Discussion**: There was no difference in the number of neurons or microglia cells between the groups. TNFalpha was significantly higher in all groups compared to native (p < 0,05), IL-6 was only increased in the lavage group compared to native (p < 0,05), IL-1ß showed no difference between the groups. **Conclusion**: With our data we can confirm earlier results, that mechanical ventilation itself seems to trigger cerebral inflammation. This is not aggravated by acute lung injury, at least not within the first 6 hours after onset. Nevertheless, it seems too early to dismiss the idea of lung-injury induced cerebral inflammation, as 6 hours might be just not enough time to see any profound effect.

#### 09AP04-5

## Postoperative cerebral tissue oxygen desaturation is associated with the development of postoperative delirium after cardiac surgery

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Background and Goal of Study: Near-infrared spectroscopy (NIRS) provides non-invasive bedside information on frontal brain oxygenation by measuring cerebral oxygen saturation (SctO $_2$ ) at the microvascular level. It has been shown that cerebral desaturation events occur as frequently in the early postoperative period as during cardiac surgery itself. Therefore, we investigated whether lower postoperative SctO $_2$  is associated with the development of postoperative delirium after cardiac surgery.

Materials and Methods: Between 2015 and 2017, patients (age≥70 years) undergoing on-pump cardiac surgery were included. Baseline SctO₂ was measured one day before cardiac surgery (FORE-SIGHT ELITE™, CAS Medical systems, Branford, CT, USA). Following ICU admission, SctO₂ was monitored continuously for maximally 72 hours and SctO₂ values were blinded for treating physicians. Left and right SctO₂ were averaged and used for data analysis. Presence of POD was assessed using the CAM-ICU. Lowest SctO₂, absolute and relative decrease in SctO₂ as well as the number of desaturations below 80% of baseline were calculated and compared between patients with and without POD. Additionally, mean SctO₂ was calculated per hour followed by a linear mixed model analysis to analyse mean SctO₂ over time in patients with and without POD.

Results and Discussion: Ninety-six out of 103 included patients were used for data analysis and 29 (30%) developed POD. Lowest postoperative SctO<sub>2</sub> was 55±6% in patients with POD and 58±4% in patients without POD (p-0.001). Absolute and relative SctO<sub>2</sub> decrease were lower in patients with POD (13±6% and 19±9%, respectively), as compared to patients without POD (9±4% and 14±5%; p=0.002 and p=0.001, respectively). Sixteen (55%) patients with POD experienced a desaturation below 80% of baseline compared to 20 (30%) patients without POD (p=0.023). Mean SctO<sub>2</sub> was lower over the first 24hrs on the ICU in patients with POD (67% 95%Cl:66-68%) as compared to those without POD (69% (95%Cl:68-69)); p=0.002)

**Conclusion:** This study demonstrated that lower postoperative SctO<sub>2</sub>, as measured by NIRS technology, is associated with the development of POD after cardiac surgery. Future studies are warranted to assess the added value of measuring postoperative SctO<sub>2</sub> to prevent POD.

#### 09AP04-6

## Horner syndrome secondary to a traumatic internal carotid artery dissection

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**Background**: Just a 4% of the internal carotid artery dissections (ICAD) have a traumatic origin <sup>1</sup>. These patients present a wide spectrum of symptoms, highlighting the ipsilateral Horner syndrome <sup>2</sup>.

Case Report: Our patient is a 26-year-old male who suffers a high energy traffic accident. He is transferred with an ambulance to the intensive care unit of the reference hospital.

Upon arrival it is stable from an hemodynamic and respiratory point of view. Neurologically it is conscious but disoriented in time and space, it presents anisocoric and reactive pupils. He reports loss of visual acuity and diplopia. He is diagnosed with a left paralysis of the sixth cranial nerve and left miosis, which worsens with light, reversing the anisocoria with the Lopimax test. It is oriented as a left Horner syndrome.

Magnetic resonance angiography shows images of "intimal flap" with flow on both sides of the left internal carotid artery, at C1 level, compatible with carotid dissection. Given the small size, it doesn't require intravascular stent placement. Blood thinning treatment is started. The patient is discharged after the resolution of his symptoms. Discussion: The ICAD should be considered in young people with symptoms of cerebral ischemia, especially if they have suffered a traumatism. The therapeutic plan (medical vs endovascular) must be individualized according to the location, the clinic and the presence of pseudoaneurysms 3.

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Learning points: Its great clinical variability together with its serious complications make it an easily underdiagnosed and potentially lethal pathology It is necessary to establish a protocol for early diagnosis to avoid these complications and minimize long-term morbidity and mortality.

#### 09AP04-7

#### Generalized tonic-clonic seizure related to naproxensodium overdose: a case report

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**Background**: Naproxen sodium is a propionic acid derivative analgesic drug. The most common side effects of this drug are gastrointestinal effects; but after overdose headache, convulsions, coma, nausea, vomiting, gastrointestinal bleeding, excitation, acute renal failure and liver damage may occur (1).

Case Report: 24 years old female patient with no past medical history was brought to our hospital with acute ingestion of 100 tablets of naproxen sodium 550 mg and having generalized tonic-clonic seizure. At hospitalization patient's pupillary light reflex are positive bilaterally, isochoric, under 100% oxygen spO2 79%, she had poor general condition, no painful stimulus. Mechanical ventilation support started with SIMV mode. Metabolic acidosis was detected in arterial blood gas.Infusion of midazolam for sedation and cristalloid infusion started. Infusion of noradrenaline started because of hypotension.1200 mg of N-acetyl cysteine was administered as infusion. Elevation of cardiac enzymes, liver function tests and pancreatic enzymes and prolongation of bleeding time were determined. Infusion of HCO3 10 mEq/hr was initiated for urine alkalisation. When the patient's urine output was more than 400 cc/h, desmopressin was administered. Patient was extubated due to the improvement of respiratory criteria, metabolic acidosis, hypoxia and hypercapnia.

**Discussion**: Naproxen sodium has a half-life of about 15 hours after oral intake. After oral administration over 30 g, toxic dose effects begin to appear (2). In our case, the patient had received 55 grams of naproxen sodium. However, we thought that the patient benefited from gastric lavage with activated charcoal. In our case, the patient had a tonic-clonic seizure after overdose. Non-steroidal anti-inflammatory drug overdose has also been reported in cases of liver damage and pancreatitis that may require transplantation(3).

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**Learning points:** Naproxen sodium massive overdoses can cause seizures, metabolic acidosis, hypotensive episodes, liver failure, pancreatitis and renal insufficiency.

#### 09AP04-8

## Subarachnoid hemorrhage: brain heart lung interaction: about 43 patients

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Background and Goal of Study: Subarachnoid hemorrhage is a neurovascular emergency mainly affecting the young subject, aneurysm rupture in 2% to 5%, but post traumatic most often. There may be a predisposing genetic terrain. Representing about 5% of strokes, the mortality-dependence associated with this pathology is of the order of 25%, cardiovascular and pulmonary complications have been reported in association with the occurrence of HSA. Mainly related to activation of the sympathetic system. The purpose of the study is to define the rate of cardiopulmonary complications that occurred in our department on meningeal hemorrhage.

Materials and Methods: It is a descriptive retrospective study of 329 patients admitted to our department who have meningeal hemorrhage over a period of one year 2016. Data collected from patients' files.

Results and Discussion: 329 patients admitted for meningeal hemorrhage, 32% on aneurysm rupture, 02 patients with diabetes and chronic renal failure on polykystic kidney stage of dialysis, 16.1% post-traumatic brain injury, 6.9% postoperative intracranial surgery, 3% on arteriovenous malformation and 1.16% on brain tumor. Among 329, 43 patients had cardiopulmonary repercussions such as acute pulmonary edema in 53.3% and cardiac arrhythmias 12.5%, alterations in myocardial function with systolic and diastolic left heart failure in echocardiography in 36.7%, the troponorin level was strongly in 50% of the cases, the use of mechanical ventilation in 11.01%, catecholamines such as dobutamine in 39.89% of the cases with limitation of the vascular filling with control of the HIC and monitoring of the PIC, a regression of the table was noted in a few days,09 patients died. As a result, in front of a cardiopulmonary distress table following hyperstimulation adrenergic and neurological inflammatory phenomena, the neurological, respiratory and haemodynamic resuscitation has priority.

**Conclusion**: Neurogenic cardiopulmonary complications appear to be a classically described but still unrecognized and under-diagnosed entity because the prevention and detection of non-neurological complications of cerebral aggression often remains secondary. Mortality is high but more related to neurological pathology than to pulmonary edema and cardiac dysfunction themselves. However, there are severe forms requiring early and adapted treatment and good knowledge of the pathophysiology of the causal mechanism.

#### 09AP04-9

# The use of quantitative EEG to study neurotransmitter mechanisms of consciousness recovery in patients with severe traumatic brain injury

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Background and Goal of Study: One of the promising directions of correction of the postischemic cerebral homeostasis is the use of drugs aimed at interrupting fast reactions of glutamate-calcium cascade: amantadine, non-competing antagonist of dopamine and NMDA receptors, and N-carbamoyl-methyl-4-phenyl-2-pyrrolidone (phenylpiracetam) with polymodal effect on a wide range of synaptic systems. Goal of Study: to study the neurotransmitter mechanisms of consciousness recovery in patients with severe traumatic brain injury (TBI)

Materials and Methods: Materials and Methods: The study was conducted in 2010-2015 in the Donetsk regional clinical territorial medical Association on the basis intensive care units of neurosurgery. 1st comparison group consisted of 30 patients treated according to standard Protocol (SP). 2nd study group consisted of 30 patients, who received, in addition to SP, the drug amantadine, which was used in the first days after injury, the infusion solution at a dose of 400 mg per day by slow intravenous drip for 7 days. 3rd study group consisted of 32 patients which were receiving, in addition to SP, the drug phenylpiracetam through a probe once a day at a dose of 100-300 mg. The groups were comparable in level of consciousness (6-8 points by Glasgow coma scale), by sex and age.

Results and Discussion: We used computer digital EEG machine NIHON KOHDEN EEG-1200. We studied the neurophysiological changes in averaged spectral analysis of the EEG at 8 derivations, in particular spectral power with the frequency below 1 Hz (the activity of neuroglial population), with a frequency of 6-7,5 Hz (cholinergic system) with a frequency of 4-5 Hz (adrenergic system), with a frequency of 11-12 Hz (dopamine system), with a frequency of 24-25 Hz (beta 2) (serotonin system). All the data obtained were processed using mathematical statistical methods, using correlation analysis.

**Conclusion**: In response to the application of amantadine and phenylpiracetam we recorded EEG changes (decrease of  $\delta$ -, the growth of  $\alpha$ - and  $\beta$ 1- and  $\beta$ 2- rhythms) reflected the decline in activity of glutamatergic neurotransmitter system, which is one of the mechanisms of consciousness recovery in severe TBI.

#### 09AP04-10

## Posterior reversibile encelophathy syndrome (PRES) after vaginal delivery

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**Background**: Posterior reversible encephalopathy syndrome (PRES) is an usually reversible neuro-radiological clinical syndrom characterized by headache, confusion, visual disturbances or blindness and seizures. Preeclampsia and eclampsia may be the most common causes of PRES. Vasculopathy and reduced brain perfusion are main pathophysiological mechanisms and commonly identified by computed tomography (CT) or magnetic resonance (MR) [11].

Case Report: A 34 year old primipara, was presented in the labour ward at 38 weeks of gestation after a healthy pregnancy. The delivery was without complications. Three hours postpartum she was complaining of headache and nausea after she developed an episode of generalised tonic-clonic seizure. She was admitted to the ICU. On admission she was confused, pupils were reactive slower to light stimulation, she was hypertensive with mild tachycardia and normal SpO2. She was treated with diazepam, magnesium sulphate, manitol and antihypertensive therapy. CT of the brain revealed parieto-occipital white matter changes, with vasogenic edema, suggestive of PRES. After definitive diagnosis has been made levetriacetam therapy initiated as the drug of choice. After two days the patient completely recovered. MR of the brain showed PRES lesions in regression. On the third day postpartum she was transferred to the obstetrical department.

**Discussion:** It is uncertain whether a cause and effect relationship exists between eclampsia and PRES or if these represent independent processes with some element of clinical overlap. [2] More than 70% of patients with PRES are hypertensive, though a significant proportion have normal or only mildly raised blood pressure. So attention should be drawn to blood pressure changes before and after delivery even if it is slightly elevated.

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**Learning points**: PRES develops in patients with complex systemic conditions such as eclampsia. PRES mostly resolves spontaneously and patients show both clinical and radiological improvements after proper diagnostic and treatment.

#### 09AP04-11

# Pathogenesis of delayed cerebral ischemia in aneurysmal subanachroid haemorrhage - a multimodality monitoring study

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Background and Goal of Study: The aneurysmal subarachnoid haemorrhage (aSAH) is a devastating form of a stroke. One of the most common complication after aSAH is the delayed cerebral ischemia (DCI), defined as focal or global neurological deterioration, cerebral infarction or both. The cerebral vasospasm has been suggested for a long time as the main reason of DCI, however the contribution of vessel narrowing in DCI remains unclear [1]. In order to study the pathogenesis behind DCI and determine the factors, which lead to cerebral ischemia, we used a multimodal continuous monitoring of multiple variables.

Materials and Methods: A total of 40 patients with a mean age of 57±15 years with diagnosed moderate aSAH (H–H grade 3±1) were prospectively enrolled in the study. Continuous recording of the arterial blood pressure (ABP), intracranial pressure (ICP), end–tidialCO2 (EtCO2), regional cerebral oxygenation (rSO2), cardiac output (CO), stroke volume variation (SVV) and cerebral blood flow velocity (CBFV) were performed using computer–based system Intensive Care Monitor (ICM+), Cambridge Enterprise. Cerebral autoregulation was assessed applying the pressure reactivity index (PRx), the tissue oxygenation index (TOx) and the mean velocity index (Mx).

Results and Discussion: In analysed group of patients after aSAH 30% have DCI and 42% of them have also a vasospasm, which occurs in 5±2 day after onset. 75% of patients with DCI has cognitive or functional disorders. The systemic cardiovascular disorders (significant reduction in CO and ABP) during acute phase have been observed. The CO and SVV were stabilized due to apply a monitored therapy. The PRx on 3th day was significantly higher than on 6th day after onset (0.128 vs. -0.054, p=0.047).

Conclusion: The monitored–guided agents therapy, combines with a multimodality monitoring of cerebral autoregulation, autonomic nervous system and cardiovascular system, allows to personalised treatment and better outcome in aSAH patients.

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#### 09AP04-12

#### Challenges in the assessment of post-extubation neurological status in an Intensive Care Unit (ICU): case report of a major burn patient

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**Background**: The recovery of neurological status following a major burn is slow and variable. Usually changes are transient and due to the injuries and medication to which the patient was exposed. Due to the difficulty in defining the diagnostic criteria, the non-convulsive status epilepticus (NCSE) is an entity difficult to identify, determine prevalence and outcome.

Case Report: Male, 15 years old, 60% of the total body surface burned. In the emergency room intubation was required due to respiratory difficulty. The patient was tachycardic, without other hemodynamic changes, ECG 15. Urinary output Occ/2h. Medical history: 33weeks premature, respiratory distress syndrome requiring hospitalization at 1 month of age for sepsis, possible cognitive deficit. In the burn ICU, he remained sedated and ventilated; noradrenaline was needed for tension stabilization. At the 2nd post-burn day, he developed acute renal injury with anuria in the context of hypovolemic shock and severe metabolic acidosis-renal substitution was initiated and maintained until the 19th day. Surgical interventions and antibiotics were necessary. He was extubated at the 45th day, presenting apathetic and not very cooperative, which was attributed to residual sedation and difficulty in accepting the current state of health. On the 7th day after extubation, psychiatry prescribed fluoxetine. At the 8th day, developed a generalized tonicclonic convulsion lasting a few seconds that reverted spontaneously, without desaturation or hemodynamic changes. EEG-focal non-convulsive disease clinical manifestations are subtle: decreased responsiveness and apathetic facial expression. Starts levetiracetam. From that day, he had no further episodes and showed great improvement of the neurological status. He was discharged from the burn ICU after 100days of hospitalization, neurological status similar to his usual. Discussion: Assessment of the neurological status of a patient after 45 days of sedation, who was in shock with multiorgan dysfunction and with a history of possible cognitive deficit is a challenge. This case report draws our attention to the existence of NCSE and to the high level of suspicion needed for diagnosis. References:

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Learning points: In patients with risk factors, we should be watchful, once early treatment seems important for recovery, to prevent long-term sequelae.

#### 09AP05-1

# The relationship between postoperative haemodynamic variables and the development of postoperative delirium after cardiac surgery

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Background and Goal of Study: One of the most commonly observed neurophysiological complication after cardiac surgery is postoperative delirium (POD). This study assessed the association between baseline demographics, parameters indicative for postoperative end-organ, including cerebral, hypoperfusion and POD development.

Materials and Methods: This prospective, observational study enrolled adult (age≥70 years) patients undergoing on-pump cardiac surgery. POD was determined using CAM-ICU. Mean arterial pressure (MAP) was measured continuously with a 2sec interval and was averaged every 5min. Linear mixed model analysis was performed to analyse averaged MAP data over 24 hours between patients with and without POD. Univariate logistic regression was performed to investigate the association between POD development and age, preoperative Mini-Mental State Examination (MMSE), Euroscore II, postoperative noradrenaline dose (μg/kg), lowest postoperative haemoglobin, postoperative blood transfusion and blood loss. Significant parameters in the univariate (p<0.1) entered backward multiple logistic regression analysis.

**Results and Discussion**: Ninety-six out of 103 included patients were used for data analysis and 29 (30%) of them developed POD. Univariate logistic regression showed an association between POD and age (OR:1.17 95%CI:1.05-1.30; p=0.003), Euroscore II (OR:1.23 95%CI:1.02-1.48; p=0.028), preoperative MMSE (OR:0.73 95%CI:0.61-0.89; p=0.001), lowest postoperative haemoglobin (OR:0.54 95%CI:0.367-0.802; p=0.002), postoperative blood transfusion (OR:1.000 95%CI:1.000-1.001; p=0.017) and postoperative blood loss (OR:1.001

95%CI:1.000-1.001; p=0.032). No association was observed between POD development and postoperative noradrenaline dose (OR:1.003 95%CI:1.00-1.01; p=0.099). Independent predictors for POD were age (OR:1.18 95%CI:1.04-1.35; p=0.001) and lowest postoperative haemoglobin (OR:0.46 95%CI:0.30-0.72; p=0.001). Mean MAP was lower over the first 24hrs on the ICU in patients developing POD (73.71mmHg 95%CI:72.56-74.87) as compared to those without POD (75.79mmHg (95%CI:75.06-76.52); p=0.003).

Conclusion(s): This study showed that POD following cardiac surgery is independently associated with increased age and lower postoperative haemoglobin. Moreover, patients developing POD had lower MAP during the first 24hrs after ICU admission.

#### 09AP05-2

Correlation between bispectral index and electromyographic activity in post-cardiac arrest patients: exploring the role of neuromuscular blockers

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Background and Goal of Study: In all previous studies, exploring the prognostic role of bispectral index (BIS) after out-of-hospital cardiac arrest (OHCA), neuromuscular blockers (NMB) were administered continuously in all patients to minimize electromyographic (EMG) activity interference. Our study cohort, however, was treated according to current guidelines, limiting NMB use to only patients experiencing shivering. This enabled us to determine the correlation between EMG activity and BIS in post-cardiac arrest patients.

Materials and Methods: Seventy-seven successfully resuscitated OHCA patients were enrolled. Targeted temperature management (TTM) at 33°C was started after ICU admission for 24 hour followed by a rewarming phase over the next 12 hours. Simultaneously, bilateral BIS monitoring was started at admission using the BIS VISTA™ device (Aspect Medical Systems, Inc. Norwood, USA). Mean BIS and EMG values were calculated per hour from initiation of TTM onwards. Afterwards, regression curves were fitted (including the calculation of the Pearson correlation coefficient) between mean EMG and BIS values below and above 30. A similar analysis was performed for patients treated without NMB.

**Results and Discussion**: In the entire study cohort, no relationship was found between EMG and BIS<30 (Y = 28.19 + 0.027X; R²=0.003; p=0.217) while a relationship was observed between EMG and BIS>30 (Y =  $28.4 - 0.198X + 0.006X^2$ ; R²=0.636; p<0.001). Neuromuscular blockers were administered in 44 (57%) patients, either in bolus or continuous. In those patients who did not received any NMB, we observed no (linear) correlation between EMG and BIS<30 (Y = 30.164 + 0.007X; R²<0.001; p=0.86) while the correlation between EMG and BIS>30 was still present (Y= $28.4 - 0.174X + 0.006X^2$ ; R²=0.555; p<0.001).

Conclusion: This analysis showed no relationship between mean EMG and BIS<30 in the entire study cohort, implying that EMG interference below this threshold is rather negligible. Interestingly, this correlation remained absent even in patients who were not treated with NMB. As such, BIS values below 30 might be usable to assist with poor outcome prognostication in OHCA patients, without the need for continuous administration of NMB.

#### 09AP05-4

Polymyxin B hemoperfusion in acute aortic thrombosis secondary to salmonellosis: a case report

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**Background**: We present the case of a complete infrarenal abdominal aorta thrombosis secondary to an infectious aneurysm due to sepsis by Samonella of group D with symptoms of acute lower limb ischemia and paraplegia, with a favorable evolution after hemoperfusion with polymyxin B (PMX-B), once it was intervened urgently.

Case Report: A 57-year-old male with COPD, debuted with a paresthesia in the lower limbs that leads to paraplegia 48 hours in the context of gastroenteritis and fever related to egg ingestion, before his admission to the emergency department (ED). In the ED, our patient had dehydration signs, pallor and pulselessness in lower limbs. An urgent CT scan reveals an aneurysm and complete thrombosis of the infrarenal abdominal aorta, which is why he was immediatly transferred to the operating room where axillo-bifemoral bypass is performed. He developed a reperfusion syndrome, multiorganic dysfunction and a septic shock that required vasoactive support and hemodiafiltration, including two cycles of B polymyxin in addition to intravenous ceftriaxone when isolating on the 2nd day of samonella from group D in the blood cultures. The treatment led to a clinical improvement of the patient with recovery and he was discharged in a rehabilitation program.

**Discussion**: The aortic occlusion syndrome is a rare entity with high morbidity and mortality. Infectious origin aneurysm are among its causes, and represent less than 2%. The clinical manifestations are variable and are characterized by symptoms of acute arterial ischemia in the lower limbs, as well as symptomatic neurological deficit, acute abdomen or renal failure. The location and proximity of the thrombus within the aorta determines the clinic. Salmonella spp sepsisoccasionally produces aneurysms in addition to states of systemic hypercoagulability, which facilitates vasculature thrombosis formation. Early diagnosis is indispensable and the TC is technique of choice. Urgent intervention is obligatory through endovascular techniques or bypass surgery. PMX-B hemofiltration in addition to standard treatment in cases of severe septic shock, seems to decrease mortality.

Learning points: Acute aortic thrombosis of infectious origin is a rare entity with a high morbimortality that requires early diagnosis and treatment. The formation of thrombi and aneurysm could be associated with Salmonellosis. B polymyxin hemofiltration could contribute to improve survival in gram negative bacteria sepsis shock.

#### 09AP05-5

### Risk factors related with fistula after pancreatic surgery in our intesive care unit

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**Background and Goal of Study**: Postoperative pancreatic fistula (POPF) is the main cause of mobidity and mortality after pancreaticoduodenectomy surgery, and its incidence range varies from 5 to 35%. The purpose of this study was to determine the association between intraoperative fluid volume administration, lactatemia, hypotension and hypoxemia during the first 48 hours and POPF.

Materials and Methods: We conducted a retrospective analysis of 53 patients after pancreaticoduodenectomy surgery performed at the Hospital Universitario Central de Asturias (Spain) from January 2016 till December 2017. The primary outcome was the development of pancreatic fistula. Secondary outcomes were death 100 days after surgery, severe hemorrhage, pancreatitis and wound infection. The investigated variables were: intraoperative fluid volume administration (ml/kg), maximum lactate level (mmol/l), hypoxemia (PaO2/FiO2 <300) and hypotension (mean tension <65 mmHg) during the first 48 hours after surgery. Descriptive statistics were performed and testing for statistical significance by using Chi-square test for categorical variables, student t test and non parametric test for continuous variables.

Results and Discussion: The overall results were: 19 (35.9%) patients developed POPF, 4 (7.6%) deaths, 2 (3.8%) severe hemorrhage, 8 (15.1%) pancreatitis and 10 (18.9%) wound infection. The mean of maximum lactate level was 1.74 mmol/l (Cl 95%, 1.42-2.05) in patients without POPF and 1.86 mmol/l (Cl 95%, 1.45-2.27) (p=0.53) with POPF. The mean intraoperative fluid volume was 58.07 ml/kg (Cl95%, 50.31-65.83) in patients without POPF, and 62.85 ml/kg (Cl95%, 55.99-69.7) with POPF (p=0.20). 8 (42.1%) out of 19 patients with POPF suffered hypoxemia, meanwhile 5 (14,7%) out of 34 patients without POPF (p=0,03). 8 (42.1%) out of 19 patients with POPF suffered hypoxemia, meanwhile 11(29.7%) out of 37 patients without POPF (p=0.15).

Conclusion: We have not found significant differences in patients with or without POPF attending to lactate level, intraoperative fluid volume and hypotension. The only remarkable finding is hypoxemia which could predict further complications related with fistula

#### 09AP05-6

## Euglycemic diabetic ketoacidosis in a Patient who had total hysterectomy

Tan A.1, Ng V.1, Nagarajan S.2, Case Report

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**Background**: Euglycemic Diabetic Ketoacidosis (EuDKA) can occur, especially in type 1 Diabetics and Diabetic parturients, and often has a delay in recognition and management resulting in increased adverse outcomes in these groups of patients (1).

Case Report: We report a case of EuDKA, precipitated by intra-abdominal sepsis and poor oral intake with omission of insulin in a patient with type 2 Diabetes mellitus, who had a Total Abdominal Hysterectomy 3 days previously. She was successfully treated with hydration, intravenous insulin infusion and antibiotics appropriate for the sepsis before being discharged home uneventfully.

Discussion: The diagnosis of EuDKA is not usually suspected in the absence of hyperglycaemia, defined as serum glucose concentration more than 13.9 mmol/L (250mg/dL), but needs to be urgently managed as an emergency. EuDKA may occur post-operatively if basal insulin is omitted when there is normoglycaemia despite poor oral intake. This absence of hyperglycaemia may mask the diagnosis and delay the management leading to significant morbidity (2). Currently there is a paucity of reports of EuDKA in the post-operative period. Our report hopes to bring up awareness of this clinical condition to expedite management and prevent mobidity.

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2. Mcnulty SJ, English P. Euglycemic diabetic ketoacidosis (letter). Pract Diab Int 2002: 19:63

**Learning points**: Euglycemia DKA may occur in the post-operative period with poor oral intake and relative lack of insulin.

Absence of hyperglycemia may mask and delay the recognition and subsequent

Absence of hyperglycemia may mask and delay the recognition and subsequent management of Diabetic ketoacidosis, which is an acute life-threatening complication

Patients with type 2 Diabetes Mellitus who require high doses of insulin are relatively insulin deficient, and would require their baseline insulin to be resumed immediately in the post-operative setting to avoid ketogenesis.

#### 09AP05-7

## Incidence of chronic pain and quality of life three months after ICU discharge

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Background and Goal of Study: Post-Intensive Care Syndrome (PICS) is defined as the deterioration of recent onset or worsening of a previous deterioration in the mental, physical or cognitive state. Occurs as a consequence of a critical illness, and which persists after acute hospital care. Our aim is to determine the incidence

of chronic pain 3 months after ICU discharge and the impact on quality of life.

Materials and Methods: After getting approval from the ethical committee of Hospital Clínic, a prospective observational study was conducted since March of 2017. Exclusion criteria included neurological and psychiatric pathology and history of substance abuse. Patients with written informed consent were evaluated: Verbal Analogue Scale (VAS), existence of neuropathic pain (DN4 Scale), presence of previous chronic pain, incidence of Anxiety and Depression (HAD test), EuroQol-5D test to assess quality of life, Duke test to register social support, Pfeiffer test to assess cognitive impairment, and Post-traumatic Stress Disorder (PTSD) test. 3 months after ICU discharge, patients were invited to attend a follow-up clinic visit for revaluation. We used descriptive statistics and McNemar test for qualitative variables.

Results and Discussion: Preliminary results until December 2017 are presented A total of 122 patients were screening for eligibility, 75 agreed to participate and 48 were invited to the three-month reevaluation with response rate of 67.8% (33 patients). 61(19-87) year-old, 70,8% males, APACHE II score 12(3-32), ICU length stay 5(3-38). VAS at ICU stay was 7(IQR 0-10) and 3 months after discharge was 2 (IQR 0-9, Wilcoxon test p < 0.001). Results showed an increased in chronic pain incidence although differences were not statistically significant (25% in front 30% after 3 months, p 0.549), taking into consideration almost half of patients have not been yet reevaluated. Differences in neuropathic pain before and after ICU stay were statistically significant (20.8% in front 39%, p= 0.013). No differences were found in social support and cognitive impairment. Furthermore, 45%, 33% and 18% reported anxiety, depression and PTSD respectively 3 months after ICU discharge. Conclusion: Data suggests that patients who required ICU stay present more incidence of neuropathic pain after 3 months. Anxiety, depression and PTSD have been reported so these patients are susceptible to develop PICS. Identification of PICS is fundamental for defining an early treatment strategy.

## 09AP05-9 I remember...ICU. An observational study

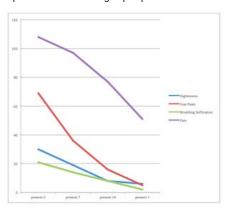
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Background and Goal of Study: Memory of events in the Intensive Care Unit (ICU) may increase the incidence of posttraumatic stress disorder, anxiety and depression related to ICU stay. Our aim was to study the memory in patients admitted to the ICU over 3 months after their discharge, to chart its change over time and to determine the patient and ICU factors associated with the various domains of memory.

Materials and Methods: This is a part of a larger prospective cohort study in a 500 bedded teaching institute to study post-traumatic stress disorders (PTSD), anxiety and depression in Indian ICU survivors. Face to face interviews in the hospital, direct home visits by a qualified clinical psychologist and telephonic interviews were employed in 124 cases. The questionnaires included- Hosp anxiety disorder Scale (HADS), Impact of Event Scale (IES-r), and ICU Memory tool. Statistical calculation was done with SPSS software; the factors affecting any memory domain significantly at univariate analysis were entered into a logistic regression equation. Results and Discussion: The memory of pain and discomfort was most predominant. There was a steady decline (varying with domain) in the prevalence of these memories over time Fig 1. Significant factors affecting memory were use of benzodiazepines, steroids, mechanical ventilation, age, Charlson's comorbidity index, APACHE II score, education, employment status and presence of delirium

in ICU. On multivariate analysis, APACHE II, education, younger age, employment status and comorbidity (Table 1).

Conclusion: Memories are frequent during and after ICU stay. Education, employment status, comorbidity and severity of illness are associated with more memories of fear and panic and nightmares. Psychologic support and advice may be planned for select subgroup of patients.



ICU Follow up	Domain	Factors affecting the Memory	P value
In ICU	Fear panic	Apache II ( Higher)	0.05
7 days post ICU discharge	Nightmare Pain	Education> 5 <sup>th</sup> grade Being Employed	0.03
14 days post ICU discharge	Fear panic	Age (younger) Apache II	0.00 0.04
1 month post ICU discharge	Fear Panic	Apache II	0.04
3 month post ICU discharge	Fear Panic	CCI ( Higher)	0.03

#### 09AP05-10

Functional ultrasounds as a guide in the diagnose of shock in a 33-year-old woman suffering an abortion, is it volume the answer? A case report

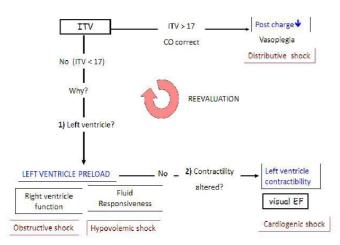
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Background and Goal of Study: Functional ultrasound (FU) has taken prominence in the last years as a non invasive tool to treat and monitor patients in shock once the information is integrated in an algorithm which integrates echo measurements in order to obtain the hemodynamic shock pattern i.e. (cardiogenic, hypovolemic...). Materials and Methods: We present a 33 y.o. woman, pregnant of 15 weeks who was admitted at the ED with hypotension and tachycardia after intense vaginal bleeding. Her blood pressure was 60/30mmHg and the heart rate 120 per minute, capillary refill longer than 2 seconds. At first, we orientated the case as an hypovolemic shock secondary to abortion, starting the initial resuscitation with intense fluidotherapy. No hemodynamic response was found, persisting hypothense and tachycardic, being norepinephrine started to maintain blood pressure. Labs showed hemoglobin of 11.7mg/dl, with acute kidney failure and coagulopathy, no leucothytose at that moment with CPR of 9mg/dL. The vaginal ultrasound showed embryonic remains that had to be removed at the operating room

After the intervention, she was admitted at the intensive care unit, under perfusion of norepinephrine. There was performed a FU that let us estimate a cardiac output of 4 L/min. E/A ratio of 1.56 and an inferior vena cava that didn't collapse with breathe. After integrating this information in our mind map we arrived at the conclusion that the patient had a distributive shock with a certain component of myocardial disfunction secondary to a septic abortion. Treatment was antibiotics, vasoactive drugs and volume restriction, being discharge from the ICU after 4 days. Results and Discussion: FU lets us classify the shock after analyzing the different variables of perfusion. It detects those relevant alterations in the shock and it quides us in the treatment once we have integrated the information in a mind map in order to obtain the hemodynamic shock pattern.

#### MIND MAP TO OBTAIN THE **HEMODYNAMIC PATTERN**



Conclusion: Volume overload could have been avoided if we had had the ultrasound at the ED, optimizing the perfusion from the beginning with vasoactive

#### 09AP05-11

#### Persistent post-ICU pain: a systematic review

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Background and Goal of Study: When pain ceases serving any protective function, and lasts more than 3 months it is defined as persistent. As much as 71% of the patients treated in intensive care units (ICU) report experiencing pain during ICU stay and both surgical and medical patients have similar amounts of pain. Many ICU patients develop persistent pain after discharge. Persistent pain has notable adverse impact in both personal and societal level. It lowers the quality of life and causes large societal costs by burdening the healthcare system and lowering the economical productivity. As the results of individual studies vary we decided to review the literature systemically in terms of persistent pain after intensive care.

Materials and Methods: A large-scale search of several relevant databases was conducted to find appropriate studies. The eligibility criteria for the studies were: focus on adult (≥18 years) ICU patients, focus on persistent pain (≥2 months), study design RCT or observational study and the article reported in English. The screening of the studies was conducted independently by each reviewer. Quality of the included studies was assessed using the GRADE system and the final report will be presented in accordance with the PRISMA statement recommendations. The systematic review is registered in PROSPERO database (register numbe CRD42016041489)

Results and Discussion: The literature search provided 16,683 publications and after removal of duplicates 8.888 of studies remained. After screening of the titles and abstracts 77 of articles were examined in detail 10 articles meeting the inclusion criteria were included in the review. The overall quality of the evidence was weak because of the observational design of the studies.

The incidence of persistent post-ICU pain was 20-68,2% at 6 months after discharge. Some of the identified risk factors were increased age, pain during ICU stay, length of hospital stay and ventilation hours but results concerning risk factors were partially contradictory.

Conclusion(s): The results indicate that persistent pain after ICU stay is a common problem but still more study is needed to determine the risk factors. The heterogeneity of the results prompts for emphasis on study design for providing more consistent information on incidence and risk factors to ease the planning of high quality prospective studies on selective areas of persistent post intensive care

09AP05-12

#### Epidural analgesia contribution in the manegement of severe acute pancreatitis

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Background and Goal of Study: The aim of our study was to compare epidural analgesia with bupivacaine to morphine subcutaneously in the management of severe acute pancreatitis (SAP).

Materials and Methods: Prospective study conducted between March 2012 and October 2015. We included 84 patients admitted for PAG. We excluded all patients who presented hemodynamic instability or altered mental status. We randomize the patients into 2 groups: group A, patients received epidural thoracic analgesia with 6ml of isobaric bupiyacaine 0.125% per hour and group B, a morphine analgesia subcutaneously at the dose of 5 mg every 6 hours. We compared the two groups during the first 5 days, the level of analgesia using a visual analog scale (VAS) every 3 hours, temperature and blood glucose finger (GAD) every 4 hours and ileus daily, white blood cells rate (BC), CRP and creatinine every day and does the chest radiograph every day and the 10th day scannographic score. Furthermore we noted the complications (infection and multiple organ failure), length of hospital stay and mortality

Results and Discussion: We included 84 patients divided into 2 equal groups. The average age is 62.23 years, body mass index is 27.4 and the sex ratio was 1.9. The mean VAS is 24,7mm in group A and 31.8 mm in group B with p = 0.024. The average temperature is 37.7  $^{\circ}$  C in group A versus 38.1  $^{\circ}$  C in B with p = 0.039 and that of glucose is 1.31 in group A versus B in 1.44 with p = 0.025. The average duration of ileus is 50.4 hours, while it is 68.9 hours in Group B with p = 0.012. No significant difference between the 2 groups in mean WBC and creatinine while the average CRP is 66,4mg in Group A against B in 88,9mg with p = 0.011. 17 patients had pleural effusion of average abundance in Group B against only 6 in group A (p = 0.021). we noted a scannographic improvement in 33 patients (77%) against 25 patients (60%) in group B with p = 0.039. The hospital stay is 17,4jours in group A versus 21.6 days in group B with p = .028. No difference between the 2 groups with respect to mortality.

Conclusion: Epidural analgesia, through its analgesic and anti-inflammatory, could improve the management of SAP

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#### 09AP06-1

#### Continuous renal replacement therapy in the treatment of septic patients in our Intensive Care Unit

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Background and Goal of Study: Main objective: describe the population of septic patients who developed acute kidney injury (AKI) in our post-anaesthetic ICU and the type of treatment they received (medical versus continuous renal replacement therapy (CRRT)).

Secondary objective: describe the population of septic patients without AKI in which CRRT was used as adsorptive therapy.

Materials and Methods: Retrospective observational study of 2298 patients admitted to the post-anaesthetic ICU during two years (2014-15). The computer system of the Extremadura Health Service (JARA) was used. The keywords for the selection of patients were: septic shock, sepsis, AKI and CRRT. Clinical records containing one or more of these keywords in their diagnosis were selected

The data are expressed in mean, standard deviation and range for qualitative variables, and number of cases and percentage for qualitative variables Results and Discussion: The data are showed in Figure 1 and 2.

Men 2014 22 17 62.8 (28 32.8 (1-120) URO n=4 GINE n=1 CGD n = 65.9 (34-86) 2015 24.2 (1-65) Exitus n= Most of septic patients did not receive CRRT (62% in 2014 and 72% in 2015. respectively). 85.3% of septic patients who developed AKI were resolved with medical treatment, which coincides with the literature description. The remaining

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14.7% (10 cases in our study) required CRRT.

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CRRT is used in critical care units primarily to replace kidney function. New indications are appearing for septic patients, such as adsorption therapy for the elimination of inflammatory mediators and endotoxins. In our series, the most frequent indication to initiate CRRT in septic patients was an adjuvant therapy (19.1% vs 14.7%), possibly due to our Unit's protocol. The development of protocols has been seen to facilitate decision-making.

Conclusion: The incidence of AKI in our septic patients coincides with what is described in the literature. The most frequent indication for initiating CRRT in septic patients was as adsorption therapy. However, more studies are needed to validate

#### 09AP06-2

#### A Successful Multidisciplinary Intensive Care Approach of **Anaerobic Septic Shock caused by Descending Necrotising** Mediastinitis

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Background: Descending Necrotising Mediastinitis (DNM) is an acute, lifethreatening disease caused by infections originating in the head and neck area. Antibiotherapy and surgical debridement of the affected tissue are the cornerstones of treatment [1]

Case presentation: We admitted a 38-year old male to our ICU with clinical manifestations of severe sepsis. His condition had worsened in the previous two weeks following an unsuccessful antibiotic therapy for lacunar angina, complicated by retropharyngeal abscesses. CT and intraoperative observations identified abscesses in the anterior and middle mediastinum region and the distal part of the neck, directly on the border with the left lobe of the thyroid gland. We confirmed Streptococcus alfa haemolyticus and Clostridium species positive cultures. PCT 20.5 μg/L, CRP 325.3 mg/L, WBC 19.8\*103 cells/μL, Lactate 6,3 mmol/L, SVR < 500 dynes/sec/cm5 and the SAPS II score of 63 pointed to a case of severe sepsis with a poor prognosis.

The treatment consisted of an aggressive antibiotic regimen, transthoracic and mediastinal surgical evacuation of the abscess, vacuum sealing drainage with a pleural chest tube, continuous venovenous hemodiafiltration using cytokineadsorbing hemofilters and intermittent Ozone therapy.

We discharged the patient after 39 days with only mild dysphonia; he was fully recovered at day 92

Discussion: DNM is a rapidly progressing life-threatening disease. Mediastinal infection can induce lethal septicaemia if not diagnosed and managed appropriately. Each case requires a personalised treatment modality [2]

In agreement with the European Association for Cardio-Thoracic Surgery recommendations [1], we initiated an aggressive antibiotic treatment. We succeeded with a targeted mediastinal surgical debridement of necrotic tissue, pleural and pericardial drainage and support of the vital organs. As adjuvant therapy, we applied CVVHDF-CAH and Ozone therapy [3].

Our approach successfully treated the DNM-induced anaerobic septicemia and allowed a full recovery

#### References:

1 Abu-Omar Y. et al., Eur J Cardiothorac Surg 2017. 2 Palma DM et al., Infection 2016. 3 Delgado-Roche L Eur. J. Pharmacology 2017.

Learning points: Effective management of DNM-induced anaerobic septic shock requires a multidisciplinary therapy based on the timely administration of antibiotics, skilled surgical intervention and the use of adjuvant treatment modalities to support renal, pulmonary and hemodynamic functioning.

#### Initial clinical results and prognostic variables in the implementation of a Sepsis Code in a University Hospital of high complexity level

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Background and Goal of Study: To known the impact i in the first months of the application of a sepsis code in a hospital of high complexity, analyzing the epidemiological and clinical characteristics, as well as the prognostic factors, of the patients with activation of a sepsis alert.

Materials and Methods: During 2014, measures were implemented for the application of the Sepsis Princesa Code (CSP) in 2015. A prospective observational study was conducted during a consecutive period of 7 months (February 2015-September 2015) in a university hospital of the third level. The association between risk factors, severity factors and analytical values with mortality was carried out by univariate and multivariate analysis.

Results and Discussion: A total of 237 patients with severe sepsis were included.

The average age was 72 years and 60% were male. 34% of the patients had some hospital admission in the 3 months prior to the episode of sepsis and 31% received antibiotherapy in those 3 previous months. 37% of the cultures were positive, detecting 11% of multi-resistant germs.

Hospital mortality at 30 days was 24% and at 60 days, 27%, with the mortality rate of those admitted to the ICU of 30%.

A statistically significant association was found between the administration of more than 2 antibiotics and mortality (p <0.05).

Significant differences were found between the patients who died and the survivors in the mean values of creatinine (2.30 vs 1.46 mg / dL), lactic (6.10 vs 2.62 mmol / L) and procalcitonin (23.27 vs 12.73 mg / dL)

A statistically significant linear trend was detected between the SOFA scale score and mortality (p <0.05). Patients with a shock index  $\geq$ 0.8 and a lactic  $\geq$ 3 mmol / L had a 2.5 times higher risk of dying, and in patients with a lactic  $\geq$ 3 mmol / L and a procalcitonin  $\geq$ 2 mg / dL the risk was 8 times higher.

In the multivariate analysis on mortality in CSP patients, independent risk factors were identified: age, lactic acid, creatinine and the need for amines.

**Conclusion**: The epidemiological, clinical and mortality characteristics of the patients in our series after the implementation of the CSP are similar to those published nationally and internationally. Opportunities for improvement have been detected. Indexes and associations of markers have been detected with utility at the local level for risk stratification in patients with sepsis alert.

Acknowledgements: La Princesa Sepsis Team

#### 09AP06-4

# Postoperative shock due to abdominal compartment syndrome after massive retroperitoneal bleeding post-renal transplantation and anticoagulation

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**Background**: End-stage renal disease (ESRD) and anticoagulation are risk factors for spontaneous bleeding (SB). Retroperitoneal bleeding (RB) is a rare but described manifestation of SB¹. Sometimes the differential diagnosis of ACS postoperatively may not be easy, like in this case.

Case Report: A 69 year-old man with atrial fibrillation, mechanical mitral valve prosthesis, and ESRD underwent renal transplantation. Subcutaneous anticoagulation treatment with LMW heparin was restarted on day 3. Two days later, he became anaemic and an angiography showed a RB from two lumbar arteries that were successfully embolized. Due to hemodynamic instability he was transferred to the ICU and transfused. After transfusion, haemoglobin and coagulation values were normal but one thrombopathy (maybe uremic) was observed. Nevertheless, he required an increasing IV epinephrine perfusion with the presence of severe shock markers. A cardiogenic cause was discarded by echocardiography. After 12 hours he suffered a cardiorespiratory arrest in electromechanical dissociation reverting after 15 minutes resuscitation manoeuvres. A massive retroperitoneal hematoma displacing abdominal organs was removed through emergency laparotomy, improving clinical status and lab values. Finally, one abdominal compartment syndrome (ACS) was responsible for the shock's cause.

**Discussion:** While ACS is easily related to abdominal disorders, triggering shock and organ failure, retroperitoneal pathologies may also be the origin. However, only a few cases associated ACS to a RB². In this case, the lack of active bleeding forced to conservative treatment. If an ACS had been suspected, early surgery could have avoided the cardiorespiratory arrest.

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**Learning points**: RB is a rare condition and an exceptional trigger for ACS. ACS is associated with shock and organ failure and must be taken into consideration also when dealing with retroperitoneal abnormalities.

#### 09AP06-5

## Assesing empiric antibiotherapy in complicated community-acquired intraabdominal infection

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Background and Goal of Study: Appropiate and early empiric antibiotic therapy for complicated intra-abdominal infection is essential for patient prognosis. Community-acquired intra-abdominal infection (CA-IAI) usually envolves sensitive pathogens but incidence of multi-drug resistant bacteria is increasing. The goal of the study is to assess suitability of empiric antibiotherapy for CA-IAI in our institution.

Materials and Methods: A retrospective clinical review was conducted in our institution from Jan 2016 to Sept 2017. We included patients with CA-IAI and

positive intraoperative cultures. We review bacteriology and susceptibility to the main agents used for CA-IAI. Common regimes as empiric antibiotherapy for CA-IAI in our institution includes beta-lactam (3rd generation cephalosporin) + metronidazole or beta-lactamase inhibitor combination (amoxicillin-clavulanic acid or piperacillin-tazobactam). We, carefully, consider extended-sprectrum beta-lactamase-producing Enterobacteriaceae, ampicilin-resistant Enterococcus sp, Ps. aeruginosa, and Candida sp. as the main pathogens resistant to empiric coverage in our institution.

Results and Discussion: 137 patients with CA-IAI and positive intraoperative culture were identified. Gram negative bacteria (GNB) remain the major pathogens in CA-IAI (80%), gram positive bacteria are involved in 48% CA-IAI cases, anaerobes 18% and fungii 7%. Extended-spectrum beta-lactamase producing Enterobacteriaceae was involved in 15% of CA-IAI, ampicilin-resistant Enterococcus sp 4%. Ps. aeruqinosa 9% and Candida sp 7%.

**Conclusion:** Extended-spectrum beta-lactamase *Enterobacteriaceae* increasing incidence in community-acquired intra-abdominal infections represents a major problem for the future. In severe complicated intra-abdominal infection with non optimum surgical source control carbapenem should be considered for empiric antibiotherapy despite community-acquired origen.

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#### 09AP06-7

Clinical audit: Adherence to empiric antibiotic local protocol in peritonitis in a surgical ICU. Are we improving?

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**Objectives:** Adequate and early empiric antibiotic treatment and surgical source control improves the prognosis of patients with peritonitis. The aim of this second audit is to review the fulfilment of the Local Intraabdominal Infection protocol approved in 2013 by the Infection and Antibiotic Policy Commission and to compare the results with a previous audit (2015)1.

Materials and Methods: We selected patients with peritonitis admitted at our surgical ICU (January 2015 to December 2016). Following data were collected: age, sex, isolated microorganism in cultures and antibiogram, temperature, hypotension, vasoactive treatment, tachycardia, tachypnea, leukocytosis or leukopenia, mechanical ventilation, renal substitutive treatment, lactate >2mmol/L, high risk factors for worse clinical outcomes, empiric antibiotic treatment and who initiated it. We compared the empiric treatment administered with the local protocol recommendation and the present adherence to protocol with the previous audit.

Results: 43 patients with peritonitis admitted for more than 24 hours were included. The empiric antibiotic treatment was initiated by Anaesthesia in 29 patients (67.4%), 5 by General Surgery (11.6%), 8 by the Emergency Unit (18.6%) and in one case by Internal Medicine (2.3%), while in the previous audit the empiric antibiotic was started by Anaesthesia in most cases (83.3%). The antibiotic protocol was followed in 20 patients (46.5%), comparing to the previous study which the fulfilment was 52% (p<0,01). Much more samples for microbial culture were obtained during surgery from 34 patients (79%), compared to the previous 39.5% (p>0,01).

**Conclusions:** We achieved to double the percentage of intraoperative samples. This allows the later correct adjustment of the antibiotic treatment. Emergency and Surgery Units are much more involved and the first dose of antibiotic is given earlier. Actions to improve the fulfilment of the intraabdominal infection protocol must be taken in order to improve the adherence to local guideline. Finally, our protocol should be reviewed to adjust it to the new SOFA criteria2.

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#### 09AP06-9

Dexmedetomidine plays a protective role against leukocyte mediated lipid peroxidation and apoptosis in lung tissues of septic rats

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Background and Goal of study: Sepsis is one of the leading causes of death in the intensive care units (ICU). Dexmedetomidine have potential for the management of pain, agitation and delirium in the ICU. This study is designed to differentiate the impact of two different dosage of dexmedetomidine on lung injury induced by sepsis. We aimed to show whether the effects of dexmedetomidine on lung injury was related to systemic ICAM release, lipid peroxidation and apoptosis of lung tissue.

**Materials and Methods:** Forty-two rats randomly divided into four groups: sham (n=6), control (n=12), 5 DEX (n=12), and 10 DEX (n=12). Cecal ligation puncture (CLP) was applied to for sepsis initiation. 5 DEX group received 5  $\mu$ g/kg/hr dexmedetomidine and 10 DEX group received 10  $\mu$ g/kg/hr dexmedetomidine. The concentration of dexmedetomidine was adjusted to be infused as 5 ml/kg/hr saline for each rat. Rats in control group received 5 ml/kg/hr saline only.6 hours after CLP, 3 rats of sham group and 6 rats of control, 5 DEX, and 10 DEX groups blood samples were withdrawn for the measurements of tumor necrosis factor-α (TNF-α), interleukin-1β (IL-1β) and intercellular cell adhesion molecule (ICAM-1) analysis. 24 hours after CLP lung samples from the remaining rats were collected for the measurement of myeloperoxidase (MPO), histologic examination, and tunnel staining for apoptosis detection.

Results and Discussion: Serum cytokine release, lung MPO activity and apoptosis in lung significantly increased in CLP group compared to sham and study groups. TNF- $\alpha$ , ICAM, and MPO were significantly lower in the 10 DEX group compared to both 5 DEX and control groups while IL-  $1\beta$ , total injury score, and apoptotic cell count had significantly lower values in both 10 DEX and 5 DEX groups compared to control group. The main cause of deaths in the intensive care units is sepsis and sepsis induced lung injury. Septic patients with lung injury require mechanical ventilation and sedation. Dexmedetomidine has been shown to be a good alternative for sedation in intensive care units, which also has immunomodulation effects.

**Conclusions:** Dexmedetomidine administration played a protective role against CLP induced lung injury evidenced by decrease in ICAM, MPO and apoptotic cell count. Increasing the dosage of dexmedetomidine effectively reduced systemic inflammation detected by serum cytokine and ICAM 1 levels.

#### 09AP06-10

Reference values of neutrophil-lymphocyte ratio, lymphocyte-monocyte ratio, platelet-lymphocyte ratio, and mean platelet volume in healthy adults in South Korea

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Background and Goal of Study: There is a growing interest in research aimed at better understanding the disease status or predicting the prognosis of patients with simple blood tests associated with systemic inflammation. The Neutrophil-Lymphocyte Ratio (NLR), Lymphocyte-Monocyte Ratio (LMR), Platelet-Lymphocyte Ratio (PLR), and Mean Platelet Volume (MPV) can be used as factors to determine the prognosis of patients in various clinical situations. However, reference values for these attributes based on large, healthy populations have yet to be determined. Materials and Methods: From January 2014 to December 2016, data from routine blood analyses were collected from healthy patients in the checkup center of a tertiary hospital in Seoul, South Korea. Retrospective data review was then performed on an electronic medical record system. Data were treated anonymously as only age, gender, BMI, medical history including cancer diagnosis, medications, and smoking status were considered.

Results and Discussion: After the initial screen, we had a collection of 12,160 samples from patients without any medical history, including cancer treatment. This patient pool consisted of 6,268 (51.5%, median age 47 years) and 5,892 (48.5%, median age 46 years) male and female patients, respectively. The mean NLR across all ages was 1.65 (0.79), and the values for men and women were 1.63 (0.76) and 1.66 (0.82), respectively. The mean LMR, PLR, and MPV were 5.31 (1.68), 132.40 (43.68), and 10.02 (0.79), respectively (Table 1).

**Conclusion:** This study provides preliminary reference data on LMR, PLR, and MPV from different age and gender groups in South Korea. The results suggest that different cutoff values should be applied to the various patient populations.

Variables		NLR	LMR	PLR	MPV
Sex	Male	1.63 (0.76)	5.05 (1.56)	122.73 (38.66)	9.97 (0.80)
	Female	1.66 (0.82)	5.60 (1.77)	142.76 (46.29)	10.07 (0.78)
Age	≤50	1.69 (0.79)	5.23 (1.62)	135.75(44.80)	10.03 (0.79)
	>50	1.57 (0.77)	5.47 (1.78)	126.40 (40.92)	10.00 (0.78)

Table 1. NLR, LMR, PLR, MPV according to demographic and clinical characteristics (n=12160)

#### 09AP06-11

Intensive Care Medicine

Comparison of Three Way Valve and Flowart Ven Valves with Sepsis Score of SOFA Score in Intensive Care Patients

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Background and Goal of Study: The aim of this study was to compare the rates of infection in Flowart venous valves and 3-way valves in intensive care patients.

Materials and Methods: Sixty-four patients were enrolled in the intensive care unit. Patients were divided according to the use of three-way valves and Flowart vein valves. SOFA scores and duration of ICU stay were recorded from the patients'

Results: 64 patients were included in the study. The SOFA score of Flowart Vein valve users was significantly lower than the SOFA score of those using three-way valves. (p <0.05). There was no statistical difference in the length of intensive care

unit stay. (P>0.05) **Conclusion**: In this retrospective study, SOFA scores of vein valves were significantly lower. According to these results, the use of Flowart vein valves statistically reduced the incidence of sepsis.

#### 09AP07-1

A network meta-analysis of anticoagulant treatment for sepsis- or infection-induced disseminated intravascular coagulation

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Background and Goal of Study: It is unclear whether anticoagulant treatment is necessary for sepsis- or infection-induced disseminated intravascular coagulation (DIC). Therefore, we performed a network meta-analysis to evaluate the effects of various anticoagulant treatments and placebo treatment for patients with sepsis- or infection-induced DIC.

Materials and Methods: All studies from four recent systematic reviews were included. In addition, we searched the PubMed, MEDLINE, and Cochrane databases for other studies that investigated anticoagulant treatment for sepsis- or infection-induced DIC using antithrombin III, thrombomodulin, heparin, or protease inhibitors. The primary outcome was mortality, and the secondary outcomes were the rate of DIC resolution and the risk of bleeding complications. The network meta-analysis was performed within a Bayesian framework using JAGS software, R software, and the rjags and gemtc packages. Furthermore, a Bayesian framework meta-analysis provided a rank probability for each anticoagulant treatments and placebo and outcome.

Results and Discussion: The network meta-analysis included 1,340 patients from 9 studies. There were no significant differences in the risks of mortality and bleeding complications among all direct comparisons and the network meta-analysis. Placebo treatment was associated with a significantly lower rate of DIC resolution, compared to antithrombin treatment in the direct comparison (odds ratio [OR]: 0.20, 95% credible interval [95% Crl]: 0.046–0.81) and in the network meta-analysis (OR: 0.20, 95% Crl: 0.043–0.84). The rank probabilities suggested that heparin had a 46.0% probability of being the worst treatment for reducing in-hospital mortality and a 95.2% probability of being the worst treatment for reducing the risk of bleeding complications.

**Conclusion**: The present study revealed no significant difference in the risks of mortality and bleeding complications for all comparisons of the four anticoagulant treatments and the placebo treatment. However, antithrombin treatment might be superior to placebo treatment in resolving sepsis- or infection-induced DIC. Nevertheless, only 9 randomized controlled trials were eligible for the present study, which indicates that further studies are needed to validate our findings.

#### 09AP07-2

# Treatment with SV40 nanoparticles dramatically improves survival in a sepsis model through multiple signaling pathways

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Background and Goal of Study: Reconstituted recombinant empty SV40 capsids (virus like particles – VLPs) were shown to significantly ameliorate acute kidney injury in a toxic mouse model induced by either mercury or cisplatin (1). The effect was mediated by prevention of apoptosis and necrosis in kidney tubular cells, partly through upregulation of HSP70 and induction of AKT1. The present study was designed to assess the efficacy of VLP treatment in sepsis.

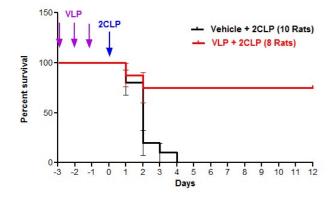
Materials and Methods: Sprague Dawley male rats weighing 200±10g were randomly divided into 4 groups: I. vehicle only (VO), II. VLPs, III. 2CLP+VO and IV.2CLP+VLPs. Vehicle (saline) or VLPs were injected to all the rats through the tail vein on three consecutive days. On the fourth day rats of groups III and IV underwent 2CLP. Survival, weight gain, blood tests and lung and liver histology were evaluated. RNAseq studies were performed on lung RNA harvested 6 hrs post the 2CLP.

Results and Discussion: All of the 2CLP+VO rats expired, while 6 of 8 2CLP+VLPs rats survived (fig 1). These rats recovered as seen by weight gain and other clinical parameters. The RNAseq studies indicated that 2CLP+VLP affected expression of over 1000 unique genes not affected by 2CLP alone. These genes take part in multiple pathways that play roles in a number of biological functions including enhanced pathogen killing, cellular homeostasis and pathways of tissue regeneration. On the other hand, treatment with VLPs alone (group II) had negligible effect on gene activity. When considering translation to clinical practice, we anticipate that the need for prophylactic treatment will be overcome. As SV40 was found to be non-pathogenic in humans (2), VLPs, which contain no genetic material, will most likely be safe. SV40 does not induce immune response suggesting feasibility of repeated administrations (3).

Conclusion: This study demonstrates the potential of VLPs for clinical treatment of sepsis via multi-targeted action, at a number of pathophysiological junctions.

References:

- 1.Butin-Israeli, V. PloS one 2008.
- 2.https://osp.od.nih.gov/biotechnology/nih-guidelines/
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#### 09AP07-3

### The effects of IgM-enriched immunoglobulin preparations in patients with sepsis

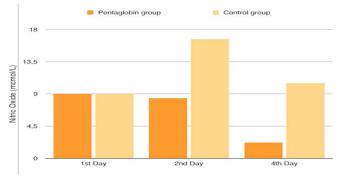
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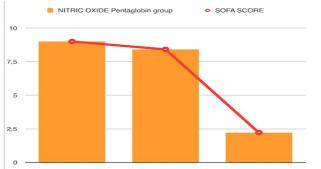
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**Background and Goal of Study**: Nitric Oxide (NO) regulates endothelial equilibrium; we evaluated the effect of IgM-enriched immunoglobulin treatment on NO levels in patients with sepsis.

Materials and Methods: A retrospective, observational study on 22 patients with sepsis was performed. 15 patients received an intravenous immunoglobulin preparation (Pentaglobin®) in addition to standard therapy; their NO levels were compared to those of 7 patients, who received standard therapy only. Therapeutic decisions where independent from the study investigation. Pentaglobin® therapy started on the day of diagnosis of sepsis; 5 ml/kg per day Pentaglobin® was infused for 3 consecutive days. Blood samples for NO measurements were taken daily for 4 days. Severity of critical illness and development of organ failure were assessed by sequential organ failure assessment (SOFA) score.

**Results and Discussion**: In pentaglobin group, serum NO levels decreased (p< 0,05) on day 1 and 3 after administration of Pentaglobin (FIG 1). The SOFA SCORE followed the same trend (FIG 2).





**Conclusion:** Present data could suggest beneficial effects of polyclonal immunoglobulin preparation Pentaglobin® on endothelium in patients with sepsis. However, further prospective study concerning the relationship between Pentaglobin and serum NO levels are needed.

#### 09AP07-4

Microbiology and best empiric antimicrobial therapy in organ/space surgical site infection after elective colorectal surgery

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Background and Goal of Study: Organ/space surgical site infections (osSSI) as anastomotic leaks and intraabdominal abscess are an important cause of morbility after elective colorectal surgery. A prompt empiric antimicrobial therapy must be started in order to improve prognosis. A continuous knowledge of local flora is important to establish an adequate therapeutic strategy. An empiric antibiotic treatment which covers more than 90% of local pathogens is recommended. The goal of the study is to determine the microbiology of organ/space SSI after elective colorectal surgery and to assess the best empiric antimicrobial therapy. Materials and Methods: We retrospectively analyzed the incidence of osSSI after elective colorectal surgery in a tertiary hospital (January 2014/December 2016). Most important variables analyzed were: type of pathogens isolated (Gramnegative bacilli, extended-spectrum β-lactamases-producing Enterobacteriaceae, *Ps.aeruginosa*, Gram-positive coccus, ampicillin-resistant *E. faecium*, methicillin-resistant *S. aureus* and fungi) and susceptibility to most common empiric antimicrobial therapies used in our institution:

- Amoxycillin/clavulanic acid (AC)
- Piperacillin/Tazobactam (PTZ)
- Imipenem (I)
- Meropenem + Linezolid (ML)
- Meropenem + Linezolid + Fluconazole (MLF)

Results and Discussion: 49 patients with osSSI were included. 39 patients had positive cultures. All cultures were polymicrobial. Isolated pathogens were: 74% Gram-negative bacilli, 54% Gram-positive coccus, 46% ampicillin-resistant *E. faecium*, 23% fungi, 13% *Ps.aeruginosa*, 10% extended-spectrum β-lactamases-producing Enterobacteriaceae and 5% methicillin-resistant *S. aureus*. Adequate treatment would be achieved in 92% of patients with MLF combination, 80.5% with ML, 33% with I or PTZ and just 23% with AC.

Conclusion: Most common isolated pathogens in osSSI after colorectal surgery were Gram-negative bacilli and Gram-positive coccus. These results are consistent with previous studies. High prevalence of ampicillin-resistant *E. faecium* and fungi found in our population are consistent with nosocomial origin of osSSI, and makes empiric treatment with MLF the most adequate. Based in our results, a wide spectrum empiric covering fungi and ampicillin-resistant *E. faecium* should

#### 09AP07-5

Multimodal approach of the patient operated on for peritoneal carcinomatosis by cytoreductive surgery and hyperthermic intraperitoneal chemotherapy. Is it possible to improve survival?

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Background and Goal of Study: Peritoneal carcinomatosis leads to a high mortality. Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC) has improved the prognosis of these patients, however it is a major surgery with multiple complications. Our objective is to evaluate the survival of patients operated in our center.

Materials and Methods: Retrospective observational study carried out in Clínica Universidad de Navarra. We performed a descriptive analysis of a total of 36 patients undergoing cytoreduction surgery with intraperitoneal hypertensive chemotherapy from October 2012 to May 2017.

Results and Discussion: 36 patients were analyzed; 61% 58 years old males. Colon cancer was the first cause of surgery (58.3%). Surgical time average was 529 min (SD 125). Table 1 shows the transfusion data and the main postoperative complications

Intraoperative transfusion	3 (8.3%)
Postoperative transfusion <3 BP	6 (16.7%)
Postoperative transfusion 3 – 6 BP	6 (16.7%)
Postoperative transfusion >6 BP	8 (22.2%)
NIMV	13 (36.1%)
ARDS	15(13.9%)
AKI	17 (47.2%)
VAS >6	6 (16.7%)
sopressor drugs postoperative requirment	6 (16.7%)

Table 2 shows SAPS 3 and SOFA predictive scales and the survival data

SAPS 3	39.5 (9.0 %)
SAPS 3 hospital death probability (%)	8.4 (7.1%)
SOFA	1.25 (1.7%)
1 month after surgery survival	33 (91.7%)
3 months after surgery survival	33 (91.7%)
12 months after surgery survival	28 (77.8%)

The main complications associated with CRS with HIPEC are mainly related to lung damage associated with volume overload, hemodynamic alterations and multifactorial renal damage.

**Conclusion:** The approach to CRS with HIPEC should be multimodal, with postoperative management in the respiratory and critical care units.

#### 09AP07-7

Vas

## Microbiological characteristics of nosocomial pneumonia in surgical patients: one size doesn't fit all

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Background and Goal of Study: Postoperative pneumonia (POP) is associated with an increase on morbi-mortality and length of hospital stay. Multicentre studies suggest that multi-drug resistant pathogens (MDR) could be present in respiratory samples in POP early after hospital admission (48h) even in patients without risk factors. This fact could imply a change on the antibiotic empiric strategy in order to improve outcomes. The aim of the study is to assess microbiological features of POP in a surgical intensive care unit (SICU) and determine if risk factors for MDR germs (RFMDR) are still able to predict their isolation.

Materials and Methods: We retrospectively analysed data from POP diagnosed

during the admission in the SICU (January/10-November/17). Variables analysed: demographic data, microbiological respiratory cultures, time onset POP (early:

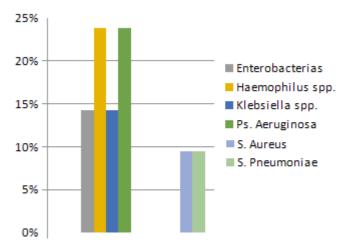
≤4 days vs late: >4 days) and RFMDR: ≥5 days of hospitalization prior to the occurrence of POP, antimicrobial therapy in the preceding 90 days, hospitalization for ≥ 2 days in the preceding 90 days.

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Results and Discussion: 195 patients with an average age of 70 (18-93) years old had at least one episode of POP, 83% ASA III-IV and 95% were intubated in the operating room. A total of 267 episodes of POP were recorded and pathogens were isolated in 70% of cases (206 isolations). MDR (12% ESBL,14% MDR Ps.aeruginosa and 4% MRSA) were isolated in 31% of episodes. In 92% of cases, MDR isolation could be predicted by RFMDR.

Most sensitive pathogens were isolated on early SICU admission and microbiological distribution is shown on the picture. Interestingly Ps.aeruginosa and Haemophilus spp. were the most frecuent germs in this group (24%). These germs are not usually present on community pneumonia.

Distribution of sensitive bacteria in early POP in patients without RFMDR;



Conclusions: On a tertiary SICU, no matter time on admission, MDR pathogens isolation are still predictable by RFMDR. Taking into account our local flora, empiric coverage of early POP in patients without RFMDR should include Ps. Aeruginosa and Gram-negative bacteria (Enterobacterias, Klebsiella spp.), that are not commonly isolated in community pneumonia.

#### 09AP07-8

Comparison of piro, Mannheim peritonitis index and peritonitis sepsis score for predicting mortality in patients with complicated intra-abdominal infection

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Background and Goal of Study: Mannheim Peritonitis Index (MPI) and Peritonitis Sepsis Score (PSS) are surgical scores validated for risk of death estimation in patients with intra-abdominal infection (IAI). PIRO (Predisposition, Insult/Infection, Response and Organ dysfunction) is a validated model for staging severe sepsis and also seems to be a good predictor of mortality. The goals of this study were: a) estimate PIRO, MPI and PSS in our critical surgical population with IAI in order to, b) evaluate if any of them predicts better the risk of mortality and, finally, c) establish a mortality percentage for every specific score value.

Materials and Methods: A retrospective observational study was performed (January 2015 to August 2017) in patients with IAI and intraoperative positive cultures admitted to a surgical intensive care unit (SICU) in a tertiary hospital. Demographic, clinical, microbiological, surgical variables and mortality were recorded. PIRO score, MPI and PSS were determined using parameters recorded during the first 24 hours at SICU admission. The evaluation of prediction accuracy for each score was performed comparing, for each endpoint, ROC curves and its areas (AUC). The value of marker defined as cut-off was determined by the maximum of Youden index. The Cox proportional-Hazzard ratio was performed for each score.

Results and Discussion: 129 patients were analysed with a mean (SD) age of 62 years (17,4), 61% male, 60% ASA III/IV. In-hospital mortality was 10%. No differences in predictive power of mortality between PIRO, MPI and PSS were found (p-value = 0.22) (Fig. 1). The cut-off point for PIRO, MPI and PSS was 9, 26 and 11 points respectively. PIRO score showed the best AUC value. A statistically significant association between mortality and score raise was found to the three scores analysed: PIRO (HR= 1,78, CI 95%= (1,36-2,35); p-value 0,000), MPI (HR= 1,14, CI 95%= (1,03-1,26); p-value 0,014), PSS (HR= 1,96, CI 95%= (1,28-3); p-value 0,002).

**Conclusions**: The scores evaluated are useful predictors of mortality in patients with IAI admitted to a SICU. However, it seems that PIRO model performs better, in terms of mortality risk evaluation in our study population. In addition, a specific cut-off value could be determined for the three scores. Finally, a precise mortality percentage could be associated to a specific score value and can be used either as a prognostic value or stratification tool.

#### References:

1. Chen XY. Crit Care 2014.

#### 09AP07-9

## Frequency of arterial catheter infections – a prospective case study

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Background and Goal of Study: Although catheter related bloodstream infections are becoming a more prevalent problem in managing cases of critically ill patients a vast majority of papers relate to central catheters and their microbiologic status. Studies concerning arterial catheters are few. The aim of our study was to perform an analysis of the incidence and epidemiology of arterial catheter infections in the ICU obtained from patients treated for septic shock. The secondary endpoint was to compare the incidence of arterial catheter infections and aetiology between surgical and neutropenic post-chemotherapy patients treated for septic shock in the ICU.

Materials and Methods: A prospective study was performed on a 74 patient case series (40 men, 34 women; mean age 62.4, median age 64) who were admitted to a 12-bed ICU of a tertiary reference oncological teaching hospital between 01.01.2015 to 31.12.2016 and in whom the arterial catheter had been indwelling for over 48 hrs. In these patients routine microbiological testing of removed arterial catheters was performed. 50 pts were admitted due to post-surgical septic complications (50 cases), 24 due to septic neutropenic chemotherapy complications.

Results and Discussion: In all 74 tested catheters no fungi were found; there were 10 cases of Gram-positive catheter infections and 1 case of Gram-negative infection (P. aeruginosa). In the neutropenic the infection rate was 2.56 per 100 catheter days; in the surgical – 1.13 per 100 catheter days. There were 20 deaths in the entire series, but among these there were only 4 cases of arterial catheter infection – 2 surgical patients and 2 neutropenic chemotherapy patients.

**Conclusion**: Arterial catheter infection does not appear to be a significant risk of catheter-derived blood stream infection. There is twofold difference between the likelihood of arterial catheter infection between septic surgical patients and septic neutropenic post-chemotherapy patients. We intend to continue this study on a prospective basis focusing on possible risks in neutropenic patents. **References**:

1. "Bacteremia related with arterial catheter in critically ill patients" F. Esteve et al 2011

#### 09AP07-10

Major complications in patients with intra-abdominal infection. Could piro score, mannheim peritonitis index and peritonitis sepsis score be useful in morbidity prediction?

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Background and Goal of Study: PIRO (Predisposition, Insult/Infection, Response and Organ disfunction) score, Mannheim Peritonitis Index (MPI) and Peritonitis Sepsis Score (PSS) are useful scores to predict mortality in patients with intra-abdominal infection (IAI). However, these scores do not estimate morbidity, clearly related with clincal and economic impact on septic patients admitted in a surgical intensive care unit (SICU).

The goal of the study is to evaluate the prediction capacity of the PIRO, MPI and PSS scores in terms of cardiovascular, renal and respiratory morbidity.

Materials and Methods: A retrospective observational study was performed (January 2015 to August 2017) in patients admitted to a tertiary SICU with IAI and intraoperative positive cultures. Demographic, clinical, microbiological and surgical variables were recorded to calculate PIRO score. MPI and PSS.

Cardiovascular morbidity include cardiac events (myocardial infarct and stroke) and vasoactive drug support longer than 24 hours. Respiratory complications were evaluated with invasive or noninvasive mechanical ventilation requirement. Postoperative renal support therapy was the renal complication evaluated.

The evaluation of prediction accuracy for each score was performed comparing, for each endpoint, ROC curves and its areas (AUC). The value of marker defined as cut-off was determined by the maximum of Youden index.

Results and Discussion: A total of 129 patients were analyzed with a mean (SD) age of 62 years (17,4), 61% male, 60% ASA III/IV. 57% had nosocomial infection and 45% presented generalized peritonitis. Cardiovascular, respiratory and renal complications occurred in 45%, 36% and 9% of patients respectively. There were no differences between PIRO score, MPI and PSS to assess cardiovascular, respiratory and renal complications (p-value= 0.05, 0.05 and 0.39 respectively) (figure 1-2). The cut-off value for cardiovascular, respiratory and renal complications was 25, 24 and 27 for MPI; 10, 10 and 11 for PSS and 6 for PIRo for each one of the complications.

**Conclusion**: PIRO score, PSS and MPI, estimated in patients with IAI admitted to a SICU, could be helpful identifying which patients may develop major complications. Our data suggest that any of the scores analyzed could be appropriate.

Nevertheless, cross-sectional studies are required to validate a score that predicts the risk of major postoperative complications.

#### References:

1. Chen YX. Crit Care 2014.

#### 09AP07-11

Prolonged prothrombin time during the vancomycin therapy in the ICU – therapeutic problem resolved using rotational thromboelastometry (ROTEM)

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**Background:** Prolongation of prothrombin time (PT) without clinical impairment of haemostasis was previously shown for some synthetic derivatives of vancomycin and was reagent or method specific. We report for the first time two cases with prolonged PT during vancomycin therapy, resulting in therapeutic problem in the ICU, which we assume to be of similar mechanism as mentioned above.

Case report: Case 1. Patient M.M. 75. yrs was given vancomycin therapy due to the parapharyngeal abscess complicated by sepsis and bilateral pneumonia. He was mechanically ventilated for 3 days. Coagulation tests performed after 5 days of vancomycin therapy have shown extremely prolonged PT (0.14, 3.97 INR) with normal fibrinogen and aPTT. PT was measured using Innovin reagent (Siemens). ROTEM control was normal in INTEM and FIBTEM, with prolonged only clotting time (CT) in EXTEM. Central venous catheter was placed uneventfully. After 8 days vancomycin was stopped. Before patient was discharged his PT was 0.57 (1.35 INR)

Case 2. Patient T.V., 33 yrs was submitted in the ICU after surgical treatment of malignant brain tumour. Preoperative coagulation tests were normal. He was given vancomycin therapy for 10 days. Percutaneous tracheostomy was considered, but coagulation tests have shown prolongation of PT (0.45, 1.5 INR), high fibrinogen (7.5) and normal aPTT. ROTEM had confirmed hypercoagulability in EXTEM, INTEM and FIBTEM analyses. Tracheostomy was uneventfully performed. After vancomycin therapy was stopped, PT returned to normal.

**Discussion:** ROTEM may be useful additional tool for clarifying diagnostic problems related to the coagulation disorders in the ICU patients, and may help to identify falsely elevated values of PT. **References:** 

1. Belley, A., Antimicrob Agents Chemother. 2017;61(2).

**Learning points:** PT testing with different reagents and at different time points during and after vancomycin administration should be considered. Interference of PT measurement should be further investigated by in vitro testing on pooled normal human plasma.

#### 09AP07-12

Concept model of critical patient monitoring system with information communication technology in the acute care situation

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Background and Goal of Study: National early warning score (NEWS) is frequently used to determine the clinical management in the acute care situation. We constructed the novel concept model including NEWS and shock index. The goal of this study was to investigate if our modified NEWS (MEWS) would predict necessity for therapeutic intervention better than the traditional shock index alone. Materials and Methods: We retrospectively collected data of the septic shock patients who were admitted to the Intensive Care Unit of Yokohama City University Hospital from April 2010 to August 2016. To calculate MEWS, systolic blood pressure, heart rate, respiratory rate, oxygen saturation, and temperature were llected from the biological information monitor (NIHON KODEN R). We also conducted new concept model of Clinical Patient Monitoring System (CPMS) which automatically maps the data of MEWS and shock index and plots fluctuation of MEWS and shock index using the Bollinger band technique every minute with information communication technology. To determine the threshold of MEWS to predict the necessity for intervention, vital sign data were classified into three zones according to the time between the data collection and the intervention as intervention zone, warning zone and stable zone.

Results and Discussion: 18 patients were enrolled. The number of data sets analyzed were 470 for intervention zone, 936 for warning zone, and 894 for stable zone, respectively. The cut off points of MEWS between intervention vs warning zones and warning vs. stable zones were <8.5 (91.2% and 23.8%) and <4.5 (87.2% and 75.5%), respectively. The left figure shows that the variations in the MEWS were greater than the shock index. The right figures show that the Bollinger band gradually developed at 20:00, and intervention was practically performed at 21:15. An increase of Bollinger band might suggest deterioration of patient condition before intervention with monitoring alarm.



**Conclusion**: Concept model of CPMS was produced with MEWS and shock index that were automatically extracted from the biological information monitor. Further study will be needed to assess the validity of this concept model.

#### 09AP08-1

Bilateral Bispectral index (BIS) monitoring on epileptiform activity detection: an anti-NMDA encephalitis case

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**Background**: Anti–N-methyl-D-aspartate receptor (NMDAR) encephalitis is a disorder characterized by acute behaviour and psychiatric changes, seizures, speech disorders and disautonomia. Despite the severity of the disorder, the prognosis is usually good. Bilateral Bispectral Index (BIS) monitoring displays four channels of electroencephalogram (EEG) and also allow monitoring density spectral array (DSA).

Case Report: A 18 year-old male, with no relevant medical history, presented with neuropsychiatric changes and speech disorder over a month, which evolved to autonomic dysfunction associated with hypoventilation periods and refractory seizures.Anti-NMDA antibodies in the blood and cerebrospinal fluid (CSF) were positive, compatible with the diagnosis of autoimmune anti-NMDA encephalitis. Due to depression of level of consciousness and severe hypoventilation, the patient was intubated and transferred to Intensive Care Unit of Centro Hospitalar of Porto to perform plasmaferesis. Standard monitoring of ICU was performed and additionally bilateral bispectral index (BIS) monitor. On day 2 after admission, he developed episodes of hyperthermia, with no identifiable infectious source. At the same time DSA pattern showed an abrupt change with increase density in high frequencies domain (Figure 1) BIS monitor also revealed epileptiform discharges, similar to the ones on conventional EEG, and a tiopental bolus was administered. Conventional FEG performed afterwards was compatible with electrical status epilepitucus and sedative and anti-epileptic medications were adjusted. Succeeding reductions in sedative an analgesic medications was perform according to DSA monitoring and conventional EEG results, with no recurrence of epileptiform discharges or a predominant high frequency DSA pattern. Clinical evolution during hospitalization was favourable with totally recovery on follow-up.

**Discussion**: Continuous EEG monitoring of this patients is highly desirable, however resource unavailability limits its use. On the other side, EEG interpretation is complex, which lead to development of quantitative analysis based algorithms, such as processed EEG and density spectral array. In this case, identification of a DSA pattern compatible with epileptiform activity was decisive on patient's treatment and prognosis.

**Learning points**: Bilateral BIS monitoring can be an adjuvant tool on epileptiform activity diagnosis, especially when continuous EEG is not available.

#### 09AP08-2

## Association Between Mean Arterial Pressure and Delirium in Postoperative Critically III Patients

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Background and Goal of Study: Postoperative delirium is common, with a reported incidence of 11-43%, and is associated with significant morbidity and cost. The extent to which perioperative hypotension contributes to delirium in critically ill patients remains poorly understood. The relationship is of considerable interest because hypotension is one of the very few potential correlates of critical care delirium that is modifiable and thus amenable to intervention.

Materials and Methods: We included 908 postoperative patients admitted directly to the intensive care unit from the operating room. A Cox proportional hazard survival model was used to assess the association between the amount of intraoperative hypotension, which was measured as the time-weighted average of MAP lower than 65mmHg, and delirium in ICU, adjusting for potential confounding variables. As for blood pressure during ICU stay, we used Cox model with the lowest MAP on each intensive care day as a time varying covariate to assess its association to delirium, adjusted for confounders and intraoperative amount of hypotension.

**Résults and Discussion**: 316 (34.8%) patients had delirium within 5 postoperative days in ICU. Intraoperative hypotension was moderately associated with higher odds of postoperative delirium. The adjusted hazard ratio associated with one unit increase in TWA of MAP<65mmHg was 1.10 (95% CI: 1.01, 1.20; P=0.029). For postoperative blood pressures, a 10-mmHg reduction in the lowest MAP on each day during ICU stay was significantly associated with a higher hazard of delirium, with an adjusted hazard ratio 1.16 (95% CI: 1.07, 1.26; P<0.001).

**Conclusion**: Both intraoperative and postoperative hypotension were associated with delirium in postoperative critical care patients. Whether the relationship is causal remains to be determined.

#### References:

1. Scholz AF, Oldroyd C, McCarthy K, Quinn TJ, Hewitt J: Systematic review and meta-analysis of risk factors for postoperative delirium among older patients undergoing gastrointestinal surgery. Br J Surg 2016; 103: e21-8

#### 09AP08-3

### Patient intoxicated with benzodiazepines, case report

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**Background:** Benzodiazepines (BZD) are sedative-hypnotic agents. BZD act as positive allosteric modulators on the gamma amino butyric acid (GABA)-A receptor. GABA is inhibitory in nature and thus reduces the excitability of neurons. Diazepam, a long-acting BZD, produces the active metabolites who increase the duration of the drug action. Slow hepatic extraction and a large volume of distribution (Vd) result in a long elimination half-life for diazepam (30h).

Case presentation: A comatose, apneic patient was presented in the emergency department, patient's pupils were myopic and symmetrical, vital signs: TA 160/100, HR 45, GCS= 5. The patient was intubated, was administered atropine in two doses: 0.5mg and a second dose 0.5 mg, he was transferred to ICU, and set on a mechanical ventilation on BIPAP Fi02=50%, PEEP=5. His vital parameters were TA160/100 HR 100 SpO2 98% He was sedated with Fentanyl 30mg/Midazolam 100mg/3 ml/h, and because of the bradycardia (up to 40 beats/min) Atropin 0.5 mg was administered several times. The laboratory report showed elevated Leu 43.8 and Glu 28.9. The patient was given Actrapid 16IE, 2000ml fluids, and the acid-base status was assessed. The acid-base status showed pH 7.239,pCO2 3.92,p02 30.96,HCO3 12.7,BEecf -14.9, and consequently the patient was given NaHCO3 40ml After 3 hours the acid-base status was re-examined reading: pH 7.296;pCO24.72;p02 32.62,HCO3 17.5;BEecf -9.2. The CT scans showed no abnormal findings. The toxicological measurements in the patient's serum showed positive findings on benzodiazepines, 856ng/ml or 4 times higher than normal values. The sedation was discontinued, and after 5 hours, the patient was awake and contactable, extubated and supported by oxygen mask. The blood parameters were improving with a tendency of drop of Leu 19.8, stabilized glucose levels to 4.6. The acid-base status was improved. After 3 days hospitalization in the ICU, the patient was transferred in the toxicology department.

**Discussion**: As with any overdose, the first step is to assess the patient's airway, breathing, and circulation and to address these rapidly as needed. The cornerstone of treatment in benzodiazepine overdoses is good supportive care and monitoring. **References**:

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**Learning points:** In acute drug poisoning, a high index of clinical suspicion and an early and prompt intensive medical therapy could improve the patient outcome.

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#### 09AP08-4

#### Creutzfeldt-Jacob Disease and Intensive Care Unit

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Background: Creutzfeldt-Jacob disease (CJD) is a rare neurodegenerative, prion disease and is seen in one million people. It usually consists of sporadic form (90%), familial (15%) and acquired forms (5%). Progressive dementia, visual disturbances myoclonus extrapyramidal and pyramidal findings and behavioral disorders are the most common clinical manifestations. Dementia, ataxia, and myoclonus are the most common clinical manifestations of CJD.

Case Report: A 78-year-old woman was treated for inpatient treatment due to vertigo, speech deceleration, near-memory flare, extended double vision, night cries and cries, weakness, It has been learned from story that she often travels abroad. She had bilateral upper-view limitation, bilateral slight rigidity, deep tendon reflex was increased, and had ataxia and dizziness. Cranial CT was interpreted as a result of senile atrophy. PET/CT was performed in patients with myoclonic seizures and ataxia but EEG was normal, but normal results were obtained and brain biopsy was decided on this. The TAU / FOSFO TAU ratio was compatible with CJD and the patient was sent to prion protein mutation and the diagnosis was confirmed with positive 14-3-3 protein. After that, consciousness and aspiration trauma and breathing problems were taken to the intensive care unit and mechanical ventilator treatment was started. Hypotensive and bradycardic patients were started inotropic and antibiotherapy was administered. After 1 week, the hemodynamics improved and the patient started spontaneously breathing. Common atrophy in MR, hyperintense areas in basal ganglia, bilateral thalamus posteromedialis, vertex in frontal lobe, and diffuse restriction in parafalcine cortical areas are observed. Now, GCS:8, spontaneously breathing, she has not cooperation and has dyskinesia Medical treatment; Depakin 2X1.5, Madopar 6X125 mg and she fed from NG.

Conclusion: Our case did not have typical EEG. MR images, but the diagnosis showed a progressive neurodegenerative process and she recognized only after positive diagnosis of 14-3-3 protein and TAU / FOSFO-TAU ratio. For patients with progressive dementia, after taking into account the analusis of CJD-spesific proteins, consideration should be given to aspiration pneumonia and intensive care follow-up and necessary precautions should be taken.

#### 09AP08-5

#### The accuracy of noninvasive total hemoglobin measurement in critically ill patients

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Background and Goal of Study: In critically ill patients, monitoring total hemoglobin concentrations (tHb) is essential. The Pronto Pulse CO-Oximeter (Masimo Corporation, Irvine, CA) monitors tHb noninvasively (SpHb). Although good correlations between the SpHb and invasively measured tHb are reported in healthy patients, the relationship between the two indices in critically ill patients is not well investigated. The aim of this study was to evaluate the accuracy of SpHb measurements in critically ill patients.

Materials and Methods: We enrolled patients admitted to the ICU of Fukushima Medical University Hospital, from 2016 to 2017. The study was approved by the ethical committee at Fukushima Medical University, and all patients or their family provided written informed consent. Blood was collected during routine blood examinations and analyzed using a cellular analysis system (UniCel DxH 800; Beckman Coulter Brea, CA). Within 30 minutes of the invasive blood sampling. SpHb values were recorded for a comparative study. The data were analyzed using Spearman rank-order correlation and Bland-Altman analysis. A p value of ≤ 0.05 was considered significant.

Results and Discussion: Of 120 measurements from 34 patients, 88 measurements were successfully obtained. The R value was 0.68 (P<0.001), bias was 1.43 g/dL (95% confidence interval, 1.17-1.68 g/dL), and 95% limits of agreement (LOA) was -1.39-4.24 g/dL. In our study, the accuracy of SpHb measurement was acceptable and the LOA was almost comparable to that of other recent studies1 (-2.90-3.26 g/ dL). Several studies have demonstrated that the accuracy of SpHb measurements is significantly reduced in the presence of vasoconstriction, which is observed in critically ill patients. This probably explains the relatively wide LOA observed in the present study. Nevertheless, SpHb levels could not be measured in 20% (22) of the cases. Phillips et al.2 have reported that hypoxia and hypothermia were predictors of failure of the device. Patients in the ICU tend to experience such conditions: therefore, we should be careful with clinical decisions based on this technology. Conclusion: The accuracy of SpHb measurement was acceptable, but clinicians should carefully consider the wide LOA and the probability of capturing failure in critically ill patients before making clinical decisions based on this measurement. References

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#### 09AP08-6

The Incidence of Delirium with its related factors, in our Postsurgical Critical Care Unit. Montecelo Hospital, Pontevedra, Spain

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Background and Goal of Study: 1-To study the incidence of Delirium in the Postsurgical Critical Care Unit (Reanimation) in the Pontevedra Universitary Hospital

2-Relate the incidence of Delirium with the specific idiosyncrasia of the Critical Surgical Patients.

3-To estimate the need to implement a specific and protocolized tool for the detection of Delirium in the Unit of Critical Surgical patients.

Materials and Methods: Retrospective descriptive observational study. All patients admitted to the unit during the year 2016 were reviewed. For the statistical analysis, the statistical package IBM SPSS Statistics v19 was used. We performed a univariate and descriptive analysis of the variables as follows: qualitative and quantitative variables were measured as number and percentage (n.%), while continuous variables were measured as mean ± standard deviation provided they followed normal distribution And as Median and Rank when they did not follow normal distribution. The normality of the variables was measured by the Kolmogorov-Smirnoff test. Bivariate analyses were performed with the T-Student test when the variables followed normal distribution and by the Wilcoxon test when they did not follow this distribution

Results and Discussion: The incidence of delirium in our unit was 33% in 2016. The mean number of days of stay in patients who did not present delirium in the unit was 7 days, while those who did presented an average of 14 days. An association with an OR> 3 was demonstrated between patients with BMI> 24.9 and the likelihood of delirium. In our unit the presence of delirium was not associated with a greater probability of exitus, but it was demonstrated that the patients who presented delirium died more precociously. We objectify that the professional who detects delirium the most is the nursing staff, given their role in the care and the continuous presence in the unit of critics.

Conclusion: The incidence of delirium in our unit was 33% in 2016. The mean number of days of stay in patients who did not present delirium in the unit was 7 days, while those who did presented an average of 14 days.

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Survival outcome in the ICU 9 months after limitation of life sustaining treatment. A three-year prospective study (2014-

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Background and Goal of Study: In case of certain cicumstances, Limitation of lifesustaining treatment (LLST) is a recommended practice. This study evaluates the outcome survival after LLST in surgical ICU.

Materials and Methods: A prospective, observational and monocentric study was carried out at the surgical ICU at the university hospital of Caen. After the weekly LLST meetings, datas were collected during three years: 2014, 2015 and 2016. The cases were analysed nine months later

Results and Discussion: The mean patient age was 68,2±7,4 years. The average IGS scores were 39±8.5 points.

the percentage of survivals after LLST were respectively: 20,2% (21/104) in 2014; 31,7% (38/120) in 2015 and 24,8% (30/121) in 2016. Nine months later, this percentage decreases respectively to: 32,3% in 2014; 29,5% in 2015 and 34% in 2016. Two patients missed and were regarded as dead.

Conclusion: In our study, the patient outcome 9 months post-discharge from the ICU after LLST survival remains low especially in case of elderly patients and severe complications

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#### 09AP08-9

#### Auxiliary hepatic transplant in a pediatric patient for hepatic failure secondary to tuberculosis treatment

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Background and Goal of Study: The potential risk of hepatotoxicity of Isoniazid (INH), Rifampicin (RMP) and Pyrazinamide (PZA) in the first-line treatment of tuberculosis has been described extensively. In spite of this, fulminant hepatic failure (FHF) due to toxic causes is an exceptional entity in pediatrics, rapidly progressive and with a poor prognosis. The only therapy in most cases is transplantation, a treatment considered to be the "gold standard" that increases survival to more than 60% in one year (1).

We present below a case of FHF due to antituberculous treatment in a 12-year-old boy, who required auxiliary orthotopic liver transplantation (THOA).

Materials and Methods: A 12-year-old male from Bolivia, with no relevant medical history, presented with a clinical picture of 2 weeks evolution characterized by continuous productive cough of morning predominance associated with fever night sweats and poor general condition. Chest radiography is performed at his health center, where cavitated multilobar pneumonia, suggestive of tuberculosis, is evident. After 24 hours, positive bacilloscopy for Mycobacterium tuberculosis was received and anti-tuberculosis treatment with 4 drugs (HRZ + E) was initiated. The antibiogram confirms that it is treated agile bacilliferous, so that a 4-drug regimen is maintained. The baseline analysis was within normal limits, abdominal ultrasound and CT ruled out extra pulmonary involvement of tuberculosis.

Results and Discussion: After the surgery, the child presents progressive improvement of general state in spite of neurological seguels with paralysis of 6º pair and right hemiparesis that evolves satisfactorily. Hepatic analysis shows decreased transaminase and bilurubin, associated with increased hepatic synthesis. Liver biopsy 15 days post transplant, reports viability of native liver without signs of regeneration and acute rejection of donor organ, which is treated with corticosteroid boluses. Currently, after 30 days from the auxiliary transplant, the patient has progressed satisfactorily.

**Conclusion**: THOA is a safe therapeutic alternative in pediatric patients with active tuberculosis and FHF secondary to antituberculous treatment. The initiation of immunosuppression and the reintroduction of tuberculostatic drugs is a challenge to avoid new complications.

#### 09AP09-1

New prediction model for cardiac arrest time of palliative care patients in the intensive care unit: a single center retrospective cohort study

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Background: In the palliative care setting, family members of terminally ill patients wish to be present for the last moments of the patient's life. However, it is difficult to provide family members with an estimated time of patient's death with accuracy. We hypothesized that dysfunction of the autonomic nervous system resulting in an imbalance between systolic blood pressure (SBP) and heart rate (HR) might precede cardiac arrest with a certain time interval. The aim of this study was to develop the algorithm to predict cardiac arrest in terminally ill patients.

Methods: We retrospectively collected data of patients who were admitted to the intensive care unit (ICU) of Yokohama City University Hospital between 2010 and 2016. Exponential decay model was used to develop the formula to calculate the predicted HR from SBP. The disparity between predicted HR and real HR was evaluated as the predictor of cardiac arrest in the following 2 hours. Patient data were randomly divided into two groups. One was used to determine the threshold of the HR disparity with the receiver operating characteristic curve, and the other was used to validate the formula by determining the diagnostic power of the threshold. Results: Of 4330 patients who were admitted to the ICU, 32 died in the ICU and 19 patients were included in this study. Exponential decay model determined the following formula: Predicted HR = SBP x 0.995 + (6.931-0.995) e -0.035 x SBP. Area under the ROC of the disparity between real HR and predicted HR was 0.650 (95% confidence interval 0.512 to 0.788), p<0.001. Threshold of the disparity was -10 bpm (sensitivity, 49.9%; specificity, 75.8%; likelihood ratio, 2.06). In the validation data set, diagnostic power of this algorithm was sensitivity 52.7 % (47.8 to 57.6), specificity 79.8 % (78.0 to 81.6), positive predictive value 35.7 % (31.9 to 39.6), and negative predictive value 88.8 % (87.2 to 90.3). Likelihood ratio 2.61, respectively. Conclusion: In patients requiring palliative care, the new prediction model estimates the breakdown of the autonomic nervous system within 2 hours of cardiac arrest.

#### 09AP09-2

Limb Ischemic Preconditioning Reduces Heart Injury after Severe Burn Injury in Rats

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Background and Goal of Study: Post-burn cardiac shock causes myocardial damage and cardiac dysfunction at the early stage of severe burns. We showed that remote ischemic preconditioning (RIPC) protects heart against myocardial I/R injury. However, little is known regarding the effect of RIPC on heart after severe burn. We proposed the existence of RIPC-induced cardioprotection in severely burned rats and further investigate the underlying mechanisms.

Materials and Methods: Male Sprague Dawley rats were assigned to shamburn,control (CON), limb ischemic preconditioning group (RIPC), each group, n=8. Rats were inflicted with 30% total body surface area full-thickness burn in a 97°C water bath for 18 s except for the sham rats. Immediately after burn injury, all rats were resuscitated with Ringer's lactate solution (4.0ml/kg/1%TBSA.i.p.). For RIPC intervention, rats received four cycles of 5 min of limb ischemia with 5 min reperfusions at 24 hours and 1 hour before burn injury. Hemodynamics were measured. 3 hours post-burn, hearts were taken for apoptosis measurements and westernblotting analysis. Myocardial mitochondria and cytosol were solated to determine mitochondrial energy metabolism, cytochrome c release and mitochondrial membrane potential (ΔΨm). Blood samples were taken for serum levels of lactate dehydrogenase (LDH) and creatine kinase-MB (CK-MB)

Results and Discussion: RIPC restored cardiac function, increased Bcl-2 expression while decreasing Bax and Caspase-3 expression and enhancing Bcl-2/Bax ratios (P<0.05 vs CON). RIPC preserved post-burn cardiac mitochondrial function by recovering ATP concentrations and decreasing AMP/ATP ratio (P<0.05 vs. CON). RIPC up-regulated ΔΨm from 11.2±2 in the CON to 17.2±1.1ug/mL P<0.05). RIPC caused a 40% lower of cytochrome c, than rats in CON (P<0.01). Serum levels of cardiac enzyme leakage were reduced in RIPC group (P<0.05 vs CON). Meanwhile, RISK pathway (Akt, ERK1/2, and GSK3β) phosphorylation was enhanced in RIPC-treated hearts compared to non-treated control groups (P<0.05), highlighting the crucial role of the RISK pathway in RIPC-induced heart protection after severe burn injury.

Conclusion: Limb ischemic conditioning effectively improves cardiac function ameliorates myocardial damage and preserves mitochondrial function after severe burn injury. The underlying mechanism may involve RISK signaling pathways.

#### 09AP09-3

Intra-aortic balloon pump as supportive treatment for sepsis-induced cardiomyopathy and cardiogenic shock in a patient with intestinal tuberculosis

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Background: Sepsis-induced cardiomyopathy (SIC)1 is a recognized entity in septic patients. It is not known if patients with tuberculosis have a higher risk of SIC and cardiogenic shock2. The mainstay of treatment of SIC is treatment of sepsis and inotropic support. The use of intra-aortic balloon pump (IABP) for circulatory support is non-standard and has rarely been reported1. We describe a case of successful IABP support of refractory shock in a patient with severe sepsis from perforated intestinal tuberculosis

Case Report: A previously well 38-year-old female, underwent emergency laparotomy for perforated caecal tuberculosis. Intraoperatively, she was aggressively fluid resuscitated and required only single vasopressor support. Inotropic requirements escalated in the Intensive Care Unit (ICU), initial pointof-care transthoracic echocardiography (TTE) showed visual estimated ejection fraction (EF) of 30%, suggesting septic shock with SIC. 48 hours later, she developed decompensated cardiac failure and refractory shock despite high-dose catecholamines. Bedside TTE showed an EF of 10%. IABP was inserted, with drastic haemodynamic improvement. Catecholamine support was weaned off within 12 hours after insertion. The IABP was removed after 72 hours. Interval TTE on day 9 of admission showed improvement of EF to 30%.

**Discussion**: SIC is present in more than 40% of cases of sepsis. It can increase the mortality rate up to 70%. Most patients improve in 7 - 10 days. The IABP has been successfully used for cardiogenic shock due to other causes but rarely in septic patients. By extension, the IABP is suited for this temporary period of support for SIC. Given the drastic improvement after its institution in our patient, it should be considered in selected patients with decompensated SIC.

#### References:

- 1. Sato R. Nasu M. A review of sepsis-induced cardiomyopathy. Journal of Intensive Care. 2015:3:48.
- 2. Sherbini et al Cardiomyopathy Secondary to Tuberculosis: A Case Series And Review Of Literatures Am J Respir Crit Care Med 193;2016:A3777

Learning points: Supportive treatment with IABP can be considered for patients with SIC and cardiogenic shock who are insufficiently supported on high dose catecholamines. Point-of-care TTE can in the expeditious diagnosis of SIC and decompensation

<sup>2.</sup> J Surg Res. 2015; 257-62

#### 09AP09-4

## Constrictive pericarditis as the first manifestation of unknown neoplasia

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Background and Goal of Study: Pericardial metastases of solid tumors usually appear as a pericardical effusion. Constrictive pericarditis is a rare presentation Materials and Methods: 57-year-old male patient with fever, asthenia, anorexia progressive dyspnea and increased edema in lower limbs, in the last two weeks. Personal medical history: right squamous oropharyngeal carcinoma treated with radiotherapy. Submucosal sigmoid adenocarcinoma treated with right hemicolectomy. Last control in Oncology: disease-free. Physical examination: fever, low blood pressure, jugular vein enlargement, hepatojugular reflux, hepatomegalv and lower limb edema. The following image tests were performed: a) Chest radiography: cavitated nodule in lower left pulmonary lobe and cardiomegaly b) Transthoracic echocardiography: diffuse pericardial thickening with slight effusion that causes signs of pericardial constriction, marked inferior vena cava and suprahepatic veins dilatation. c) Cardiac magnetic resonance: acute-subacute pericarditis with constrictive physiology. d) PET-CT: mild uptake in ower left pulmonary lobe, intense uptake in pericardial thickening with little amount of effusion that can't differentiate between inflammatory/infectious or tumor process. Other findings: 24.400 leukocytosis with neutrophilia, elevated liver enzymes. hyperbilirubinemia. The case was presented in a medical-surgical session and it was decided to perform a pericardial and lower left pulmonary lobe nodule biopsies The cardiac surgeons practiced subxiphoid pericardial biopsy with pathologycal anatomy result of squamous carcinoma. Pulmonary biopsy could not be performed due to the patient's clinical status. With this medical outcome, surgery or oncological treatment were underestimated. Comfort measures were prioritized and the patient died on the third postoperative day.

**Results and Discussion**: Pericardial diseases require a wide differential diagnosis. In our case, because of the patient's history and the presence of pulmonary nodule, the tumor etiology was the most probable.

Conclusion: The metastatic involvement of the heart is much more frequent than the primary one and is generally underestimated. Its prevalence in some series is up to 15-30%. Generally, the cardiac involvement goes unnoticed because the symptoms of the primary tumor prevail. Lung cancer is the most frequent primary tumor in cardiac neoplastic disease.

#### 09AP09-5

## Measuring Central Venous Pressure Using the Proximal Lumen: An Audit

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Background and Goal of Study: The majority of UK Critical Care Units use the distal lumen for central venous pressure monitoring (CVPM) (1). As previously discussed, this poses an increased risk in the event of central venous catheter (CVC) displacement (1). Although there may be differences in measurement, there is limited evidence to suggest any particular lumen is superior to others for CVPM (2). There has been a suggestion that the proximal lumen offers an added measure of safety and should be the lumen of choice for CVPM (1,3). The aim of this audit was to measure compliance of CVPM using the proximal lumen in critical care units of NHS Avrshire & Arran.

Materials and Methods: We prospectively performed daily checks on each CVC within the ICU at University Hospital Crosshouse (UHCH) and the ICU and HDU at University Hospital Ayr (UHA), encompassing all critical care units of NHS Ayrshire & Arran. The lumen being used for CVPM were documented. Data was collected between November 2016 – February 2017 at UHCH, and between August 2017 – November 2017 at UHA.

Results and Discussion: A total of 181 daily CVC checks were performed; 131 at UHCH and 50 at UHA. Proximal lumen were used only 60% of the time (66.4% at UHCH, 44% at UHA respectively). We identified this as a significant safety risk and changes are currently being implemented.

Conclusion: CVC displacement can lead to complications and death (1). The use of proximal lumen for CVPM can reduce unnecessary risk to the patient. Despite concern, many units throughout the UK, including our own, continue to use the distal or medial lumen for CVPM. We expect the implemented changes will lead to greater compliance with using the proximal lumen for CVPM.

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#### 09AP09-6

Estimation of left ventricular filling pressure post cardiac surgery: echocardiography VS. invasive measurement of left atrial pressure (ECHOPOG study)

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Background and Goal of Study: Measurements of echo-Doppler parameters such as the transmitral flow (E/A) and early diastolic velocity of mitral annulus (Ea) are used to assess left ventricular filling pressure (LVFP) and thus guide fluid therapy. These parameters, although of daily use in the ICU, have never been properly evaluated on a homogeneous population of post-cardiac surgery patients. We designed this study to test the reliability of non-invasive LVFP estimation in the ICU after cardiopulmonary bypass (CPB).

Materials and Methods: We conducted a single-center, prospective observational study at a University Hospital. All adult patients admitted in the ICU after cardiac surgery with CPB were considered eligible for participation. Patients who had undergone mitral surgery or with mitral pathology were excluded. Simultaneously with Trans Thoracic Echography (TTE), left atrial pressure (LAP) measurement was performed through a surgically placed catheter. LAP was considered as the reference measurement for LVFP. Echo-Doppler measurements (E/A, TDE, E/Ea, E/Vp) were performed offline without knowledge of the hemodynamic data. The primary study endpoint was the correlation between LAP and E/Ea. Secondary study endpoints were the correlation between LAP and other echo-Doppler parameters (E wave, E/A, TDE, E/Vp) and their diagnostic performances, isolated or combined through the 2016 algorithm of the American Society of Echocardiography (ASE), to predict a LAP>18 mmHd.

Results and Discussion:62 patients and 88 trans-thoracic echography (TTE) were analyzed. We observed no significant correlation between E/Ea and LAP (Pearson's coefficient at 0,19; p=0,08). Subgroup analysis according to ventilatory mode, cardiac rhythm or LVEF did not change this result. Other parameters were significantly but weakly correlated with LAP: E wave (r=0.44; p<0.001), E/A (r=0.36; p=0.001), DTE (r=-0.26; p=0.016). The E/Ea ratio could predict a LAP>18 mmHg with a 46% sensibility and a 83% specificity, with a best cut-off point value at 13cm/s. The application of the 2016 ASE algorithm did not improve this performance with a 50% sensibility and a 75% specificity to predict a LAP>18 mmHg.

Conclusion: Our results suggest that post-cardiac surgery TTE cannot be reliably used for the LVEP assessment in the ICU, regardless of whether the echo-Doppler parameters are isolated or combined using the 2016 ASE algorithm.

#### 09AP09-8

## Evaluation of the interest of NICOM in the diagnosis of diastolic dysfunction in comparison with echocardiography

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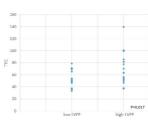
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Background and Goal of Study: Acute respiratory failure (ARF) is one of the most common reasons for admission in intensive care unit. Transthoracic echocardiography (TTE) is the gold standard method for assessing cardiac function. However, TTE is not always feasible, due to factors related to patients or organization. NICOM is a non-invasive tool to evaluate cardiac output by using bioreactance. The aim of our study was to compare the Thoracic Fluid Content (TFC) evaluated by NICOM with the TTE assessment for the diagnosis of diastolic dysfunction; and to evaluate the abilitity of the NICOM to follow the evolution of the natient under treatment.

Materials and Methods: We conducted a prospective single-center study. All patients admitted for ARF had TTE upon admission and were spread into two groups: « high left ventricular filling pressure (LVFP)» and « normal LVFP » group. The value of TFC was collected on admission, then, between the 24th and 48th hour with a new TTF

Results and Discussion: During the study, 34 patients admitted for ARF were included, 17 in the normal LVFP group and 17 in the high LVFP group. Mean TFC in the low LVFP group was 53.1 +/- 13.5, versus 71.7 +/- 27.3 in the high LVFP group (p=0.017). The area under the ROC curve was 0.72, the sensitivity and specificity were 71% for a TFC cut-off of 54.There was not a good correlation between the variation of LVFP assessed by TTE and variation of TFC.

Conclusion: In patients admitted in ICU for ARF, the TFC is significantly higher in patients with high LVFP than in those with low LVFP. The lack of correlation between TTE at day 1 and TFC values may be explained by the high dependency between TFC and sensors placement. The patients were included in ICU, that is to say, after the first medical treatment by the emergency pratician. In this context, where TTE is widely available, terest of the NICOM seems moderate. But such a monitor could be useful to screen the patients without needing TTE evaluation, for example in a prehospital setting or in the emergency department.



#### 09AP09-9

## Pituitary macroadenoma apoplexy after off-coronary artery bypass surgery

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**Background**: New onset of pituitary tumor (PT) apoplexy following cardiopulmonar bypass (CPB) surgery is a very rare complication with variable presentations. As a result of sudden increase of sellar surrounding structures, severe headache, visual disturbances, and impairment in pituitary function may happen.

Case Report: A 61 years man with history of tabaquism, hypertension, dyslipemia and triple coronay artery disease presented as instable angina, developed third nerve palsy and severe headache after off-CBP triple coronary artery bypass surgery. Intraoperatorative standard monitoring plus TEE was used. Low-dose nordenaline (NAD) was started after induction for hypotension but surgery concluded without complications and the patient was admitted in ICU. NAD could be stopped.

After 4 hours the patient was extubated and a left third cranial nerve palsy with ptosis and dilated pupil, severe headache and visual disturbances were noticed, with no other symtoms. Urgent CT revealed an unknown sellar mass with parasellar extension. Glucocorticoid and thyroid hormone replacement therapy was started. All electolytes, cortisol, prolactin and thyroid levels were normal but twelve hours later the patient presented an episody of bradicardia and mental status deterioration. New CT and MRI showed tumor growth without signs of bleeding. Neurosurgical team scheduled an endoscopic transsphenoidal surgery successfuly done next week with partial recovery of visual changes.

**Discussion:** Precipitating factor may be related to CBP, anticoagulation, low cerebral blood flow, or anesthetic agents. This case was an off-CBP surgery so hypotension or anticoagulation could be the root cause. There are few cases reported, none of them with such an early onset. Succes in management depends on early diagnosis and intervention. Neuroimaging and pituitary function studies must be performed. Surgery for prompt decompression is the most common treatment but each case should be evaluated about risks due to anesthesia and surgical stress after cardiac surgery.

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- 2. Telesca M, et al. Intensive Care Med 2009,35: 185-186.

**Learning points**: Pituitary infarction after CBP surgery could be the first manifestation of a PT.

Haemodynamic changes could precipitate a pituitary apoplexy.

These patiens can be managed with supportive measures, but those clinically and neurologically unstable may benefit from urgent decompression.

### 09AP09-10

## Non-convulsive status epilepticus after cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Seizures after cardiac surgery (CS) have been charcterized as type II adverse neurologic outcome (1). They occur, on average in 5 - 70 of 1000 adult CS patients (2). In contrast to generalized tonic-clonic convulsions, detection of non-convulsive seizures in an intensive care environment is challenging as they can easily be confused with e.g. oversedation or confusion. A delay in the diagnosis, however, particularly of non-convulsive status epilepticus, has been associated with a tremendous rise in morbidity and mortality (3). Furthermore, due to the difficulties related to the recognition of non-convulsive status epilepticus, its incidence after cardiac surgery is still unknown.

Materials and Methods: We, therefore, retrospectively assessed electroencephalograms (EEG) of patients who had undergone either isolated coronary artery bypass graft (CABG) surgery or aortic valve replacement (AVR)

both with cardiopulmonary bypass between January 1, 2014 and June 30, 2015. All EEGs had been ordered by a consultant neurologist to either confirm or rule out suspected perioperative brain injury and were re-analyzed by three epileptologists. Results and Discussion: During the above mentioned period a total of 469 isolated CABG and 377 isolated AVR procedures were carried out. At the same time 18 EEGs were recorded in AVR patients and 16 in isolated CABG patients during their stay in the intensive care unit. Non-convulsive status epilepticus could be detected in 4 AVR patients (0.9%) and in 1 patient (0.3%) after CABG surgery. Despite the limitations of this trial, particularly its retrospective design and the individual decision of neurology consultants to order an EEG, it appears that it is not only the incidence of seizures that increases with open heart surgery but also the incidence of non-convulsive status epilepticus. The three-fold greater incidence of this frequently missed seizure type makes patients undergoing open heart surgery more vulnerable for more severe adverse postoperative cerebral outcome.

Conclusion: Patients after open heart surgery with unexplained prolonged

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unresponsiveness require special attention. EEG recordings should probably be ordered more liberally to allow early detection of this elusive and potentially devastating type of neuronal hyperexcitation.

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- 2. Sharma V et al. Anaesthesia 2014:69:124-30.
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#### 09AP09-11

## Mini-fluid challenge to predict fluid responsiveness measured by Vigileo FloTrac

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**Background and Goal of Study**: Classical FC is defined as a fluid administration of 300-500 mL in 30 minutes. Fluid responsiveness is defined as an increase in systolic volume greater than 10% after a FC1. An increase in aortic blood flow measured by transthoracic echocardiography (TTE) after an infusion of 100 mL colloid (mini-FC) can predict fluid responsiveness2. Our objective was to determine if the a dministration of 100ml can predict fluid responsiveness measuring the stroke volume index (SVI) with Vigileo FloTrac.

Materials and Methods: A prospective study was conducted in our institution during the past year. Inclusion criteria was: patients admitted to the surgical intensive care unit (SICU) with septic or hypovolemic shock; we excluded patients with history of cardiac arrhythmias, valvular heart disease or severe ventricular dysfunction.

SVI was measured by the Vigileo FloTrac system before infusion of fluids (baseline), after 100 ml (1 min), 300 ml (15 min) and 500 ml (30 min) of colloidal infusion (gelafundin 4%).

SVI changes in each dose stage (100, 300 and 500 ml) from baseline were compared using the McNemar test.

**Results and Discussion**: Twenty two critically ill patients were included: mean age 73.8 years (SD+/- 9.2), 60% male; shock etiology was: 45.5% septic and 54.5% hypovolemic.

Mean SVI at baseline was 28.8 mL (SD +/- 6.9), 31 mL (SD +/- 7.1) after 100 mL, 33 mL (SD +/- 7.1) after 300 mL and 34 mL (SD +/- 8) after 500 mL.

SVI increased >10% from baseline after a mini-FC predicted and increase of SVI >10% after a classical FC of 500 mL but not after 300 mL (p=0.0143, p=0.1797 respectively). SVI increased >10% had a positive predictive value of 100% but just a negative predictive value of 54% to predict fluid responsiveness after a classical FC. Conclusion: The mini-FC approach monitoring SVI measured by Vigileo FloTrac could detect fluid responders but a negative mini-FC might be carefully interpreted. A limitation of our study is the small sample included.

#### References:

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#### 09AP09-12

## Clinical features and factors for recurrence of patients receiving landiolol for atrial fibrillation after cardiac surgery

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**Background:** Postoperative atrial fibrillation (POAF) is a common complication, and landiolol, an ultra-short acting beta-blocker, has been used to treat POAF in Japan. In this study, we investigated the efficacy and safety of landiolol for patients with POAF after cardiac surgery. Furthermore, since there were many cases of POAF recurrence in this study, we have also reported on the prediction factors for recurrence

Methods: This retrospective study was conducted between January 2014 and September 2016. The study included post-cardiac surgery patients who received landiolol for POAF in the intensive care unit. We first investigated the following parameters to assess the actual situation, efficacy, and safety of landiolol administration. These included systolic blood pressure (SBP), cardiac index (CI), and landiolol doses at the start of administration (T0) and the POAF improvement (TI). The recurrence rate of POAF were also investigated. We next investigated whether CHADS2 (C2) and CHA2DS2-VASc (C2V) scores are useful as predictors of POAF recurrence.

**Results:** 1) Of 19 eligible patients with POAF after cardiac surgery, 18 patients (94.7%) showed POAF improvement. In these patients, landiolol was administered 1.5[0.7-2.3] (mean [interquartile range]) mcg/kg/min at T0 and 2.1[1.4-3.0] mcg/kg/min at T1. SBP was 115[101-131] mmHg at T0 and 103[87-115]mmHg at T1, CI was 3.0[2.0-4.2] L/min/m2 at T0 and 3.0[2.6-3.9] L/min/m2 at TI, and there was no significant difference in either parameter.

2) To investigate the predictors of POAF recurrence, the 18 cases in which landiolol was effective were divided into a recurrent group (Rc, N=10) and a non-recurrent group (Nrc, N=8). C2 was 2.0[1-3] in the Nrc group and 3.5[2-4] in the Rc group, and was significantly different (p=0.04). C2V was 3.5[3-4.75] in the Nrc group and 5.5[3-6] in the Rc group (p=0.07).

**Discussion:** This study showed that landiolol is effective for POAF without circulatory suppression. And we also examined the predictors of recurrence. Our results strongly suggest an association between POAF recurrence and "C2 score". This study is the first report to show that the C2 score can predict POAF recurrence after landiolol administration. Therefore, our results suggests that C2 may be used to evaluate the necessity of measures to prevent POAF recurrence. Moreover, from the viewpoint of simplification of management and medical economy, it can aid in predicting the appropriate withdrawal timing of landiolol.

#### 09AP10-1

## Urine output after intravenous bolus of furosemide predicts the occurrence of acute kidney injury

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Background and Goal of Study: Furosemide is a potent diuretic that exerts its action in the ascendent loop of Henle; since it is highly bound to plasma proteins, to exert its actions in the intraluminal side of loop of Henle, the tubular cells have to take up furosemide from peritubular circulation and transport it to the luminal side of loop of Henle. If there is urine output after furosemide bolus (FB), this would mean that peritibular circulation and tubular cells preserved their integrity. The goal of the study was to determine the difference in urine output after FB in critically ill patients depending on wheather they would develop AKI or not.

Materials and Methods: This was a prospective observational study in a surgical ICU of the Emergency centre of the Clinical centre of Vojvodina, Novi Sad, Serbia, 156 patients that were injected furosemide bolus (FB) (5, 10 or 20 mg) at discression of the intensivist were included. The indication was oliquria or anuria after volume replacement, thus, the patients' central venous pressure had to be at least 10 mmHg and mean arterial pressure was at least 65 mmHg. Immediately afterwards, urine output was collected in the first and second hour after FB. In the next days, acute kidney injury (AKI) occurrence was noted using the RIFLE criteria. Differences in urine output between patients with and without AKI were assessed with Mann-Whitney U test. ROC curves were calculated for discrimination of the urine output in the first and second hour after FB that best predict AKI occurrence. Results and Discussion: Urine output in the first and second hour after FB was significantly lower in the patients who developed AKI class F (Failure), 0,323 ml/ kg/h/mg of furosemide versus 0,074 ml/kg/h/mg in the first hour and 0,281 ml/kg/h/ mg versus 0,044 ml/kg/h/mg in the second hour. Cut-off value for the urine output in the second hour after FB that best predicts AKI occurrence is 0.158 ml/kg/h/mg (AUC 0.770, 95%CI 0,697-0,844, Sensitivity 0.722, Specifity 0.688). Furosemide has a predictive value for the occurrence of the class F of AKI. Chawla and colleagues were injecting patients furosemide bolus of 1 to 1.5 mcg/kg and showed that the resultant urine output can predict the progression of AKI.

Conclusion: Even minor doses of FB can help in determining which patient will develop AKI class F.

#### 09AP10-2

Utility of bladder ultrasound study due to monitor postoperative diuresis in non-catheterised patients. Protocol implementation

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**Background and Goal of Study:** The increase of anaesthetic procedures in limited bed hospitals force the physicians to be more efficient in perioperative length stay. One of the main problems to reduce the hospitalization is the discharge delay due to the lack of spontaneous diuresis in short stay postoperative units (SSPU).

The goal of study is the implementation of a protocol based on bladder volume estimation with echography obtains better outcomes and reduce the discharge delay

**Material and Methods:** After the study Ethical approval, our Engineering Department developed a software to estimate the bladder volume using an image obtained with a conventional convex ultrasound transducer (Image1). This software has been validated with healthy volunteers.

This observational study compares the common abdominal palpation for bladder examination (Control group (CG)) against the ultrasound evaluation (Protocol Group (PG)). The population for this study are 40 patients aged between 18 and 70, ASA I-II without any urinary disorder and with a length of stay in SSPU from 1 to 3 hours.

The team designed a protocol (Table 1) to study the patient before using and urinary catheter, to detect any urinary postoperative disorder like oliguria, which lack of diagnosis can cause an acute renal failure, or urinary retention that may cause bradycardia or hypotension.

All nurses from SSPU had been taught on how to proceed with the protocol and how perform the bladder echography.

Results and Discussion: Although there is no hospitalization discharge reduction (p>0'05) the protocol let us improve our patients urinary monitorization in SSPU, increasing the spontaneous diuresis, avoiding urinary retention and detecting patients that may suffer oliguria (p<0'05). More fluids were needed in SSPU to treat the patients in the PG (p<0'05) and there was not an increase of urinary catheterisation.

**Conclusion:** It is possible to improve our patient attention optimizing the use of the SSPU resources, like designing protocols and teaching nurses on how to use the echography technique.

Further studies are required to demonstrate the real impact of our protocol implementation.

#### 09AP10-3

## Side and position of haemodialysis catheters (VasCath) can affect its survival

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**Background and Goal of Study**: Costs of AKI to the NHS are £434-620m pa which includes costs of continuous haemodialysis. The cost of each haemodialysis kit and catheter is around 500 pounds. One of the most common causes of dialysis kit/catheter change before its expiry is the malfunctioned catheters.

Materials and Methods: All patients were admitted to ITU between the periods from 1st of November, 2015 to the 1st of May, 2016 were involved in the audit. A retrospective systematic review and evaluation of records of all these patients and patients who had received continuous haemodialysis through a VasCath were selected. Twenty five cases out of 115 admissions had haemodialysis via VasCath and 40 catheters required for them, average 1.6 catheters for every patient. The maximum duration of dialysis was 7 days and minimum was 12 hrs, mean (+/- SD) 32hrs (+/- 10)

Results and Discussion: Insertion sites: LT IJV (40%, femoral 25%, RT IJV 17%, LT subclavian 10%, RT subclavian 8%, survival in hours: RT subclavian 116.6 (+/-10 SD), femoral 69.7(+/- 6.7 SD), RT IJV 69.4(+/- 7 SD), LT subclavian 40.1(+/- 3.98 SD), LT IJV 64.4(+/- 5.4 SD). Collectively: RT side 83.5(+/- 7.8 SD), LT side 59.6(+/- 5.5 SD), femoral 69.7(+/- 7 SD) hrs. Tip position in the CXR: above carina by >1 cm survived in average 45.3(+/- 4 SD), at level of carina -/+ 1 cm survived 88.9(+/- 3.98 SD) hrs, below the level of the carina > 1 cm survived in average 50.5(+/- 4.32 SD) hrs. The Need for lines swap, repositioning or rewiring was in 3 out of 10 in RT side VasCath which equals 30% and in 14 out of 20 in LT side VasCath which equals 70%, six out of 10 cases of femoral VasCath which equals 60%.

Conclusion: Our findings significantly favoured right chest side haemodialysis catheters over left and catheter tip position at the level of the carina (-/+) 1 cm over far deep or superficial catheter tips. We have also observed that we unintentionally favoured left side over right side due to availability as usually patients would have right side already cannulated with a central venous catheter (CVC) before the decision for dialysis was taken and that led to change our practice and favour Lt side CVC insertion in any patient with AKI and/or potential need for dialysis and also started using the same vein dual catheter technique to obtain a vascular access and VasCath in the same vein

#### References

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#### 09AP10-4

## Reperfusion injury with renal repercussion leading to amputation as a complication of radial artery cannulation

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**Background**: Arterial line placement has a major complication rate below 1%. Ischemic injury can occur in patients with impaired perfusion or hemodynamic instability. Reperfusion injury (RI) is a life-threatening situation and this is, to the best of our knowledge, the first report of its occurrence after radial artery cannulation (RAC).

Case Report: 68-year-old woman admitted to the ICU due to cardiogenic shock. Relevant treatment, including vasopressors, was started. Arterial line was placed in left radial artery, but stopped working shortly after and was removed. Left forearm and hand became pale and cold. Doppler showed no flow in both ulnar and radial arteries, weak pulse in brachial artery. Vascular surgery team opts for conservative treatment. After 12h left forearm pain as well as anesthesia and paresis of the I and II left fingers developed. Doppler showed permeable ulnar artery, no flow in radial artery from mid-forearm. Restoration of circulation was attempted with peripheral nerve block (sympaticolysis), salicylate and arterial vasodilation (nimodipin), resulting in a better perfused hand, warm fingertips, but persistent ischemic area in the forearm. Severe pain, worsening of the ischemic area and muscle rigidity in the entire left forearm and hand developed in the following 12h. Doppler showed no flow in both ulnar and radial arteries. Concomitantly, rapid deterioration of renal function was observed. Mid-arm amputation was performed due to the presence of severe ischemia and RI. The patient was released from the ICU on the 6th day. Discussion: Female sex, hypotension and use of vasopressors are known risk factors for development of hand ischemia after RAC. 1RI is a risk to be considered in the treatment of ischemia after RAC. Attempts to reperfuse the ischemic area after 4-6h can produce both local and systemic complications. In our case, the attempt to restore circulation after more than 12h led to both worsening of ischemia and RI with renal repercussion.

#### References:

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2.Cardiovasc Surg. 2002 Dec;10(6):620-30

**Learning points**: This is a warning to those attempting restoration of circulation after ischemic complications due to RAC. The golden period of 4-6h should be respected, as both worsening of ischemia and RI are a risk. Monitoring of renal function is essential, as remote RI can be complicated by the release of myoglobin from necrotizing muscle, and subsequent tubular injury.

#### 09AP10-5

## Role of terlipressin in preventing Acute Kidney Injury in refractory severe septic shock

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Background: Recent international guidelines suggest the use of vasopressin or terlipressin for vasoplegic shock after cardiac surgery to prevent Acute Kidney Injury (AKI) [1]. A potential role for terlipressin in protecting the kidney in severe septic shock (SS) by decreasing the use of noradrenaline and by decreasing the vasoconstriction of the afferent glomerular arteriole is suggested by our case report. Case Report: A 70 year-old women, with medical history of ileostomy because of colonic cancer surgery in 2015, presented faecal peritonitis and severe SS secondary to suture failure of ileostomy closure and required emergent surgery in the immediate postoperative period. Severe vasoplegia occurred intraoperatively refractory to noradrenalina at 2mcg/kg/min. Terlipressin at 2mcg/kg/h was initiated Hemodynamic stability and increase in urine output were achieved, which allowed a 50% reduction dose of noradrenaline. Piperacilin/tazobactam and fluconazol were given intraoperatively, which was changed to meropenem and vancomicin the day after. ESBL Escherichia Coli and Enterococcus faecium were observed in the abdominal culture. Vasopressors were stopped 48 hours later. Urine output and Glomerular filtrarion rate (GFR) were well maintained from baseline 84 to 92ml/min in 72h, despite severe SS and high dose of vasopressors. Patient was discharged to the floor one week later.

**Discusion**: A recent trial showed a kidney protective effect associated with vasopressin after vasoplegic shock after cardiac surgery. In severe septic shock the benefit of using vasopressin is unclear. We observed a case of severe abdominal refractory SS, who benefit from using terlipressin infusion, leading to a 50% reduction of noradrenaline, as well as, an improvement of urine output and GFR despite high dose of vasopressors. This fact could be explained by the predominant vasoconstrictor effect of terlipressin on efferent glomerular arteriole and therefore an improvement in GFR, unlike noradrenaline or adrenaline effects.

#### References:

1. Joannidis M, et al. Prevention of acute kidney injury and protection of renal function in the intensive care unit: update 2017. Expert opinion of the Working Group on Prevention AKI section, European Society of Intensive Care Medicine. Intensive Care Med 2017; 43:730–749

**Learning points**: The use of terlipressin in severe refractory SS is suggested, as may have a role in preventing AKI associated with Severe Septic Shock.

#### 09AP10-6

Continuous venovenous hemodiafiltration using cytokineadsorbing hemofilters with Prismaflex oXiris filter for the treatment of Myocarditis

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**Background**: Myocarditis is a challenging disease due to the heterogeneous clinical manifestations and varying aetiology.

Case Report: We hospitalised a 14-year-old febrile boy with chest pain, tachycardia and pharyngitis. Echocardiography (TTE) showed an ejection fraction (EF) of ≤ 60% and a mild mitral regurgitation (Fig. 1a-c); troponin T was >50 ng/mL. The WBC and CRP were 27.5\*103/mL and 282 mg/L, respectively. The blood cultures were negative, and PCT normal. His condition quickly worsened; he developed a pulmonary congestion, pleural and pericardial effusion (Fig. 1d-f) and his EF dropped to 40% with moderate mitral regurgitation. Treatment consisted of diuretics, ACE-inhibitors, β-blockers and antithrombotics, including prophylactic Ceftriaxon. The patient was placed on continuous venovenous hemodiafiltration using cytokine-adsorbing Prismaflex oXiris filters (CVVHDF-CAH) at 35 mL/kg/hr. Azithromycin was included in the therapy at this stage; we replaced the hemofilters every 24 hr. Therapy improved the clinical condition within 48hr; troponin T decreased to 0.19 ng/mL. The patient was afebrile with improved cardiopulmonary parameters at discharge on day 8 (Fig. 1g-i). We reassessed the patient on day 15; he was in good condition, EF> 55% with a normal mitral profile.

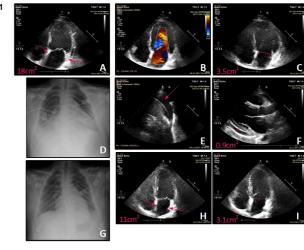
#### Discussion:

Myocarditis is a rare and severe cardiac inflammatory disease. The endomyocardial biopsy is the gold standard diagnostic method, but it is infrequently used due to the risks. Treatment of myocarditis is supportive [1]. Removal of pro-inflammatory mediators is an attractive approach to curb the disease progression. CVVHDF-CAH using Oxiris filter can efficiently eliminate inflammatory cytokines and chemokines, resolve pulmonary congestion, prevent acute renal failure and pulmonary oedema [2]. We administered prophylactic broad-spectrum antibiotics to reduce the risks of bacterial co-infections but delayed the inclusion of Azithromycin until the start of the CVVHDF-CAH due to its nephrotoxicity.

#### References:

Canter et al., Circulation 2014. 2. Turani et al., Critical Care 2013
 Learning points: CVVHDF-CAH using Oxiris filter is an attractive adjuvant therapy for Museuralitie.

Figure 1



#### 09AP10-7

## Hemofiltration can effectively lower blood glutamate levels in critically ill patients

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Background and Goal of Study: Excess concentrations of glutamate following acute and chronic brain insults have been shown to play a well-established role in secondary brain damage, and are associated with a poor neurological outcome. Previous studies have suggested that hemodialysis and peritoneal dialysis may be effective in reducing blood glutamate levels; however, these methods may not be viable for hemodynamically unstable patients. Hemofiltration is associated with more a favorable hemodynamic profile, longer duration, and less need for anticoagulation. This study examined whether blood glutamate concentrations

1st session

Materials and Methods: Blood samples were taken from 10 critically ill patients immediately before initiation of hemofiltration, and after 1, 2, 4, 6 and 12 hours. for a total of 6 blood samples. Samples were sent for determination of glutamate glutamate oxaloacetate transaminase (GOT), glutamate pyruvate transaminase (GPT), hemoglobin, hematocrit, urea, creatinine, glucose, sodium, potassium, platelet and white blood cell (WBC) levels.

Results and Discussion: There was a statistically significant reduction in blood glutamate levels by 1 hour after starting HF compared to baseline levels (p<0.05) Values continued to decline, reaching significance at 4 and 6 hours after HF initiation (p<0.05. Fig 1). There was no difference in levels of GOT or GPT.

Conclusion: This study demonstrates that glutamate can be cleared from the blood by hemofitration. This suggests a potential therapeutic role for hemofiltration in reducing blood glutamate levels, especially in critically ill patients where hemodialysis and peritoneal dialysis may be contraindicated.

#### 09AP10-8

#### The Most Frequently Cited 100 Articles Related to Nutrition in the Critical Care Literature

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Background: We investigated most highly cited 100 articles related to nutrition in the critical care literature.

Materials and Methods: Using the advanced mode of the Web of Science (WOS), the words "WC=Critical Care Medicine AND TS=nutr\* OR WC=Critical Care Medicine AND TI=nutr\* OR WC=Nutrition & Dietetics AND TS=intensive care OR WC=Nutrition & Dietetics AND TI=intensive care OR WC=Nutrition & Dietetics AND TS=critical care OR WC=Nutrition & Dietetics AND TI=critical care" were used to scan articles on December 2017.

Results and Discussion: From 1975 to date, it appears a total of 5182 articles related to nutrition in the critical care were published in the WOS. The most cited article had 806 citations, the least cited article had 120 citations. The mean citation number was 218.88±131.46. The mean annual citation number for the articles varied from 89.56 to 3.56 and the mean was 16.00±13.83. The most cited article was by McClave, Stephen et al. "Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically III Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition(ASPEN)" published in "Journal of Parenteral and Enteral Nutrition". Most three area's of articles related to nutrition in critical care focused in; "Enteral Nutrition", "Immuno-Nutrition", and "Outcomes of the Nutrition" were conducted in 24%, 23%, and 20% studies, respectively. The three journals that appeared most frequently in the top 100 were Critical Care Medicine (51%), Intensive Care Medicine (14%), and Journal of Parenteral and Enteral Nutrition (7%). Of the articles, 96% were listed in the SCI and only 4% were listed in the SCI-E. The top three countries listed for authors were USA (36%), Canada(%14), England(9%), and Germany(9%). Of the authors, 37% on the continent of Europe and 63% outside the continent of Europe. There was no significant difference found between the continent of authors, index of journal and the total number of citations and mean annual number of citations

Conclusion: This is the first study to investigate articles with most citations in the field of nutrition in critical care literature. The most cited article had 806 citations The most frequently cited studies in the field of nutrition include "Enteral Nutrition topics. There was no significant difference found between the continent of authors or index of journals and the total and mean annual number of citations.

### Critical Emergency Medicine - Trauma and Resuscitation

#### 10AP01-1

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#### Kinetics of plasma procalcitonin during the acute phase of severe traumatic brain injury

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Background and Goal of Study: Procalcitonin is recognized as a biomarker of inflammation and sepsis, plasma levels were found after major surgery and polytrauma. The aim of our study is to evaluate the kinetics of plasma procalcitonin during the acute phase of severe trauma.

Materials and Methods: 78 Severe trauma are included in a prospective study. were excluded from the study those who had a serious medical history that could interfere with the assay of procalcitonin or other acute pathologies may alter the procalcitonin. It was noted severity scores (IGSH0 / H48, ISS, BSC) and the kinetics of white blood cells, CRP, creatinine and procalcitonémie (ELISA [Brahms®]). Venous samples were taken at J1,2,3 and J7.

Results and Discussion: The average PCT at day 2 was  $14.3 \pm 7.6 \mu g$  / I for patients with an ISS score at admission≥25 versus 3.6 ± 2,2µg / I for those with ISS <25 (p = 0.022). The average PCT at day 7 for patients with an ISS score at admission ISS≥25 was 8.5 ± 4,1µg / I versus 0.6 ± 0,38µg / I for those with ISS <25 (p = 0.031).

	dead	favorable	
PCT 2	8,5±5,8	6,7 ± 1,4	0.02
PCT 3	9,1±6,2	7,6 ± 1,5	0.016
PCT 7	31,5±7,5	19,1±4,2	0.008

Conclusion: The significant increase of the kinetics of blood Procalcitonin seems to be a predictive factor of gravity References

1. Shuixiang Deng et al. Procalcitonin as a marker of sepsis and outcome in patients with neurotrauma: an observation study. BMC Anesthesiology 2013.13:48.

#### Influence of Gender and Age on the Performance of Chest Compression by Anesthesiologists - Data from Departmental Training Using the RQI System®

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Background and Goal of Study: The quality of cardiopulmonary resuscitation (CPR) is a major determinant of the survival from cardiac arrest. The aim of the present study was to test the association between rescuers' gender, age and the accuracy of chest compressions among anesthesiologists.

Materials and Methods: 60 anesthesiologists performed 3, 2 minutes cycles of chest compressions with 2 minutes rest between cycles. The RQI (Laerdal) realistic mobile simulation station was used for training and data collection. Data on - mean compressions depth (MCD), percent of deep enough compressions (DEC), percent of fully released compressions (FRC) and mean compressions rate (MCR) were

Results and Discussion: MCD and DEC increased from the 1st to the 2nd training session (p<0.05); MCD, DEC (p<0.001) and FRC (p<0.05) increased from the 1st to the 3rd training session. (Table 1) There was no change in the MCR.

Gender differences: Unlike male anesthesiologists (n=42), female anesthesiologists (n=18) did not improve their performance with training sessions. Men anesthesiologist performed better than female anesthesiologists did in MCD (53.9±6.8cm vs. 49.5±4.4cm, p<0.05; 56.2±4.4cm vs 49.2±7.1 p<0.01; 57.2±3.5 cm p<0.001, in the 1st, 2nd and 3rd sessions respectively). and DEC (75.1±35.5% vs 57.7±36.1%. 88.1±23 vs 59.9±36.9. 94.5±66.5 vs 66.5±36.7; p<0.05 in the 1st, 2nd and 3rd sessions respectively).

Age differences: While all 36 anesthesiologist younger than 50 years completed 3 training sessions, 3/24 older anesthesiologists were exhausted and quitted training following the 1st sessions. Both groups improved performance with training and there were no differences between age groups.

Mean Depth (cm)	Deep enough (%)	Mean rate (comp/ min)	Mean Depth (cm)	Deep enou- gh (%)	Mean rate (comp/ min)	Mean Depth (cm)	Deep enough (%)	Mean rate (comp/ min)
52.6	69.6	78.6	54.4*	79.8*	112.3	55.3**	86.0**	114.6
±7.4	±36.9	±32.1	±6.2	±30	±20.4	±6.1	±25.7	±17.2

2nd session

\*p<0.05 \*\*p<0.01 In comparison to 1st session # in comparison to 2nd session Conclusion: Data support previous published data on the influence of gender and age on the quality of CPR. Data also suggest that in future training at least three training sessions should be performed

#### 10AP01-3

#### Targeting Tie2 restores haemorrhagic shock-induced microcirculatory perfusion disturbances in cremaster and kidnev during fluid resuscitation in rats

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Background and Goal of Study: Haemorrhagic shock (HS) is associated with acute kidney injury (AKI) and increased mortality. Previously, we showed that targeting the endothelial angiopoietin/Tie2 system, which is involved in microvascular leakage, reduced HS-induced vascular leakage and restored microcirculatory perfusion in the cremaster. We hypothesised that the Tie2 agonist, vasculotide (VT), also restores renal perfusion as first step in prevention of AKI

Materials and Methods: HS was induced in rats by blood withdrawal till a MAP of 30mmHg. After 1 hour, rats received VT or PBS as control, followed by fluid resuscitation for 4 additional hours to maintain MAP>50mmHg. Microcirculatory perfusion was measured in the cremaster muscle using intravital microscopy (n=10 per group) and in the kidney using contrast echography (n=5 per group) Renal perfusion was calculated by multiplying microvascular filling velocity and microvascular blood volume.

Results and Discussion: HS was characterized by a significant drop in MAP and heart rate and the development of metabolic acidosis. HS reduced the number of perfused capillaries (5±2 vs 11±2, P<0.0001) and increased non-perfused capillaries (10±2 vs 5±1, P<0.0001) in the cremaster compared to sham rats. Fluid resuscitation partly restored cremaster perfusion (perfused 8±2 P<0.001, nonperfused 8±3. P<0.01). HS decreased renal microvascular filling velocity (0.5±0.3) vs 1.0±0.3 sec-1, P<0.01) without affecting microvascular blood volume (197±188 vs 390±202 a.u., P=0.25), resulting in decreased renal perfusion (61±20 vs 334±61, P<0.01) compared to sham rats. Fluid resuscitation restored renal perfusion (175±27, P<0.05). Administration of VT had no effect on systemic haemodynamics. VT restored microcirculatory perfusion in the cremaster during fluid resuscitation compared to untreated HS rats (perfused 10±3 vs 8±2, P=0.07, non-perfused 6±2 vs 8±3 P<0.05). Interestingly, one hour following fluid resuscitation microvascular blood volume (788±476 vs 253±98 a.u., P<0.001) and renal perfusion (471±243 vs 188±62, P<0.01) were higher in VT compared to untreated HS rats, but this effect abolished over time (230±98 vs 175±21, P=1.0).

Conclusion: Targeting Tie2 with vasculotide restored microcirculatory perfusion in the cremaster and kidney following haemorrhagic shock and fluid resuscitation. Future studies will focus on targeting Tie2 as therapeutic target to prevent AKI following haemorrhagic shock.

### 10AP01-4

#### Sonographic support in non shockable cardiac arrest : diagnosis of pseudo-PEA and probability of occurrence of ROSC in the out of hospital setting

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Background and Goal of Study: Over the last decade, the prevalence of PEA as presentation rhythm of cardiac arrest(CA)increased more than those of VT/VF and become a challenge for providers of the Emergency Medical Service. An additional visual support during ACLS protocol might show that the PEA would be related to mechanical activity detected with pocket size ultrasound (i.e.focused

cardiac US evaluation FOCUS). This condition pseudo-PEA has different features than true Pea (no pulse and any cardiac motion at FOCUS). Aim of study was to describe if pseudo-Pea was linked with higher probability of ROSC compared to true Pea in Out of Hospital CA (OHCA).

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Materials and Methods: This was an observational descriptive study.

Between September 2015 and December 2017 we enrolled patients from FMS of Western Liguria who, underwent cardiopulmonary resuscitation US-assisted, for OHCA.

FOCUS examination was performed during the pulse check of resuscitation effort with a pocket size ultrasound (GE Vscan©) for not more of 10".

Presence of any cardiac motion was recorded and linked with electrocardiografic activity and ROSC.

Exclusion criteria were expected death,OHCA not testified,and dispatch-guided CPR not carried out.

Results and Discussion: All Exams performed showed a good technical result

(n=30). Male/Female ratio was 1.5.

Median Age was 80 years (interquarile range 24).

The ALS team observed these rhythms

asystole = 64% PÉA = 30%

VT-NP/VF both = 3%

Mechanical activity was detected in 55.% of PEA (i.e.pseudoPEA).

ROSC was achieved in 100% of VT/VF,10.5% of asystole,80% of pseudo-PEA and 0% of true-PEA.

Result suggested the presence of electrical activity and left ventricular contraction was linked to better response to higher frequency of ROSC than absence or only valve motion.Conclusion: FOCUS allowed to detect mechanical cardiac activity in PEA patients in the pre-hospital setting.

Rhythms more frequently detected by ALS team are the non-shockable.

Frequency of ROSC in pseudo-Pea was higher than other non shockable rhythms (e.g.true PEA and asystole)

These results underlined the utility to enhance use of US support in the prehospital ALS scenario

#### 10AP01-5

Differences between conventional laryngoscopy, video laryngoscopy and flexible fibre optics with regard to the change in dural sac width on an unfixed cadaver model with unstable cervical spine injury

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Background: Airway management in the case of patients with an unstable cervical spine requires a cautious approach if secondary damage is to be prevented, but the question regarding the optimum method still remains unresolved. The aim of our study was to investigate whether intubation through conventional laryngoscopy, by using a video laryngoscope and by means of a portable, flexible fibre bronchoscope varied with regards to dural sac compression on an unfixed human cadaver model with two different unstable injuries of the upper cervical spine...

Methods: Orotracheal intubation by conventional laryngoscopy, by using a video laryngoscope and by using a flexible disposable endoscope system were performed in 6 fresh human cadavers under myelography by lateral fluroscopy. Compression of the dural sac at the C0/C1 and the C1/C2 level as well as secondary parameters were assessed in the intact spine as well as in presence of isolated atlanto-occipital dislocation an of combined atlanto-occipital dislocation and atlanto-axial instability. Results: Fiberoptic intubation showed less compression of the dural sac than conventional and videolaryngoscopy at the C0/C1 level in isolated AOD as well as in combined AOD and AAI At the C1/C2 level fibreoptic intubation showed less compression than conventional and videolaryngoscopy in isolated AOD and less compression than videolaryngoscopy in combined AOD and AAI. Videolaryngoscopy resulted in less compression than conventional laryngoscopy at the C0/C1 level, but not at the C1/C2 level.

Conclusions: Intubation using a fibre bronchoscope caused the least dural sac compression in our cadaver model with unstable cervical spine.

### 10AP01-6

#### Gender differences in CPR-quality and use of automated external defibrillators

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Background and Goal of Study: Effective Basic Life Support (BLS) is crucial to improve survival after cardiac arrest. The early use of automated external defibrillators (AED) is a key point in the chain of survival. The aim of this study was to evaluate a possible gender difference in the quality of chest-compression-only (CCO) CPR and the handling of an AED.

Materials and Methods: 445 first year medical students were asked to participate in this open, prospective controlled trial. After providing written informed consent the students were asked to perform single-rescuer CCO CPR on a manikin (Ambu Man C, Ballerup, Denmark) and to follow the instructions of an AED for 4 minutes. Baseline demographics (such as gender and body mass index (BMI)) of the students were documented. CPR-quality was assessed by using the combined parameter "effective compression ratio" (ECR). ECR is defined as chest-compressions with correct depth, correct hand position and complete decompression multiplied by flow time (active CPR time). In the tested setting, correctly performed CCO CPR has a maximum ECR of 0.92.

In addition, time-related parameters of the AED use were documented and the students were asked to subjectively rate their own CPR-quality on a 10 point Likert-scale, where 1 means poor and 10 means excellent.

Data are presented as mean  $\pm$  SD. A p-value < 0.05 was considered significant. **Results and Discussion**: 297 female and 148 male students participated in this study. ECR differed significantly between genders (Female: 0,13  $\pm$  0,20, Male: 0,08  $\pm$  0,14; p = 0.001). The table shows the collected data. The subjective rating of the CPR-quality was significantly higher in the group of male participants compared to the female participants (7,0  $\pm$  1,6 versus 6,5  $\pm$  1,8, p =0.001).

Parameter	Male, mean ± SD	Female, mean ± SD	p-value
Compression rate, n/min	99 ± 14	100 ± 13	0.52
Compression depth, mm	52 ± 10	47 ± 12 mm	< 0.001
Wrong hand position, %	21,3 ± 30,6	21,9 ± 30,9	0.85
Incomplete decompression, %	50,2 ± 38,2	34,5 ± 36,8	< 0.001
Flow time fraction, %,	84,8 ± 2,8	83,2 ± 8,5	< 0.004
Body mass index (BMI), kg/m <sup>2</sup>	23,1 ± 2,5	20,8 ± 2,6	< 0.001

**Conclusion**: Female participants achieved a significantly better objective CPR-quality (ECR), but they subjectively rated their own CPR-quality significantly worse than the male participants. Further studies are necessary to evaluate this impact of gender on CPR-quality, but CPR trainers should be aware and address these gender differences during CPR training.

#### 10AP01-7

## The study of the immune profile dynemics and the level of endogenous intoxication in patients with polytrauma

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**Background and Goal of Study**: Formation of the reaction of the immune system to the polytrauma begins with the first minutes of its receipt, the implementation of adaptive reactions to primary damage with a high risk of multiple organ disfunction development.

The aim of the study: Study of the immune status level and the severity of the inflammatory response in patients with polytrauma. Measurement of the level of C-reactive protein was carried out by a "sandwich - variant" of solid-phase immuno enzyme analysis

Materials and Methods: The immune status was studied in 95 patients with polytrauma during the first day after receiving an injury (LII, the CD3, CD4, CD8 population, the immunoregulatory index, IgG, IgM according to standard techniques). Measurement of the level of C-reactive protein was carried out by a "sandwich - variant" of solid-phase immuno enzyme analysis.

Results and Discussion: The index of LII (leukocyte index of intoxication) was studied, that was at the level of  $0.91 \pm 0.08$  during the first day (norm - 0.8-1.6). Increasing of the C-reactive protein in the level of 8 times and amounted to 24.6 ± 4.1 mg/l (norm-0-3 mg/l). The analysis of primary cellular indicators and humoral immunity revealed that the relative number of T lymphocytes CD3 was  $53.4 \pm 4.2\%$ , which was 21.5% lower than the norm of 58-76%. Expression of the populations of helpers and suppressors was initially reduced by 11.8% and amounted to 20.3 ± 2.6%, for the CD4 population (norm-23-48%), decreased by 6.5% -15.9  $\pm$  1,6% for the CD8 population respectively(norm-17-25%). The decrease in immunoreactivity was confirmed by low values of the immunoregulatory index - 1.28±0.02 (norm-1.8-2.5). The level of immunoglobulin fractions was within the normal range; for IgM  $1,01 \pm 0,03$  g/l (norm-1,19-2,4 g/l). For lgG values were  $6.6 \pm 0.3$ g/l (norm -8-17g/l). Conclusion: Thus, in response to traumatic effects, on the one hand, there was a pronounced inflammatory stimulation characterized by high C-reactive protein that indicates the initiation of an inflammatory response within the next hours after the injury, on the other hand, there was the hyporeactivity of the cellular and humoral

#### 10AP01-8

#### **Processing Times and Usability of Manual Defibrillators**

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**Background:** Manual Defibrillators underwent a rapid technical progress. Thus, the complexity of operating such a device has increased likewise. The accurate use of a manual defibrillator can prevent a delay in starting CPR and reduce interruptions of chest compressions [1]. The study aimed at evaluating the usability of modern manual defibrillators from 4 manufacturers. We hypothesize that usability differs between the devices.

Methods: After informed consent (ERB of the University of Freiburg), 43 voluntary operators were asked to execute a series of tasks, typical for a cardiac arrest scenario, at 4 different defibrillators (Lifepak™ 20 (Physio-Control Inc., USA), Defigard Touch 7™ (Schiller, Switzerland), Corpuls 3™ (GS, Germany) and X Series™ ALS (Zoll-Chelmsford, USA). Operators were naïve to the included devices. The operators' gazes were measured via an eye-tracking device (Tobii Pro Glasses 2, Tobii AB, Sweden). From these data, task's processing time (PT), time until the operator first fixated the interface's area of interest (TFF) and the operator's gaze distribution (Heat Map) were analysed. After having executed the task, the operators' evaluated the usability via a standardized questionnaire. The primary endpoint was TD. Secondary endpoints included TFF and usability score (data given as mean±SD; α<0.05 was considered significant).

Results: In certain tasks TDs differed significantly between the defibrillators. Exemplary tasks showing TDs being longer compared to other devices were "Set defibrillation energy to..." in the Defigard Touch 7™ (41±34 s) and the Corpuls 3™ (26±16 s), "Activate pacemaker mode" in the Lifepak™ 20 (20±17 s) and "Connect the therapy cable" in the X Series™ ALS (71±30 s). Executing the task "Activate AED mode" in the Defigard Touch 7™ required long TD (40±32 s) and long TFF (11±14 s), indicating some operators' confusion on locating the function's button. This finding is also supported by the respective heat map. Overall, operators' rated usability the best in the Lifepak™ 20 (all p<0.01), followed by Corpuls 3™, Defigard Touch 7™ and X Series™ ALS.

**Conclusion:** Our findings reveal evident differences of the usability of manual defibrillators, depending on the task in question. Shortcomings of the interfaces impair the operator's efficiency. Eliminating these issues might improve the operator's performance and, as a consequence, the patient's safety.

#### References:

1. Chan et al. JAMA 2010;304(19):2129-36

#### 10AP01-9

## Seeing further beyond with point-of-care US: a powerful tool in the perioperative setting

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**Background**: Point-of-care ultrasound has been gaining importance as a valuable tool for evaluating critical patients in the ICU or emergency department. This skillset can also be applied in the peri-operative setting. We present a case where its use allowed safe management of a potentially fatal surgical complication.

Case Report: An ASA I 37-year-old female underwent an uneventful elective abdominal hysterectomy under general balanced anaesthesia. At the postoperative care unit, she started an IV perfusion of Metamizole, Tramadol and Metoclopramide. Shortly after she complained of nausea, dyspnea, and she was pale, hypotensive and tachycardic. Our main hypothesis consisted of intraabdominal hemorrhage; despite an initial responde to fluids, this diagnosis was not supported by the arterial blood gas lab findings. Furthermore, the surgeon performed an endovaginal and abdominal ultrasound (US) which did not reveal any free fluid. Differential diagnosis included anaphylaxis and pulmonary embolism: as such, the IV infusion was stopped and 0.5mg of IM Adrenaline and 200mg of IV Hydrocortisone administered, with no improvement. We then performed a focused cardiac US, which revealed an hyperkinetic, "empty" right ventricle and a collapsed inferior vena cava. Although a 2nd abdominal US still revealed no free fluid, our high suspicion for hemorrhage led us to perform emergent surgery, which confirmed our hypothesis (with numerous blood clots limiting the blood pooling in the costophrenic recesses). We were ultimately successful in its management, and the patient was transfered to the ICU for post-operative vigilance.

**Discussion**: Point-of-care US is a relatively novel instrument which allow diagnosis, monitoring and management of several different stages of the ABCDE approach. In this case, it heightened our suspicion of hemorrhage and helped us timely manage of an otherwise fatal case: intra-operative attitudes demanded the activation of massive hemorrhage protocol due to a clinical picture of consumption coagulopathy, as well as hypothermia and acidosis.

#### References:

 Focused cardiac ultrasound: recommendations from the American Society of Echocardiography. Spencer KT et. al. J Am Soc Echocardiogr. 2013 Jun;26(6):567-81

**Learning points:** Point-of-care ultrasound is a rapidly-expanding field with important implications in anesthesia, from pre-operative evaluation to intra and post-operative monitoring, diagnosis and management of intra and post-operative events.

#### 10AP01-16

#### Comparison of Emergency Medical Services among European Union member states: A Healthcare Professionals Associations Survey

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Background and Goal of Study: Different organization schemes and functioning of the emergency medical services (EMS) within the Croatian healthcare system prompted us to to investigate the functioning of this component of the medical system in the European Union.

Materials and Methods: Committee for International Cooperation of the Croatian Medical Chamber conducted a comprehensive survey among 16 European Union (EU) member states. The questions were answered by representatives of the national medical associations/chambers of EU countries as listed: Austria, Bulgaria, Croatia, Czech, Republic, Denmark Estonia, Germany, Greece, Hungary, Italy, Lithuania, Malta, Romania, Slovakia, Slovenia and Sweden. The concept of the questionnaire was based on the composition of emergency care teams, organization of the emergency medical service in local communities, the implementation models of emergency aid at primary and secondary levels, triage scales as well as patient participation in the service process.

Results and Discussion: Organization of EMS among EU member states differs considerably Out-of-hospital acute medical care in the majority of countries is provided by a medical doctor and a registered nurse in an emergency ambulance car. Most of the surveyed countries (80%) have organized Integrated Emergency Hospital Units (IEHM). Patients are triaged by registered nurses in the 45% of countries, and afterwards in 73% of surveyed countries the patients are treated by residents and specialists of internal medicine, anesthesiology and surgery. General practitioners are not equally involved in the treatment of emergency patients: in 26% of countries they are not obliged to participate in the management of emergency patients, in the rest the mechanisms vary considerably. Nearly 80 % of countries reported misuse of IEHM for the purpose of avoiding general practitioners, but only 5 countries have measures for controling this trend.

**Conclusion:** Implementation models of emergency medical services are very divergent between surveyed countries, and mostly not synchronized even at national levels.

#### 10AP02-1

## A retrospective audit of outcomes after traumatic brain injury in a regional hospital in Singapore

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Introduction: Traumatic brain injury (TBI) is the leading cause of death and permanent disability in children and young adults all over the world. In this retrospective audit, we aim to look at epidemiology and outcomes from a non-tertiary regional hospital.

Methods: The study is a retrospective review of patients who were admitted to our SICU between 2013 and 2015. Data was retrieved from patient medical records, hospital information system, and post-mortem reports, captured in the Singapore National Trauma Registry. The inclusion criteria was TBI cases admitted to SICU / HDU with ISS more than/equal to 9. Phone interviews were conducted for patients admitted with ISS >15 in the form of a questionnaire GOS-E for patients who were admitted from January 2013 to May 2014.

The primary outcome was mortality rate and secondary outcome was disability based on GOS-E score.

**Results:** A total of 367 patients were admitted to the SICU with TBI between 2013 and 2015. 73.8% were male and 26.2% were female. The median age was 51(IQR 32-67). The majority were Chinese (65.1%). Common mechanisms of injury were road traffic accident (46.1%) and fall (42.0%).

Of the patients admitted, 30.8% had severe TBI, 18.5% had moderate TBI and 50.7% had mild TBI.

Primary Outcome

The overall mortality rate of patients with TBI on discharge was 20.4%. The mortality rate was 44.2%, 13.2% and 8.6% for severe, moderate and mild TBI respectively. Secondary Outcome

Phone interviews had been carried out for patients admitted between Jan 2013 to May 2014, 6 months after the initial injury to determine their functional status based on GOS – E score. A total of 150 patients had ISS >15, with 28% (n= 42) mortality before discharge. 93 patients were eligible for interview with a total of 88 patients evaluated. 28.4% had severe disability or had expired; 9.1% had moderate disability; 62.5% had good recovery.

**Discussion:** Although our hospital is not a tertiary trauma center, a large proportion of patients are admitted to us with trauma. Our outcomes are similar to international standards. At the time of review, our TBI patients had been managed largely based on BTF guidelines. In 2015, department guidelines/protocols had been established and further updated in 2016. Further audits will need to be done to determine adherence to the protocols.

#### 10AP02-3

# EEG suppression ratio monitoring in successfully resuscitated out-of-hospital cardiac arrest patients: a novel prognostic marker

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Background and Goal of Study: Numerous studies already assessed the role of bispectral index (BIS) monitoring to assist in early neuroprognostication in the post-cardiac arrest (CA) setting. We investigated the prognostic role of the suppression ratio (SR), another parameter calculated by the BIS EEG monitor, in out-of-hospital cardiac arrest (OHCA) patients admitted to the ICU.

Materials and Methods: Between 2011 and 2015, 77 successfully resuscitated OHCA patients were enrolled in this prospective, observational study. Immediately after ICU admission, targeted temperature management (TTM) at 33°C was initiated for 24 hours followed by a rewarming period over 12 hours. Bilateral BIS monitoring was simultaneously initiated using the BIS VISTA™ (Aspect Medical Systems, Inc. Norwood, USA). Suppression ratio values were measured continuously together with BIS values. Mean SR values were then calculated per hour and used for further data analysis. A receiver operator characteristics analysis was performed to determine the optimal SR threshold and optimal time point to predict poor neurological outcome. At 180 days post-CA, neurological outcome was defined using the cerebral performance category where a CPC1-2 and CPC3-5 was defined as good and poor neurological outcome.

Results and Discussion: Thirty-nine (51%) out of the 77 OHCA patients had a poor neurological outcome at 180 days post-CA. In these patients, mean SR was higher during both the hypothermic phase at 33°C (CPC1-2: 6±12 vs CPC3-5: 37±27; p<0.001) and the rewarming period (CPC1-2: 3±12 vs CPC3-5: 22±28; p=0.001). The optimal time point to predict poor neurological outcome was at hour 23 using a mean SR value above 2.5. This corresponded with a positive predictive value of 89.3% (95% CI: 70.6 – 97.2%), a negative predictive value of 71.4% (95% CI: 56.5 – 83%) and a false positive ratio of 10.7% (95% CI: 2.8 – 29.4%). Only three patients with a mean SR value above 2.5 at hour 23 attained a good neurological outcome. The presence of at least a single SR value above 2.5 at hour 23 was associated with a 4.4-fold higher risk of poor neurological outcome (95% CI: 2.09-9.30; p<0.001).

**Conclusion**: This study demonstrated that EEG suppression ratio, obtained by the BIS monitor, might assist with early poor outcome prognostication in successfully resuscitated OHCA patients.

#### 10AP02-4

## The Shok Index as apredictor of massive transfusion in trauma patients

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Background and Goal of Study: Haemorrhage is the leading cause of shock in trauma patients. Shock Index (SI) is the ratio of heart rate to systolic blood pressure. It's a useful tool guide diagnosing hypovolemia. The objective of this study is to compare the prehospital SI (PH-SI), hospital admission SI (H-SI) and Critical SI (C-SI) as predictors of massive transfusion.

Materials and Methods: Retrospetive study from patients arrived to the hospital from January 2013 to 2016, as trauma code that required required admission in critical care unit. SI was calculated from the first prehospital register, hospital and critical care values. The first 24 hours transfused red blood units (RBU) were recorded. IS and RBU were compared with the analysis of variance and with the Spearman correlation test. A p-value ≤ 0.05 was considered significant.

Results and Discussion: The patients recruited were 184 (81.5% male), age 43.5 (31-59), Injury Severity Score 29 (22-36) and total mortality 26 patients (14%). The transfusion requirements were 4 (2-6) units. The SI values were as follows: PH-SI: 0.77 (0.61 - 1.01); H-SI: 0.78 (0.64 - 1.00); C-SI: 0.92 (0.76 - 1.13).

#### 5-<10 >=10 <5 RBU р n=21 1.20 n=13 0.86 1.33 PH- SI 0.013 (0.69 - 1.10) 0.91 (0.61 - 1.76) 1.32 (0.78 - 1.32) H- SI 0.009 (0.74 - 1.22)(0.94 - 1.57)(0.94 - 1.81)1.24 0.187 C-SI (0.83 - 1.27) (1.00 - 1.48) (1.08 - 1.64)

The Spearmen correlation index RBU comparing PH-IS H-IS and C-IS was 0.46 (p < 0.001), 0.66 (p < 0.001) and 0.295 (p = 0.02) respectively.

Conclusion: The PH-SI an H-SI, but not the C-SI, are good predictors of transfusion requirements in critical trauma patients[W1] [W2].

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- 2. A Olaussen et al. Injury Int J Care Injured 2015; 46: 822-826

#### 10AP02-5

#### One-year mortality of patients admitted to the intensive care unit after in-hospital cardiac arrest: a retrospective pilot study

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Background and Goal of Study: In-hospital cardiac arrest (IHCA) is one of the major adverse events in hospitalised patients, with a reported incidence of 1 to 5 per 1,000 admissions(1). Survival to discharge varies from 18-27% (2). Little is known about long-term survival after In-Hospital Cardiac Arrest (IHCA). The purpose of this study is to report the one-year survival of patients after cardiopulmonary resuscitation (CPR) for IHCA and to identify predictors of one-year survival in IHCA patients admitted to the intensive care unit (ICU).

Materials and Methods: A single-centre retrospective chart study was conducted of all adult in-hospital CPR attempts conducted between January 2003 and February 2014 in a 555-bed tertiary teaching hospital in Amsterdam (NL). The demographic and clinical variables of patients were obtained at 24 hours pre-arrest, during CPR and post-CPR during their ICU stay. All the patients were tracked one year after discharge from hospital.

Results and Discussion: CPR was performed for IHCA on 423 patients during the study period. Return of spontaneous circulation (ROSC) was achieved in 288 (68%) patients, of whom 236 patients were admitted to the ICU, Overall, 98 (23%) patients survived one year after discharge. The survival rate of patients who were admitted to ICU after IHCA was 38% (90/236) at hospital discharge and 26% (61/236) at one year after discharge. Univariate analysis showed numerous variables are associated with one-year survival, especially clinical scores such as APACHE and SAPS calculated at admission to the ICU.

Conclusion: The one-year survival of patients who were admitted to the ICU after IHCA was 26%. Survival was associated with patient and pre-arrest. CPR characteristics and severity of diseases at ICU admission reflected by clinical scores calculated then. A multicentre prospective cohort study will be conducted to further assess quantitative and qualitative outcomes References:

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#### 10AP02-6

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#### One-year survival after in-hospital cardiac arrest: a systematic review and meta-analysis

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Background and Goal of Study: In-hospital cardiac arrest is a major adverse event with an incidence of 1-6/1000 admissions. It has been poorly researched and data on survival is limited. The outcome of interest in IHCA research is predominantly survival to discharge, however recent guidelines warrant for more long-term outcomes (1). This systematic review aims to quantitatively summarise one-year survival after in-hospital cardiac arrest.

Materials and Methods: This systematic review and meta-analysis was reported following the PRISMA and MOOSE guidelines and was registered with PROSPERO. We performed a systematic search of all published data up to June 20th, 2017. Results of the meta-analyses are presented as pooled proportions with corresponding 95% confidence intervals (CI). Between-study heterogeneity was assessed using I2 statistic and the DerSimonian-Laird estimator for T2. Subgroup analyses were performed for cardiac and non-cardiac patients.

Results and Discussion: Our search strategy retrieved 5984 records, of which 3652 remained after duplicates were removed. Finally, we included 37 studies in our systematic review and meta-analyse. The pooled one-year survival after inhospital cardiac arrest is 13.0% (11.0% - 15.0%; I2=100%). Subgroup analysis of cardiac patients revealed a one year survival of 40% (95% CI: 32% - 48%), while analysis in non-cardiac patients resulted in a one year survival of 10% (95% CI: 9% - 12%). These data cover the period 1985 - 2017 and show no significant change in survival over that period.

Conclusion: One-year survival after in-hospital cardiac arrest is poor. Survival is higher in patients admitted to cardiac wards. The time trend between 1985-2017 has shown no significant improvement in one-year survival rates. Research into IHCA population characteristics might elicit the issue of stagnated survival over the past decades.

#### References

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Acknowledgements: We would like to thank the Erasmus MC librarians for their

#### 10AP02-7

#### Limitations of medical treatment in pre-hospital setting in Finland

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Background and Goal of Study: Main ethical principle in medicine states that intended medical treatments should provide more benefit than harm. When patient's situation is terminal without hope of improvement, futile medical treatments are withheld or withdrawn. General guidance on withholding or withdrawing futile medical treatments are ethically noble but ambiguous, and practical local protocols for acute situations are often lacking. However, in these acute situations and in pre-hospital setting anesthesiologists often have to make limitations of medical treatment (LOMT). The goal of this study is to examine the frequency and content of LOMT made by Finnish pre-hospital physicians. We also examine the quality of information available when making the decisions on treatment.

Materials and Methods: An observational nationwide multicenter study conducted on five physician-staffed Helicopter Emergency Medical Service (HEMS) bases in Finland. We collected prospective data in FinnHEMS database for three months in 2017 on all patients within HEMS missions for whom the physician made a new LOMT

Results and Discussion: We observed 114 missions with new limitation of medical treatment, which was 3.6% (CI95% 3.0–4.2) of all missions (n=3166). Some HEMS missions were cancelled due to LOMT without encountering the patient. The frequency of making LOMT varied between bases 0.8% (CI95% 0.0-1.6) and 5.8% (Cl95% 4.0-7.6), Pearson's Chi-square, p<0.001. The most common limitations were do-not-attempt-resuscitation order (n=49), withdrawing an already initiated but futile cardiopulmonary resuscitation attempt (n=42) and withholding intensive care (n=42) and some patients received two to four different LOMT. When making treatment decisions, information from paramedics on scene was available in 89% but the patients' medical records in only 20% of situations. LOMT were made on patients in nursing homes or primary care facilities in 26% (n=30) of situations, which is 1% of all HEMS missions. The pre-hospital physicians had to make

decision on treatment limitations in n=47 (47%) situations where they thought that some LOMT should have already existed. Every third of these situations (n=15) occurred in nursing home or in primary care facility.

Conclusion: Making limitations of medical treatment is an intrinsic part of prehospital physicians' work in Finland. There seems to be variation in local LOMT protocols between HEMS bases.

#### 10AP02-8

#### High in-hospital cardiac arrest rate in a district general trust

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Background and Goal of Study: The National Cardiac Arrest Audit (NCAA) for the period 1/4/2015 - 31/3/2016 revealed a higher than expected number of cardiac arrests per 1000 hospital admissions at our Trust compared to national average. NCAA data for the period showed 44 cardiac arrests on hospital wards against an expected number of 30. The aim of our audit was to determine standards of care up to the cardiac arrest and potential for preventability.

Materials and Methods: Multidisciplinary retrospective analysis of retrieved patients' notes. All notes reviewed separately and independently by ITU/ Anaesthetics specialty doctor level or above and critical care outreach nurse.

Results and Discussion: Seventy-one percent (71%) of cases were > 70 yrs old and 42% of cases were >80 yrs old. DNACPR was not considered or discussed in 71% of cases. 21 cases out of 38 were from cardiac or respiratory ward or emergency assessment unit. In 26% of patients the observations had been significantly overdue. Thirty-one cases (82%) showed room for improvement (clinical and/or organizational) according to NCEPOD classification. 4-5 cases (11-13%) were considered as probable or strong evidence of preventability according to Hogan score (2). Twenty two (58%) did not have return of spontaneous circulation (ROSC). Of the 16 patients with ROSC: 4 were admitted to ITU; 10 ward based ceiling of care; 2 did not require ITU. 3 patients (<8% of arrests) survived to discharge home (1 via ITU, 2 ward only) (national average: >18%). 60% of cardiac arrest calls happened during night shifts. More than 60% (23) cases were admitted to hospital >3 days before cardiac arrest. 27 of 38 cases had >2 organ failures/ severe dysfunction upon time of admission. 15 cases had end stage disease (severe CCF with moribund status, severe COPD on home O2).

Conclusion: Shortfalls in vital signs monitoring may have contributed to the number of cardiac arrests. In view of hospital length of stay before arrest, co-morbid status and proportion of night-time arrests it appears that mainly an appropriate treatment escalation plan had been lacking in many patients. This was also reflected in the high number of patients who after ROSC were deemed inappropriate for admission to ITU. The systematic use of treatment escalation plans should be considered to ensure appropriate patient selection.

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National Cardiac Arrest Audit 2015/16 – ICNARC.

#### 10AP02-9

#### Comparison of different schemes of analgosedation in patients with severe traumatic brain injury in the postoperative period

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Background and Goal of Study: Compare different methods of analgosedation with using dexmedetomidin in patients with severe traumatic brain injury.

Materials and Methods: 80 patients were diagnosed with severe traumatic brain injury. Patients in the 1st group (n = 40) had analgosedation with morphine and sodium oxybutyrate (GOMK), and patients in the 2nd group (n = 40) were additionally treated with dexmedetomidine. The dynamics of concentration of stress markers (insulin, cortisol, glucose), HOMA index, autoantibodies to brain antigens restoration of consciousness by the Glasgow coma scale (GCS), duration of the artificial lungs ventilation (ALV) were determined.

Results and Discussion: It was found, that in the 2nd group the reduction of the intensity of stress reactions was occured 3-4 days earlier. It was found that analgosedation with using dexmedetomidin can reduce the peak of autoantibody concentration of S-100 protein, neurospecific enolase and total cerebral antigen (p <0.05). In the 2nd group the restoration of consciousness by the GCS was faster by 24.3% (p <0.05), the duration of ALV was less by 21.2% (p <0.05), and a frequency of pneumonia was less by 14.3% than in patients in the 1st group

Conclusion: The use of dexmedetomidin may reduce an intensity of stress and autoimmune reactions in patients with severe traumatic brain injury, accelerate a restoration of consciousness by the GCS and reduce the duration of ALV.

#### Inhalation injury and its impact on the quality of the treatment of burn patients

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Background and Goal of Study: Inhalation injury are defined as injuries of the upper respiratory tract caused by a direct effect of heat and /or chemical injury to the lower respiratory tract caused by inhalation of harmfull gases. Combined with skin burns, morbidity and mortality of patients with inhalation injury is significantly higher. The goal of our study was to determine the impact of inhalation injury on hospital stay and survival.

Materials and Methods: A five-year prospective study included patients older than 18 years, with II and III degree burn injury. Diagnosis of inhalation injury was made on a subjective assessment of the burn severity, thogether with the fact that it happend in closed space. Physical findings, burns of the face and neck, presence of soot in the proximal airway, throat irritation, coughing of the dark sputum, stridor and hoarseness were also used to confirm the inhalation injury diagnosis. We examined the impact of inhalation injuries on the lenght of hospital stay as well as on survival. T-test was used to compare the average values of the parametric features and Pearson Chi-square to compare the differences in frequency of categorical feature. Cox regression analysis was used in order to determine predictors of in hospital mortality. P values less than 0,05 were considered statistically significant.

Results and Discussion: 172 females and 472 males were included in the study. The avarage age of our patient was 54 years. Most of patients had combined burns of Ilb and III degre. Ila in 4.9%. Ilb in 34.5%. Ilb-III 53.6%, and III degre in 7.1% of patients. The most common mechanism of injury was flame (49.7%). Diagnosis of inhalation injury was made in 33 patients (5.1%), and overall mortality was 17%. The avarage length of tretmant of uor patients was 19+-18 days. A high-statistically significiant difference was observed in relation to the length of tretment of patients with and without inhalation injuries (23±7 vs. 16±15, days, p<0,001). Our results also showed that inhalation injury was also a significant predictor of intra hospital mortality (RR=11.95, CI=7.84-18.21).

**Conclusion**: Our study results confirm that presence of inhalation injury significantly affects length of hospital treatments as well as overall survival

#### 10AP03-1

#### Case report: Massive transfusion, ROTEM testing and goal directed fluid therapy in a trauma patient from the ER to the ICU. The challenge to prevent resuscitation coagulopathy

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Background: Severe trauma often results in uncontrolled, noncompressible diffuse microvascular bleeding, potentially leading to exsanguination. Importantly, 40% of trauma-related deaths are linked to coagulopathy. Patient management strategies in cases of major bleeding prioritize control of hemorrhage, maintenance of intravascular volume, and early support of coagulation. We report a case of multiple trauma and brain injury to highlight the role of guided management with ROTEM and CO/SVV monitoring.

Case Report: A 22 year old male was transferred intubated to our ER after a severe motorcycle collision. Upon admission an ABCDE approach was implemented and ROTEM was ordered. During CT scanning he became unstable and was moved to the OR under vasopressor support. The patient suffered multiple fractures (pelvic, ribs and occipital condyle); right hemopneumothorax; right hemidiaphragm, liver kidney, adrenal gland and bladder rupture; retroperitoneal hematoma; diffuse axonal injury and intraventricular hemorrhage. During damage control surgery, hemostatic resuscitation was conducted and our interventions were matched to ROTEM. Standard monitoring, IBP, invasive CO/SVV, temperature, BIS were applied. Goals of treatment remain MAP ≥80mmHg, Hb 7 to 9 g/dl and avoidance of metabolic acidosis, hypothermia and coagulopathy. Data from continuous evaluation of hemostatic and hemodynamic parameters guided a total transfusion of 12 RBC. 6 FFP, 3 SDP and infusion of 2g Tranexamic acid, 6g fibringgen, 2500IU PCC and 10L of crystalloids according to SVV. After the 5 hour intervention at admission to the ICU the ROTEM was normal. After 3 months of hospitalization, the patient was discharged to a rehabilitation center. Discussion: Damage Control Resuscitation is characterized by prompt evaluation

of coagulopathy and targeted treatment along with permissive hypotension pursuing a restricted fluid resuscitation strategy. The ultimate goal is to prevent and treat the lethal triad. However, fluid resuscitation management is controversial for patients with severe TBI and hypotension is inappropriate. In this case, CO/SVV monitoring was applied to provide indices of hemodynamic status along with ROTEM testing for a multifaceted goal directed approach.

Learning points: DCR should be adjusted to polytrauma patients with severe TBI. Special measures regarding MAP and fluid therapy should be considered and goal directed hemodynamic and hemostatic management may provide guidance.

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#### 10AP03-2

#### Unresponsive patient after flexible bronchoscopy - a fatal case of cerebral air embolism

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Background: Vascular air embolism (VAE) during bronchoscopy is a rare but serious complication<sup>1</sup>. Presentation depends on the volume and rate of gas infusion and can range from clinically undetectable to cardiovascular collapse. Neurological manifestations may arise from arterial or paroxysmal emboli, or be secondary to hypoperfusion<sup>2</sup>.

Even though considered a safe procedure, bronchoscopy implicates several risk factors for VAE, such as sitting position, pressure gradient and air inflation.

Case Report: A 19 year old female with stage IV Hodgkin lymphoma underwent flexible bronchoscopy under sedation with propofol. A lung biopsy was performed. followed by air installation (120mL) and lavage with saline. Simultaneously, an episode of desaturation and bradycardia was treated with supplemental O2 and atropine. At the end of the procedure, the patient was hemodynamically stable but unconscious. Pupils were isochoric and reactive, decerebrate movements were elicited by painful stimuli and spontaneous but irregular breathing required intubation and assisted ventilation. Blood gas analysis was normal. Brain CT revealed cortical air emboli and infarctions. Hyperbaric oxygen therapy (HBOT) was initiated 8h after the event and repeated the next day. Due to neurological deterioration with diffuse cerebral edema, the patient died at day 3.

Discussion: Although mechanisms are unclear, we speculate that high bronchial pressure and trauma to a necrotic lesion resulted in air entering pulmonary veins, then left heart and cerebral vessels. Since the natient was sedated and clinically stable, neurological signs were recognized only at the end of the procedure.

A high level of suspicion is crucial for early recognition and prevention of further air entry. While a drop in end tidal CO2 may be an early sign, precordial doppler is a more sensitive non-invasive method. A possible benefit for HBOT has been suggested for treatments in the first 6 hours, as a high O2 blood content might reduce the size of air emboli and subsequent ischaemia. However, brain infarcts on the first CT carry a poor prognosis<sup>2</sup>.

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Learning points: Mechanical trauma to bronchial lesions increases risk of VAE. VAE must be considered in patients who remain unresponsive or present focal signs or seizures following bronchoscopy. As VAE can be a catastrophic event, risk assessment, monitoring and prevention strategies are needed.

#### 10AP03-3

#### Hypertension in a patient with spinal cord trauma... can clevidipine be an option?

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Background: Studies support the idea that certain changes in the cerebral circulation are related to the position of first cervical vertebra (C1). On the one hand, superior cervical subluxations (C1-C2) can generate changes in the cerebral circulation (ischemic or compressive), which may be associated with high blood pressure levels. On the other hand, the afferent sensory signals of the suboccipital musculature, through postural reflexes and/or vertebral nerve plexuses, may also have relationship on central cardiorespiratory control and, therefore, also influence

Case report: Male, 39 years old, who suffer cervical fracture (C5-C6) with spinal cord injury while jumping head in the pool. When arrive to hospital presents: GCS 15 points, arms and legs areflexia, ASIA A, SaO2: 95%, BP: 120/50 mmHg, HR: 80 bpm. Under general anesthesia, trauma surgeons perform surgical decompression and fixation of two vertebral bodies. During this process, patient suffer hypertension (140/85 mmHg) during 6 min in spite of adequate remifentanil dose (25 microgr/Kg/ min) and it decided employ clevidipine (2 mg/h) for two hours reaching an adequate blood pressure (approx 125/70 mmHg).

Discussion: High blood pressure is a complex disease that affects a large percentage of the current population. On the other hand it was found that high cervical trauma can influence in the mechanism that regulate the responses of high blood pressure control system. The tight control of mean arterial pressure is mandatory during perioperative time. Clevidipine is a recently introduced and it can be an alternative in this kind of patient (2-4).

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#### 10AP03-4

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#### Airway management in a penetrating neck injury in zone I. A case report

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Background: Penetrating neck injury (PNI) is a life-threatening emergency due to the potential involvement of vital structures of the neck and thorax. In this scenario airway management might be a challenge if the respiratory tract is involved. We present case report of an open tracheal injury secondary to a stab wound in zone I. Case Report: A 43 year old male with history of depression was brought to the emergency department. He had tried to commit suicide by stabbing himself in the neck with a sharp knife. His vital signs on arrival were BP 140/72 mmHg, HR 140 bpm. SpO2 92% (FiO2 100%), At physical examination he presented obnubilation. tachyonea, signs of respiratory distress and suspicion of airway injury with air coming out from the PNI. No major bleeding or any other lesion was observed. Patient critical condition did not allow diagnostic imaging and was transferred to the operating room. Fiberoptic bronchoscopy was attempted, but it was not successful. General anesthesia was instituted after the surgeon was scrubbed and ready for surgery. Videolaringoscopy was then attempted, visualizing the glottis but the insertion of the endotracheal tube was not possible, probably due to the knife obstructing the tracheal lumen. The knife was withdrawn, acknowledging the risks of this maneuver, and the surgeon proceeded to secure the airway inserting an endotracheal tube through the wound. Chest tube drainages where inserted bilaterally. Findings consisted on a section of the trachea in the 2nd tracheal ring. No other organ or major vessel were affected. Retrograde intubation was then performed and the surgeon proceeded to repair the injury. Patient remained hemodynamically and respiratory stable, was extubated and discharged to a psychiatric facility after 6 days.

Discussion: Neck injuries can be a life-threatening event due to bleeding, airway obstruction from tracheal injury or hematoma. Successful management depends on early detection of vital injuries, appropriate diagnostic assessment and proper surgical treatment if needed

In those PNI cases in which the airway is involved, it is of vital importance that surgeons and anesthesiologist work as a team to secure the airway.

#### Learning points:

- Although uncommon, PNI are life-threatening due to the potential injury to vital structures of the neck and thorax.
- PNI cases with airway involvement are a challenge to anesthesiologists and surgeons and therefore should be managed in a multidisciplinary approach.

#### 10AP03-5

#### Cardiac arrest after a cerebral gas embolism - case report

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Background: Cerebral arterial gas embolism (CAGE) is a serious and often iatrogenic fatal event associated to invasive procedures. Correct diagnosis is only possible upon suspicion. We report a case of a cardiac arrest (CA) after a CAGE. successfully managed with Hyperbaric Oxygen Therapy (HBOT).

Case Report: A 63-year-old male, ASA II, underwent a CT-guided Transthoracic Needle Aspiration Biopsy (CT-TNAB) of a nodule in the apex of the left lung without immediate complications. The patient was transferred to the recovery room and was monitored according to ASA standards. One hour later he lost consciousness and CA in pulseless electrical activity was diagnosed. Advanced life support was initiated and recovery of spontaneous circulation achieved after one cycle. He presented a Glasgow coma scale (GCS) 7 (E4M2V1). The neurological examination revealed conjugate eye deviation and bilateral decerebrate posture. A brain CTscan showed a fronto-parietal cerebral gas embolism in the territory of the right middle cerebral artery (MCA). The chest x-ray and CT were normal. A transthoracic echocardiogram revealed a likely patent foramen ovale, but more investigation is required. The patient was transferred, intubated and ventilated with FiO2 1, to a Hyperbaric Center, After a HBOT session, significant recovery was observed: GCS 5, central facial palsy on the left side and a left hemiparesis (muscle strength grade 2 in the upper limb and 4+ in the lower limb). The brain CT scan showed a complete resolution of the CAGE. He was discharged home 9 days after the event, with an improved neurological condition.

Discussion: There are many different causes for CAGE, mainly following surgical and medical procedures. Among them, TNAB might have caused a fistula allowing the air to reach the pulmonary veins, the systemic circulation through the left heart. Another mechanism includes arterialization of venous bubbles via a patent foramen ovale. In this case, the etiology remains poorly understood and further investigation s needed. HBOT accelerates nitrogen reabsorption and improves oxygenation of ischemic tissue, and in our case it was the key for an improved outcome of our patient.

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Learning points: The diagnosis of CAGE is challenging and must be sought off following some invasive procedures. It's a possible cause of a CA. HBOT can be a successful treatment for this condition.

#### 10AP03-7

#### Accidental venous injection of 15 ml air: Did Durant's manoeuvre hinder cerebral air-emboli?

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Background: Accidental VAE has an estimated incidence of 1:772 to 2.65 to 100.000 hospitalizations<sup>1</sup>. VAE can be self-resolving and asymptomatic<sup>2</sup>, but sometimes cause severe circulatory collapse and/or reach the arterial circulation. Case report: During routine CT examination of a 86 year old man of at least 15 ml of air was infused by mistake at a rate of 3 ml/sec via a venous cannula. The patient was asymptomatic during the infusion. A CT thorax 15 seconds after the air infusion showed abundant amounts of air in the pulmonary artery. A CT caput showed no pathology. The patient was placed in Durant's position (left Trendelenburg) and given oxygen by a reservoir mask. After one hour, a pulsed wave echo Doppler (E/D) revealed air in the pulmonary artery. Hyperbaric oxygen therapy (HBO) was requested. Since the patient was asymptomatic, the on-call physician at the hyperbaric chamber decided not to commence HBO. The patient was kept in supine position, received oxygen, fluids and anticoagulants. E/D after six hours showed no air in the pulmonary artery. He remained asymptomatic and was dismissed after 24 hours observation. MR caput after five days showed no new pathology.

Discussion: As little as 10 ml air injected iv has caused systemic embolization, if administered rapidly3. In our case the infusion rate was extremely rapid, and we had to fear systemic egress of air. As others we have found in our porcine studies that septal heart defects is not a prerequisite for arterial embolization. Systemic air can occlude vital arteries, causing eg. myocardial infarction or stroke

The first symptoms of VAE are typically a drop in end tidal CO2, saturation or blood pressure. The definite diagnosis is established by echo Doppler or CT/MRI examinations. Once VAE is suspected, accelerated wash out of the high content of N<sub>a</sub> in air and hence reduction in bubble size can be accomplished by applying 100% O<sub>a</sub>. If available, bubbles can effectively be reduced by recompression. E/D during air infusion to swine in our laboratory have consistently shown how air move retrograde out of the right ventricle and up into liver veins. As we detected air in the right heart for a long time, we speculate that Durant's position prevented air from reaching the systemic circulation. The normal SWI-MRI indicates that air emboli did not reach the brain.

#### References:

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#### 10AP03-9

Real emergencies in interventional gastroenterology massive pneumomediastinum and pneumoperitoneum after argon plasma coagulation of Barrett's oesophagus

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Background: Endoscopy complications are a rising concern on the quality of endoscopic care, given the technical advances and the complexity of therapeutic procedures, over the entire GI and bilio-prancreatic tract. A case of hollow organ perforation can be real emergency condition with real vital compromise.

Case report: We report a case of esophageal and gastric perforation in a generally healthy 45-year-old woman who underwent endoscopy and argon plasma coagulation (APC) for ablation of Barrett's esophagus. We observed endoscopically a long segment - more than 3cm Barrett's esophagus, a substenotic cardia with irregular mucosa and a large sliding hiatus hernia; stomach and duodenum were normal. APC was performed under sedation with Propofol and Ketamine. The procedure lasted 12 min. During awaking severe chest pain, respiratory distress appeared, she became cyanotic, poorly responsive, and pulseless, while O2 saturation dropped to 60%. After Ambu balloon ventilation and catecholamine supplementation, a radial pulse reappeared, O<sub>2</sub> saturation rose and patient regained consciousness. Respiratory drama reappeared but also at that moment extensive subcutaneous emphysema was observed over the chest, neck, right upper extremity and face with complete closing of the right eye. Oxygen saturation dropped again after a few minutes and the abdomen became tense. The patient was placed in orthopneic position, titration of Morphine and high flow O therapy were instituted. At surgery, a 3-mm-wide esophageal and cardia perforations were found, esophageal and gastric resections with gastro-esophageal anastomosis were performed. The patient was discharged 2 weeks later.

Discussion: Given the unknown source of perforation, confirmed during surgery, we tried to avoid forced ventilation and keep the normal breathing of the patient The clinical presentation and the increase in intra-abdominal pressure suggested a perforation in the peritoneum without connection with the pleura, but there could be an indirect communication with intrapleural space. High peak inspiratory pressures. could develop tension pneumothorax and death of the patient in a few minutes

Conclusion: Simultaneous esophageal and gastric perforation determining syncope, pneumoperitoneum and pneumomediastinum. The awareness of the operator and anesthesiologist for their potential, early recognition, and local organized facilities for immediate handling, makes all the difference in the subsequent outcome

#### 10AP03-10

#### Awareness during CPR on cardiac arrest due to aortic dissection

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Background: Awareness during CPR is formerly reported in the literature but only n rare cases and it is still not clear whether these cases have anything in common

Case Report: A 69-year old male is admitted to the hospital due to 3 days dyspeptic symptoms. The patient reports onset of dyspnoea a few hours before arrival but has no other complains. During admission a short period of tachycardia (250/min) is followed by asystolic cardiac arrest and CPR is immediately initiated (chest compressions: 100/min and mask ventilation with 100% oxygen, ratio 30:2). By the arrival of the cardio-resuscitation-team, the patient has a peripheral hemoglobin saturation of 100% and a high level of awareness with open eyes and movement of the head and both arms and legs. Re-evaluation of the hearts rhythm after 3 minutes still shows asystoli. A total of 10 mg of Epinephrine is administered in boluses of 1 mg every 3-5 minutes. By the 3ed hand-off for rhythm evaluation, the patient is orally ntubated and there is still a high level of awareness as compressions continues. A total of 5 arterial gas samples are done during the 90 minute CPR, and despite a decrease in pH to 7,11 and lactate of 18 after 90 minutes all other markers remain within the normal range, and both the arterial and peripheral hemoglobin saturation remains 100%. The level of awareness does not decrease notably during the 90 minutes. Echocardiography is performed during hands-of periods by a cardiology consultant and a heart with no noticeable ultrasonic movement is seen. After one hour a projection visualizing the aortic arch raises suspicion of an aortic dissection. The patient is later shown by autopsy to have suffered a complete aortic dissection. Discussion: High level of awareness plus saturation and arterial gas almost within the normal range through all 90 minutes indicate very effective chest compressions and peripheral and cerebral blood flow. Even though the patient had a poor prognosis (complete aortic dissection and refractory asystole), the termination of CPR raised ethical questions in the team as the patient was still conscious once the resuscitation was terminated by 90 minutes. Awareness during CPR also raises the question of proper sedation doing resuscitation, which is currently not part of the guidelines. References:

1. Olaussen et al: Return of consciousness during ongoing CPR: A systematic review. Resuscitation, 2015

Learning points: Pain relief/CPR, Heart rhytms/CPR, ethical aspects

### Respiration and Airway Management

#### 11AP01-1

Airtraq videolaryngoscope intubation vs. fiberscope intubation through the I-gel supraglottic device in simulated cervical in-line stabilization

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Background and Goal of Study: Orotracheal intubation in patients with limited cervical spine mobility may be difficult if performed with direct laryngoscopy. These patients may benefit from techniques with less o no movement of the neck. Our aim was to compare the efficacy and safety of using the Airtrag® videolaryngoscope and the I-gel® supraglottic device for orotracheal intubation in patients with simulated cervical fixation.

Materials and Methods: 60 patients without difficult airway predictors in whom orotracheal intubation was necessary were recruited. After information and patients' acceptance, they were randomly divided into 2 groups of 30. One group (A) was intubated using the Airtrag® laryngoscope and the other (G) was intubated using a fiberoptic bronchoscope through the I-gel®. After 3 minutes of preoxigenation with 100% O2, general anesthesia was induced. Patients' pillow was then removed and simulated cervical stabilization by means of a strip tape was established thus fixating the patient's head to the surgical table in neutral position in order to prevent cervical movements. Group A patients were manually ventilated for two minutes with 100% O2, and then orotracheal intubation using the Airtrag® was carried out. In group (G) the I-gel® device was inserted during the two minutes of manual ventilation after the anesthetic induction at anesthesiologist discretion. After two minutes of manual ventilation and I-gel® insertion, orotracheal intubation was performed with the help of a flexible fiberoptic bronchoscope. Intubation success rate, time to intubation (Tti), number of intubation attempts and adverse events were recorded and compared between both groups.

Results and Discussion: All patients were successfully intubated. Tti was  $28,5\pm16,3$  s for group A, and  $25,2\pm11,5$  s for group G (p 0.543) showing no statistical differences between both techniques. In one patient of group A the Airtraq® could not be introduced into the patient's mouth because it collided with the chest wall and he was intubated using the I-gel®. We also encountered difficulty in Airtraq introduction in other patients. No adverse events were recorded.

**Conclusion:** Both Airtraq® intubation and fiberoptic guided intubation through the I-gel® are safe and effective techniques to achieve intubation in patients with cervical spine stabilization and reduction of neck mobility. Fiberoptic intubation through the I-gel® seems to be easier to perform than Airtraq intubation.

#### 11AP01-2

Which nostril should be used for nasotracheal intubation with Airtraq NT: the right or left? A randomized clinical trial

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Background and Goal of Study: Nasotracheal Airtraq, is specifically designed to improve the glottis view and ease the nasotracheal intubation process in normal and difficult cases.

Materials and Methods: After Ethics committee approval, we decided to enroll 40 patients with an ASA physical status of I or II, between 18-70 years of age undergoing elective maxillofascial, oral and double chin surgery to determine which nostril is more suitable for nasotracheal intubation with nasotracheal Airtraq. Patients were randomised into the right and left nostril groups. After standard anesthesia induction with propofol and fentanyl, rocuronium was used for muscle relaxation. Our primarily aim was to compare the glottis visualization time, intubation time and total intubation times. Demographic and airway management variables, Cormack-Lehane grades, the need for optimization, tube adjustment maneuvers (90° anti-clockwise rotation, external laryngeal pressure, cuff inflation, head flexion, operator change and the use of Magill forceps in strict order), hemodynamic data, occurrence of epistaxis during the process were also recorded.

Results and Discussion: All intubations were performed by experienced user of the Airtraq and the Airtraq NT. We enrolled 40 patients, however 2 patients denied to participate and 3 patients lost-to-follow up. Then we analysed 35 patients. Demographic and airway characteristics were similar among the groups. Nasotracheal intubation through the right nostril was shorter than that of the left nostril during nasotracheal intubation with the Airtraq NTO (p<0.001). 90° anticlockwise rotation of the tip of the tube was needed for directing the tube into the vocal cords in both right and left nostril groups (72% vs 88%). External laryngeal pressure can ease the intubation from the left nostril (p=0.001). Cuff inflation, head flexion maneuvers also can be helpful in some cases. We did not need any operator change or Magill forceps for any of the patients.

**Conclusion**: Nasotracheal intubation via the right nostril can be safely and quickly performed with the Airtraq NT without the need of Magill forceps. We recommend the use of the 90° anti-clockwise rotation maneuver and external laryngeal pressure to direct the tube into the vocal cords first. On the other hand; cuff inflation, head flexion maneuvers also must be kept in mind.

#### 11AP01-3

A comparative study of the efficacy of the McGrath X-blade vs the C-MAC Videolaryngoscope in patients with simulated difficult airways

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Background and Goal of Study: The McGrath X-blade is an angulated blade attachment that is designed to be used with the McGrath MAC videolaryngoscope. We compared the McGrath X-blade with the C-MAC videolaryngoscope under the condition of a simulated difficult airway, through the use of manual in-line stabilisation. We present the findings of our interim study analysis.

Materials and Methods: Patients of ASA physical status I to III, aged 21 to 80 years old, undergoing general anaesthesia requiring tracheal intubation were recruited into this randomised controlled trial. Patients with history of or predicted difficult airway, gastro-oesophageal reflux disease, patients who decline to participate or lack the mental capacity to give consent are excluded from the study. General anaesthesia with muscle paralysis is performed in a standardised manner. Participants received intubation using either McGrath X-blade (MGX) or C-MAC (CM) videolaryngoscopy, with manual in-line stabilisation. Primary outcome measured was First Pass Success (FPS). Secondary outcomes included overall successful intubation within 2 attempts or 120 seconds, time to intubation, glottic view obtained and rates of complications. We aim to recruit 210 patients based on power calculation.

Results and Discussion: An interim analysis of 91 participants was performed. Patient demographics were comparable between both MGX and CM groups. First pass success at intubation was 76.9% in the MGX group vs 81.3% in the CM group (p=0.3). Overall success was 88.4% (MGX) vs 91.7% (CM) (p=0.73). The Cormack & Lehane laryngeal grade was superior in the MGX group compared to CM group (Grade I: MGX 55.8% vs CM 25%; Grade II: MGX 44.2% vs CM 47.9%; Grade III: MGX 0% vs CM 7.1%; p<0.001). There was no significant difference in time to intubation [MGX 68.3s (mean 42.2s), CM 55.3 (mean 30.7s); p=0.087] and perioperative complications between the two groups.

Conclusion: Our interim analysis findings demonstrated superior glottic view using the McGrath X-blade, but with no significant improvement in intubation success or time to intubation compared to the C-MAC videolaryngoscope. We await the final results upon completion of the study

#### 11AP01-4

A new medical device that Converts a LaryngoscopE into a low-cost VideolaryngoscopE Reusable. (C.LE.VE.R.scope)

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Background: Direct laryngoscopy (DL) is still the gold standard for tracheal intubation. Video laryngoscopy (VL) decrease Cormack enhancing glottic vision, it is used as rescue device when DL fails or when a patient has difficult airway predictors. Then, why is not VL first-line device for tracheal intubation? Price is the problem. VL are expensive, they are not in every place, and each model has different way of use, different from DL. CLEVERscope (CL) is a new medical device that fits on Macintosh and McCoy blades, and convert them into a video laryngoscope. It produces the most economic VL in the market, very simple to mount-unmount, used like DL. Previous its commercialization we test in humans its safety and efficacy.

Material and Methods: After ethics committee and regulatory agency approval we start observational (PHASE I) study of 50 patients programmed for surgery with general anesthesia without difficult airway predictors. All patients signed consent. After induction we first do a DL with a Macintosh nº4 blade, and then we perform tracheal intubation with CL mounted on the same blade, we registered Cormack of both attempts, time of CL procedure, success rate (first attempt and global), and any complications associated with CL use (blood, teeth, mucosal or glottic lesions) both intra and postoperative. We interview patients at PACU looking for complications (pain, dysphonia). CLEVERscope has different parts, the gadget that anchors the laryngoscope blade (Utility Model certificate 201630976 and international extension PCT/ES2017/070540), microcamera and a 7" monitor that can be replaced by an Android smartphone.

Results and Discussion: Partial sample collected (15/50) shows that Cormack I with CL was 93% (14/15) but only 60%(9/15) with DL. CL reduce Cormack 1.45 degrees when DL shows Cormack>I. All patients could be intubated with CL, 87% at first attempt, only 13% (2/15) need a second attempt (one preforming tracheal tube with a stylet and another increasing blade number). Mean time for tracheal intubation was 33,5seg. None of 15 patients suffered immediate complications during CL use. At PACU interview only two patients report a mild sore throat (VAS<4).

Conclusion: This study shows that CLEVERscope is a safe medical device without serious complications, being an effective Videolaryngoscope that increase glottic vision over Direct laryngoscopy (at least reduce one Cormack degree), with a high intubation success rate and reduced intubation time.

#### 11AP01-5

Changes induced by the Airtraq Mobile app on handling and improving intubation ease with Airtraq in simulated difficult airways by novice users

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**Background**: The Airtraq Mobile app is a new intubation solution designed to combine any smartphone to a universal adaptor fitted on any Airtraq. High quality image resolution allows live image display and sharing, in addition to picture and movie recordings

This study was designed to assess the changes induced by adding the Airtraq Mobile to Airtraq SP intubations in simulated difficult airway scenario by novice

**Methods**: This prospective, single blinded, randomized study included 106 ASA I-III adults in which difficult airway was simulated using a rigid neck collar. All novice intubators were directly assisted by an experienced Airtraq user. Patients were randomly allocated for Airtraq SP (AS) vs Airtraq Mobile (AM) intubation.

Success and number of attempts necessary were recorded, as well as times (expressed as median seconds [25th;75th]) necessary for glottis identification, blocking of the cuff, ventilation and total procedure. Ventilation was defined as the observation of end-expiratory CO<sub>2</sub> curve on capnography, procedure time as the time from touching the Airtraq to ventilation. Timing and type of assistance by the supervisor were equally analyzed. 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: Demographics and anatomical characteristics were identical in both groups of simulated difficult intubation. An interim analysis shows that the Airtraq Mobile device decreases the number of overall failed intubation (40% vs 60%), increases the success rate (90.6% vs 82.7%) of first attempt Airtraq assisted intubation by novice users and shortens the total time necessary for trachel intubation (65[51;86] vs 74[51;108]). Timing and type of assistance by supervisor was earlier in the AM group. It was offered spontaneously respectively in n=(78.4%) vs n=(28.9%). Post-operative airway discomfort was less frequent in the AM group for each

Post-operative airway discomfort was less frequent in the AM group for each individual item with a three time increase of dysphagia in the AS group. 32.7% of the patients in the AS group had at least one item related to post-operative discomfort vs 21.6% in the AM group.

Conclusion: The use of the Airtraq Mobile solution to assist intubation by novice users in simulated difficult airway increases first pass sucess while reducing post-operative airway discomfort. Sharing the airway changes timing and type of assistance by an experienced user assisting to the procedure.

#### 11AP01-6

Comparison of Airtraq<sup>™</sup> double lumen and McGRATH<sup>™</sup> MAC video laryngoscope for double-lumen endotracheal tube intubation by an experienced anesthesiologist: a prospective randomized clinical trial

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Background and Goal of Study: Recently, different types of video laryngoscopes have been reported for use in double-lumen tube (DLT) intubation. However, the advantages and disadvantages between them remain undetermined for DLT intubation. This study aimed to compare the utility of Airtraq™ double lumen (Airtraq DL) and McGRATH™ MAC (McG) video laryngoscope for DLT intubation in patients undergoing elective surgery by one experienced anesthesiologist.

Materials and Methods: A total of 37 patients who were scheduled for elective surgeries were enrolled in this study and randomly allocated to one of two groups; in each group, Airtraq DL or McG was used for tracheal intubation. After regular induction of anesthesia, tracheal intubation with a video laryngoscope was performed by one experienced anesthesiologist. Our primary outcome measure was the intubation time. The intubation time was defined as the time from insertion of the device into the oral cavity to removal of the device from the oral cavity. The intubation time was compared between the devices using an unpaired t-test. The Mann-Whitney U test was used to assess intubation time. Data are presented as mean ± SD. P < 0.05 was considered statistically significant. This study was approved by the institutional review board of

Tokai University, School of Medicne, and wirtten informed consent was obtained from each patient.

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**Results and Discussion**: All the patients in the study were intubated successfully at the first attempt without any adverse effect. Intubation time was significaantly shorter in the Airtraq DL group compared with the McG group (Airtraq DL:  $15.9 \pm 0.8$  seconds vs McG:  $18.2 \pm 0.6$  seconds, P=0.033, respectively).

**Conclusion**: When using video laryngoscopes for DLT intubation, Airtraq DL is superior McG in intubation time by one expereienced anesthesiologist.

#### 11AP01-7

Comparison of tracheal intubation with Videolaryngocope and conventional laryngoscope by inexperience Medical Interns

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**Background and Goal of Study:** The aim of this study was to investigate success rate, time of intubation, angle of head extension of manikin with King Vision® Videolaryngocope and conventional laryngoscope Covidien Laryngobloc Macintosh by Medical Interns inexperienced in advanced airways management.

Material and methods: Participants - 114 Medical Interns inexperienced in advanced airways management. The criterion of inexperience was five or less intubation by any kind of laryngoscope. Participants were asked to intubate manikin firstly by conventional laryngoscope Covidien Laryngobloc Macintosh then by King Vision® Video Laryngoscope. Time, success rate of intubation, and degree of head extension were measured. Angle was measured by "Angle Pro" (5fuf5 CO) application installed on an Iphone 6 (Apple, Cupertino, USA) attached to manikin head.

**Result:** Endotracheal intubation was successful in 85 first attempts with Covidien Laryngobloc Macintosh compared to 81 with King Vision® Video Laryngoscope. Mean time of successful intubation was 17s  $\pm$  4.8s with head extension angle 23.8° $\pm$ 3.7° with conventional laryngoscope and 26.1s  $\pm$  5.1s; 18.8° $\pm$ 3.8° with King Vision® videolaryngoscope.

**Conclusions:** Effectives of intubation by both laryngoscopes were comparable. Conventional laryngoscope was less time-consuming but required increased head extension angel compared to King Vision® Videolaryngocope.

#### 11AP01-8

Correlation between preoperative difficult intubation criteria and improvement of laryngoscopic view with the use of video laryngoscope, compared to conventional laryngoscopy

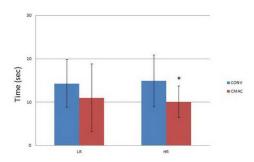
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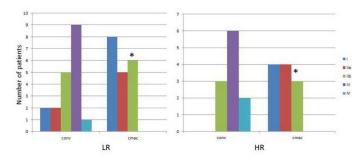
Background and Goal of Study: Video laryngoscopies have been shown to improve Cormack-Lehane view. However, the presence of one or more difficult airway criteria increases the possibility of difficult laryngoscopy. Goal of the study was to evaluate whether the presence of one or more prognostic factors of difficult intubation are corelated with greater improvement of Cormack-Lehane view with the use of c-mac video laryngoscope.

Materials and Methods: Patients scheduled to receive general anesthesia and have at least one criterion of difficult intubation, were eligible. Criteria were Mallampati score 3-4, thyromental distance <6cm, cervical movement <90°, interincision gap<4cm, presence of buck teeth or micrognathy. Patients were allocated in two groups, based on the number of difficult intubation criteria present (1-2 criteria low risk group LR, 3-4 criteria high risk group, HR). All patients were anesthetized using a standard regimen and laryngoscopy via conventional laryngoscope was followed. Best view and time to achieve it, were recorded. Afterwards the same anesthetist attempted laryngoscopy through c-mac. The same parametres were recorded. Comparisons between time to best views and best views achieved via conventional vs cmac laryngoscope were made for both groups (Wilkoxon test). Statistical significance was set at p<0.05.

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Results and Discussion: A total of 30 patients were studied (LR=19, HR=11) Time to best view was significantly shorter for c-mac, compared to conventional laryngoscopy, only for HR group (p=0.000). Regarding laryngoscopic image, LR and HR groups showed significantly better laryngoscopic views, compared to laryngoscopy (p<0.001 for both LR and HR).



Conclusion: Cmac leads to better larvngoscopic views, no matter how many criteria of difficult intubation are present. In HR group, cmac also improves the time to best view.

#### Awake intubation using video laryngoscope for anticipated difficult airway

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Background: Awake tracheal intubation is a challenge for the anesthesiologist and a source of discomfort for the patient. It is classically performed using fiberoptic laryngoscopy. However, in some clinical situations where the nasal route is not accessible or surgery requires orotracheal intubation, Video laryngoscope (VL) represents an interesting alternative. We've shown that superior laryngeal nerve blocks (SLNBs) made it possible to perform awake nasotracheal fiberoptic intubation with satisfying conditions for the patient & the practitioner (1). The purpose of our study is to evaluate awake intubation using VL with SLNBs.

Materials & Methods: A monocentric retrospective study from May2015 to Nov2017. All patients with expected or known difficult airway requiring awake intubation, whose nasal route was not accessible and/or surgery required orotracheal intubation, were included. SLNBs are made by the infiltration of 1ml of Lidocaine 1% in contact with the large wing of the hvoid bone and 1ml in the hyoid-thyroid membrane. 2 to 3 lidocaine sprays are administered in the oropharynx and 5ml transtracheal. Remifentanil sedation with target-controlled infusion is associated. AIRTRAQ VL has been used. The primary outcome is the time from onset of the act to the appearance of the first capnography curve on the monitor The secondary criteria are the numbers of side effects.

Results and Discussion: 21 patients were included in this study. The median age is 58[2:76] years, the median ASA class is 3[2:4]. The median duration of intubation is 80 [54;218] seconds (Fig1). All of the intubations were successful with a median of attempts at 1[1;2]. We have observed 3 cases of cough including one case of

desaturation. In one case, the administration of propofol was necessary for the passage of the tube through the glottis. 50% of the procedures were performed by anesthesia residents and 30% by nurse anesthetists. The procedure is comfortable for the patient & easily performed. According to our knowledge, we report the first series of patients for whom the indication of awake orotracheal intubation was

Conclusion: Awake intubation using VL with SLNBs is a Promising alternative to fiberoptic intubation when the nasal route is not available; surgery requires orotracheal intubation or lack of fiberoptic expertise.

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#### 11AP01-10

A novel modified nasal PAP mask assembly maintained spontaneous ventilation and continuous active oxygenation in a cachetic patient with a large mandibular sarcoma, a large thyroid nodule and a difficult airway during video-laryngoscopy-guided oral fiberoptic intubation

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Background: A nasal PAP mask assembly was shown to improve oxygenation by maintaining spontaneous respiration in sedated obese OSA patients or patients with difficult airway during awake/sleep endotracheal intubation (ETI). 1-6 We report its use in a patient with a mandibular mass during ETI.

Case Report: A 66 v/o cachectic male with A-Fib. RBBB. HTN. anemia. NIDDM. bipolar disorder, schizophrenia, lung cancer s/p RUL lobectomy, thyroid mass (2.6x4.8 cm) and necrotic mandibular sarcoma (4.4x7.4 cm) presented for resection and reconstruction. The mass extended to his lower lip. He had a Mallampati class IV airway and poor face-mask-fit. A modified infant mask was secured over his nose with head-straps and connected to the anaesthesia machine via a breathing circuit. APL valve was adjusted to deliver 5-6 cm H.O CPAP with O. (4L/min). Deep sedation was titrated with 100 mg lignocaine and small boluses of propofol (6x50 mg). He maintained spontaneous ventilation and 100% SpO<sub>2</sub> with pressure-control (PC) ventilation (PIP 13 cm H<sub>2</sub>O, PEEP 5, RR 20). Video-laryngoscopy (VL) grade larvngeal



Rocuronium (50 mg) was administrated to relax the vocal cords in order to advance FOB. However. ETT met resistance about 4 cm below the vocal cords. After inserting a rigid stylet, ETT was advanced smoothly. FOB revealed no tracheal bleeding. He maintained 100% SpO<sub>2</sub> during intubation and tolerated the procedure well. He was kept intubated and sedated and extubated next afternoon.

Discussion: This modified nasal CPAP mask assembly provided continuous active oxygenation in a patient with a large mandibular mass and difficult airway during VL-guided FOI. It maintained spontaneous nasal ventilation and subsequently provided PC nasal ventilation. It allows calm attempts to perform VL/FOI and may improve patient safety.

#### References

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- . ASA AM, 2013;
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Learning points:1: How to construct this nasal PAP mask assembly. 2: How to provide optimum nasal CPAP to maintain spontaneous respiration. 3: How to perform awake/sedated combined FOB/VL ETI with continuous active nasal

#### 11AP01-11

#### Totaltrack VLM vs. Macintosh laryngoscope for orotracheal intubation in obese patients (OVESION RCT)

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Background and Goal of Study: In obese patients' airway management is essential to prevent early arterial oxygen desaturation related to a reduced functional residual capacity (FRC) and atelectasis formation during induction and after tracheal intubation. The Macintosh laryngoscope is the standard method for endotracheal intubation. However, sometimes is ineffective and poorly tolerated by the obese patient. The Totaltrack VLM® (TT VLM) (MedComflow S.A., Spain) is a hybrid device, between a supraglottic airway and a videolaryngoscope. However, despite its use in clinical practice, there are no comparative studies regarding direct laryngoscopy in obese patients.

Materials and Methods: OVESION is an interventional randomized clinical study (NCT03106974). Primary Outcome Measure is saturation of blood oxygen at the end of orotracheal intubation, established with a curve of Capnography. Secondary Outcome Measures are total time of successful intubation, total time of successful intubation, number of maneuvers needed, IDS Scale, POGO Score, number of attempts of endotracheal intubation, hemodynamic response, degree of satisfaction of the researcher in a Visual Analogic Scale (0-5), adverse effects encountered during intubation. Estimated enrollment is 1.440 adult patients. Inclusion criteria are BMI >30, ASA 1-3, scheduled surgeries that require orotracheal intubation, general anesthesia with neuromuscular relaxation before intubation and patients who sign informed consent. Exclusion criteria are ASA 4, difficult airway already known, alterations of airway documented, allergies to device components and urgent surger

Results and Discussion: In a retrospective 96 case-series analysis of hemodynamic (systolic and diastolic pressure) and ventilation efficiency (pulsioximetry) were measured before inserting the device in the mouth of the patient, and 1 and 5 minutes later. Patients mean BMI was 26, and ASA status was 2 in 84%, and 3 in 17%. There no exists important incidences in 77.5% patients, difficulties not avoided intubation, and successful ventilation after intubation was in 100% patients. 74% of researchers said they were satisfied, and 15% very satisfied.

Conclusion: We believe TT VLM facilitates oxygenation during tracheal intubation, under safe conditions and uninterrupted ventilation. In cases of a failed intubation attempt, TT VLM can continue optimal ventilation/oxygenation while the operator thinks about the next step of the strategy.

#### 11AP02-1

#### The possibility of difficult intubation in children with hydrocephalus undergoing shunt surgery

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Background and Goal of Study: Hydrocephalus commonly cause serious challenges in airway management of newborn and pediatric patients, leading to enlarged head and distortion of skull anatomy. This result in difficulty for conventional laryngoscopy by hindering positioning of head. We aimed to determine the relationship between head circumference and the difficulties of intubation in pediatric patients undergoing shunt surgery.

Materials and Methods: After obtaining the institutional board approval and written informed consent of parents, this study enrolled ASA I-II, between the ages 0-18 monhts 60 patients requiring ventriculoperitoneal shunt insertion. Before the beginning of the surgical procedure; head circumference, the lower lipchin distance, the upper lip-chin distance, the ear lobe-chin distance, tragus-chin distance, sternomental distance, thyromental distance, neck extension, presence of macroglossia. Cormack-Lehane Classification scores were recorded. In addition, the number of attempts of successful intubation, the used endotracheal tube size,

the presence of optimization manoeuvres, the presence of dental trauma were also recorded. The difficulty of intubation was evaluated with a 10 cm VAS ruler.

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Results and Discussion: The patients divided into three groups as control (group C, n=20), newborn (group B, n=20) and >1 month of age (group A, n=20). Head circumference, the lower lip-chin distance, the upper lip-chin distance, the ear lobechin distance, tragus-chin distance, and sternomental distance were significantly longer in group B (Table 1). There was no statistically significant difference among groups regarding their demographics, Cormack-Lehane scores, the presence of macroglossia and the requirement for optimization manoeuvres, the number of tracheal intubation attempts or a necessity of videolaryngoscope (p > 0,05). Compared with group A, head circumference, the lower lip-chin distance, the upper lip-chin distance, the ear lobe-chin distance, tragus-chin distance, and sternomental distance were significantly higher in group B (p<0,05) and neck extension was also lower in group B (p<0.05). There was no significant difference in number of intubation attempt between group A and B (p<0,05, Table 2).

Conclusions: Our findings suggest that, hydrocephalus is not related with the increased incidence of difficult intubation due to the large occiput and limited neck extention in patients under 18 month years old.

#### 11AP02-2

#### Mucopolysaccharidoses: airway management step by step

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Background: Mucopolysaccharidoses (MPS) are a group of rare genetic inherited diseases with a progressive course due to the accumulation of glycosaminoglycans. Clinical manifestations are multisystemic, variable and include severe morphological changes. The anesthetic management of these patients is complex, particularly the airway management, which can be planned to include a fiberoptic airway investigation prior to surgery. We present two cases of patients with MPS type VI and VII proposed for fiberoptic airway mapping.

Case Report: A 23-year-old man diagnosed with MPS type VI and a 28-year-old female with MPS type VII were listed for a corneal transplant and aortic prosthesis revision surgery under general anesthesia, respectively. Both had history of difficult intubation, and so they were proposed for fiberoptic bronchoscopy airway mapping. The patients were premedicated with midazolam, positioned (seated) and monitored. The airway was prepared with topical and nebulized lidocaine 2% (nasoand oropharynx). Pre-oxygenation was achieved with 100% O2 via endoscopy mask. A remifentanil perfusion was started using target-controlled infusion targeting a predicted plasma-site concentration of 2.0 to 2.5 ng/ml. The fiberscope was nasally introduced with lidocaine applied according to the spray-as-you-go technique. The patients remained awake, calm and cooperative, with spontaneous ventilation. There were no airway obstruction or desaturation episodes during both of procedures and they remained hemodynamically stable.

Discussion: We present the anesthetic management of patients with a rare genetic condition with major structural abnormalities of the upper airway in whom a conscious sedation for fiberoptic airway mapping was performed due to the high risk of difficult intubation and ventilation. It has been reported that 25%-50% of MPS patients have problematic airways and 82% of MPS patients receiving anesthesia require urgent airway interventions. We encountered no major problems and emphasize that careful planning and experienced support for difficult airway management are important when anesthetizing such patients

#### References:

1 R Walker et al. J Inherit Metab Dis (2013)

Learning points: In MPS patients, the most critical problems related to anesthesia are difficult intubation and airway control. Therefore, careful evaluation of anesthetic risk factors should be made before the procedure, namely evaluation of airways.

#### 11AP02-3

Applying extracorporeal membrane oxygenation as anesthetic consideration for huge intra-thoracic goiter causing severe tracheal obstruction with positional symptoms

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Background: Perioperative anesthetic management of thyroid mass causing severe tracheal obstruction with positional symptom is critical in regard that it can lead to difficulty in either ventilation or intubation and result in acute respiratory decompensation at every stage of anesthesia.

Case Report: A 67-year-old male patient with huge intrathoracic goiter causing severe tracheal obstruction, presenting progressive dyspnea aggravated by supine position was scheduled for total thyroidectomy. The preoperative CT scan showed large multinodular goiter extended to thoracic cavity with diffuse 6cm-segmental tracheal narrowing, 4.29 mm in diameter at the narrowest portion of the trachea.

(Figure1).





Figure 1. preoperative CT scan showed huge intrathoracic goiter causing severe tracheal obstruction(Left). The narrowes portion of the trachea was 4.29mm in diameter(Right)

Prior to induction of general anesthesia, we applied veno-venous extracorporeal membrane oxygenation (ECMO) under sedation with dexmedetomidine in preparation for potential difficulty in securing the airway during general anesthesia, and then anesthesia induction and maintenance progressed uneventfully. After the surgical procedure, resolution of the tracheal narrowing was revealed in fiberoptic bronchoscope and chest radiograph postoperatively. ECMO was weaned 2 hours after the surgery and extubation was performed on the first postoperative day. The patient was discharged without any complication.

**Discussion**: Although the literatures on using extracorporeal circulation before induction of anesthesia for prevention of airway and hemodynamic complication is limited to few case reports, the establishment of femorofemoral bypass under local analgesia prior to induction of anesthesia in elective manner and not as a rescue has been safely performed in adult patients.

References:

1. Gardner JC, Royster RL. Airway collapse with an anterior mediastinal mass despite spontaneous ventilation in an adult. Anesth Analg 2011; 113: 239-42. Learning points: Since induction of general anesthesia is unsafe in patients with huge intra-thoracic goiter causing severe tracheal obstruction presenting positional symptoms, even with maintenance of spontaneous ventilation, applying ECMO before induction of general anesthesia can be considered as a way of maintaining oxygenation safely.

### 11AP02-4

## Airway management in Oropharyngeal recurrence of Cervical Teratoma: a case report

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**Background**: Intraoral tumors pose diverse problems for airway management and need tailor-made solutions. We present a case of oropharyngeal recurrence of left cervical teratoma; anesthesia for tracheostomy was challenging due to compromised upper & lower airway and time consuming surgical access in an infant with previous tracheostomy scar.

Case Report: 5 month child with aspiration pneumonia, stridor, failure to thrive and delayed milestones; Cervical teratoma was excised on day 11 of life and ventilated for 14 days postop. Latest MRI revealed 2.2x2.1x1.8 cm mass in the left peritonsillar area projecting into the oropharyngeal cavity and abutting the retropharyngeal tissues. Preop examination revealed friable mucosa, prone to bleeding during laryngoscopy. Child was premedicated in the OR with surgeons ready. Gradual inhalational induction done with Sevoflurane in Oxygen, facemask ventilation was not effective. A size 3.5 ETT was used as nasopharyngeal airway(NPA) and connected to anesthesia circuit. Tracheostomy was done with infiltration of local anesthetic. After a week of nutritional and respiratory rehabilitation, excision of the mass was done under general anesthesia with tracheal tube ventilation.





**Discussion**: This child had pharyngeal dysmotility causing aspiration; tracheostomy was needed to allow better pulmonary toilet, respiratory rehabilitation and to protect the airway post excision. Tracheostomy under local anesthesia, inherently difficult in an infant, was not feasible as fibrosis from previous scar, fashioning of tracheal flap and securing stay sutures necessitated immobilization for a few extra minutes. Anesthetic goals were:

Maintenance of spontaneous ventilation.

Maintain upper airway during sedation for tracheostomy. Optimum positioning and immobility.

Avoid handling and bleeding from teratoma.

We achieved them via moderate sedation & assisted ventilation through NPA.

Learning points: Nasopharyngeal airway may salvage 'difficult mask ventilation

difficult intubation' scenario.

Elective tracheostomy is the optimal airway management in peculiar circumstances; unlike adults it needs moderate sedation with careful airway management in infants.

#### 11AP02-5

Challenges in difficult airway management – airway management in a case of prolonged enlarged thyroid gland (struma permagna)

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**Background**: Thyroid gland diseases often are associated with thyromegaly, which could lead to increased neck size and circumference, as a known predictor of difficult intubation.

Case Report: We present a 63 year old men with a left sided neck swelling with dimensions 96x71 mm. The thyromental distance was <6,5 cm, neck mobility was restricted. Mouth opening was adequate with Mallampati grade 4. Direct laryngoscopy revealed swelling of the epiglottis and restriction of the vocal cords mobility. Because of the anticipated difficult mask ventilation due to the huge size of the tumor, fiberoptic intubation was planned. Patient recieved 5mg Midazolam, 150µg Fentanyl, 50mg Rocuronium and 250mg Propofol. Endotracheal tube 7,5 mm was then threaded over the FOB. Total thyroidectomy was done. After careful consideration of the fact that problems with extubation were possible due to longer duration of the intervention, the edema and the possible postoperative bleeding, we decided that a tracheostomy should be done.

Discussion: Comorbid conditions and some patient characteristics such as laryngeal edema, anterior neck swellings, short neck and obesity, Malampati class 3/4 airway, neck mobility less than 90°may further aggravate the airway difficulties [1]. Our circumstance were in line with this finding. Preoperative imaging studies gave us details of the tracheal deviation and a light degree of tracheal compression. The first choise in this case was an awake fiberoptic intubation. Sendasgupta et al. and Tan and Esa stated in their studies that awake fiberoptic intubation offers more hemodynamic stability and better patency of the airway. Our patient didn't tolerate well the awake fiberoptic intubation. We had to give him anesthetics in order to intubate him, minimizing the possible risks. Considering the possible problems with the extubation due to the longer duration of the intervention, the supraglottic swelling and the high intraoperative blood loss and not having the equipment for fiberoptic bronchoscopy in case of a need of a reintubation, it was decided that a tracheostomy should be done before awaking the patient.

#### References:

1. Bouaggad A, Nejmi SE, Bouderka MA, Abbassi O. Prediction of difficult tracheal intubation in thyroid surgery. AnesthAnalg 2004;99:603-6

**Learning points:** Proper preoperative airway assessment, preparation and skillful management reduce the morbidity and mortality in difficult airway cases involving thyroid enlargement.

#### 11AP02-6

## Elective venovenous extracorporeal membrane oxygenation for the placement of a tracheal stent

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**Background:** The extracorporeal oxygenation membrane (ECMO) is an advanced support device in critical patients that allows blood oxygenation through an artificial membrane (1). It is frequently used in procedures in which there is a high potential for hemodynamic instability or as a rescue in emergency situations.

Case Report: A 62-year-old woman, diagnosed with unresectable right pulmonary adenocarcinoma, with extrinsic tracheal compression that compromises spontaneous ventilation, was brought to the operating room to perform the placement of a tracheal stent by rigid bronchoscopy, with the help of VV-ECMO as a support. She was brought from the critical care unit, connected to non-invasive mechanical ventilation, with the right radial artery canalized and two peripheral venous lines. After monitoring, the left internal jugular vein was canalized with a high-flow catheter and cannulated through a high-femoral vein support cannula, reaching the right atrium. Left femoral vein was guided and placement of cannula in right iliac vein was performed. Respiratory assistance was then started by extracting blood from the right atrium and reinjecting it into the iliac vein. After checking improvement in both SpO2% and arterial blood gases, anesthetic induction was performed. Few minutes later we observed a deterioration in oxygenation, requiring inversion of the flow to improve it. Tracheal stent placement was performed without further incidents. Once the situation of hemodynamic stability and correct oxygenation was assessed, ECMO weaning was performed with good tolerance and the patient was transferred sedated, intubated and connected to mechanical ventilation to critical care unit.

**Discussion**: ECMO is an advanced and invasive tool that can allow survival in extreme situations but that carries a great risk and potential complications. The choice of VV-ECMO over cardiopulmonary bypass minimizes this risk. There are numerous strategies for the cannulation of VV-ECMO. Femoral access was preferred in this case because it was well tolerated with minimal sedation and was at a considerable distance from the area of intervention with bronchoscopy.

1. Gourdin M et al. Use of venovenous extracorporeal membrane oxygenation

under regional anesthesia for a high-risk rigid bronchoscopy. J Cardiothorac Vasc Anesth. Elsevier Inc.; 2012;26(3):465–7.

Learning points: ECMO should be considered in situations in which oxygenation may be compromised.

#### 11AP02-7

## Forcefull difficult extubation due to cuff invagination in patient after parotide tumor surgery: the need for algorithm

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**Background**: Extubation could also be as difficult as intubation. The higher risk for extubation failure is associated with obesity, goitre, obstructive sleep apnea, major head/neck and upper airway surgery, and cervical spine surgery. The possible mechanical causes are laryngeal trauma, cuff herniation, damaged pilot tube, adhesion to tracheal wall and surgical fixation of the ETT. There are no algorythms for difficult extubation due to mechanical causes.

Case Report: We report the case of a 57-year-old woman, ASA status III, who underwent the tumor surgery of left parotid gland. Induction and maintance of general anesthesia were uneventful. Extubation was planned 20 hours after she was placed in ICU. The cuff was deflated, but it was not possible to pull the ETT out due to high resistance. Nasogastric tube was taken out for suspected knicking with ETT, antiedematous therapy was administered, and oxygenation and hemodynamic stability were mainteined. Fiberoptic bronchoscopy was done both through the nose and ETT in search for oedema, obstacles and signs of accidental surgical fixation, that also surgeon excluded. ETT was passable, without signs of cuff herniation. After that, videolaryngoscopy in analgosedation was done, with bougie placed in the ETT to secure the route and enable urgent intubation if the sudden laryngospasm occurs. Videolaryngoscopy showed signs of the arythenoids oedema, that could be a result of attempts of extracting ETT. Signs of hemorrhage. lateral shift of anatomical structures or surgical fixation of ETT were not present, so ETT was forcefully pulled out with rotation and traction. Eventually, cuff invagination was observed. There were no respiratory sequellae after ETT being removed, and the patient recovered well.

**Discussion**: Besides anatomical changes, mechanical causes of the tube malfunction may rarely cause difficult extubation, that is seldom present in literature in the form of case reports. Possible mechanical malfunction or cuff invagination in combination of arythenoid oedema may be the explanation for difficult extubation of our patient. After extubation airway collapse may occur and it is important to secure the airway so algorithm is needed in order not to jeopardize the patient.

**Learning points:** Whenever difficult extubation is present it is important to check the tube patency, to search for existing oedema of the epiglotis or the vocal cords, and the signs of surgical fixation. Difficult extubation algorithm is required.

#### 11AP02-8

# Anesthetic challenges in cancer patients: considerations for palliative management of tracheoesophageal fistula: report of two cases

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**Background**: The palliative management of patients with tracheoesophageal fistula (TEF) is a challenge to the anesthesiologist who despite the abnormality of the anatomy and function of the airway, apnea and endoscopic manipulation must keep the patient with spontaneous ventilation, normoxemia and normocapnia.

Case Report: Case report 1: 43 year old patient with metastatic breast cancer who presents TEF by false path during a tracheostomy. Under sedation with dexmedetomidine, the tracheotomy cannula was removed. FTE was observed, via bronchoscopy, high-frequency ventilation (Jet) was initiated, and introduced self-expandable covered stent. In the intensive care unit, stent was placed, patient presented hypoxemia. didn't respond to treatment and suffered a cardiac arrest. Case 2: 57 year old patient with stage IIA esophageal squamous cell cancer who required chemotherapy, radiotherapy and an esophageal stent, was admitted for aspiration pneumonia and suspected TEF. Fibrobronchoscopy evidenced TEF at the left bronchus. The esophageal stent was removed and patient was scheduled for a dual endoscopic procedure. Patient was sedated with dexmedetomidine and both (bronchial and esophageal) stents were placed. Utilizing the Karnofsky Performance scale the patient scored 90/100 with a previous rating of 60/100.

Results and Discussion: In the intraoperative, considering that these patients with decreased lung compliance and function, increasing the difficulty for ventilation after anesthetic induction presented by hypoventilation, hypoxemia and hypercapnia. Muscle relaxation and positive pressure ventilation should be avoided, and patient's spontaneous breathing decrease the risk of bronchoaspiration and prevent the escape of volume by TEF [1]. Total intravenous anaesthesia (TIVA) using propofol or dexmedetomidine is recommended. In cases of difficult oxygenation and ventilation high frequency ventilation can be used as an adjuvant. The oxygen administration should be titrated to the minimum tolerable by maintaining an adequate flow of fresh air with FiO2 32-40%, after period of apnea should be administrated 100% [2].

#### References:

1.Semin Cardiothorac Vasc Anesth.2017;21:357-359.

2.Curr Pharm des.2012;18(38):6314-24.

**Learning points**: The anaesthesiologist should avoid muscle relaxation, positive pressure ventilation, and inhaled agents.

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#### 11AP02-9

## Airway management of a patient with an extramedullary plasmocytoma in the proximal trachea undergoing tracheal resection – a case report

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Background: All airway surgery presents its unique challenge in the collaborative effort between anesthesiologists and surgeons. Tracheal tumors are rare and constitute as little as 0.1% of all malignancies. We present a case of Extramedullary Plasmocytoma (FMP) in the trachea with fewer than 20 cases previously reported Case Report: A 51 year old woman presented with respiratory distress and diagnosed with EMP in the tracheal posterior wall 10mm below the vocal cords (extending 20mm), obstructing 70% of the lumen. Preoperative radiotherapy and curative tracheal resection with end-to-end anastomosis was planned. The patient's pre-placed tracheostoma was used during anesthesia induction. The surgeons requested a neurosign orotracheal tube be placed with a flexible bronchoscope after which the tracheostomy tube was removed. When the trachea and tumor were exposed a size 5 tube was inserted distally for ventilation and the orotracheal tube withdrawn to the upper larynx. After resection the posterior anastomosis was completed, the distal tube removed and ventilation resumed via the orotracheal tube. All vital parameters were stable. Chin stitches were placed with the neck in a forward flexed position to minimize anastomotic tension. Measures to avoid nausea and local edema were ascertained. Since bag-mask ventilation and fiber optic intubation was simple and the surgery uneventful she was extubated on the operating table at the return of spontaneous breathing and was immediately able to speak. The patient was monitored in the ICU for 24h.

**Discussion**: Tracheal tumors are rare as described above and each surgical resection requires its unique plan as an obstructed airway, previously treated with radiation therapy should be managed with great respect. The alternative ventilation strategies discussed were:

1)Supraglottic airway device → not optimal

2)Jet-ventilation → not optimal

3)Transtracheal ventilation with Ventrain → possible

4)Tracheostomy before tracheal resection→ good choice

5)Flexible bronchoscopy for oral intubation → good choice

6)ECMO (v-v) → rescue therapy.

**Learning points:** Pre-surgical communication between the anesthesiologist and surgeons is essential when dealing with a potentially difficult airway to plan for safe ventilation and maximized surgical space throughout the resection.

Each tracheal tumor case is unique in location and size. Comorbidities and treatment history helps determine the course of the airway management.

#### 11AP02-10

#### Negative-pressure pulmonary edema due to postthyroidectomy tracheomalacia: a case report

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**Background**: Negative-pressure pulmonary edema (NPPE) is a rare and potentially serious complication of airway obstruction. Following thyroid surgery, it can happen due to laryngeal nerve damage, laryngeal edema, cervical hematoma, pneumothorax and tracheomalacia (1,2). We present, to our knowledge, after Ikeda and Sharma (2), the 3rd case of a NPPE due to goiter-caused tracheomalacia after thyroidectomy.

Case Report: A 61-year old female patient was diagnosed with retrosternal goiter after left hemithyroidectomy 30 years earlier and scheduled for excision of the remaining gland. Surgery was uneventful and the patient was transferred to the post anesthesia care unit breathing spontaneously, with no signs of respiratory distress or dysphonia. 2-hours after extubation, acute-onset severe dyspnea developed, requiring reintubation and mechanical ventilation. An X-ray was performed showing pulmonary edema. NPPE caused by tracheomalacia was diagnosed after excluding other causes of pulmonary edema and airway obstruction. She was successfully extubated the same day without any other complications.

**Discussion**: Although sufficient tracheal compression from thyroid enlargement to result in post-thyroidectomy tracheomalacia is rare (1), with an estimated incidence of 0,3%, it is a life-threatening complication after extubation, leading to airway compromise, respiratory complications, and even death (1). Identifying the described predictive factors for tracheomalacia after thyroidectomy (3) and using the appropriate airway management in these cases can avoid unnecessary adverse outcomes

#### References

1. Lee, C. et al. Management of a patient with tracheomalacia and supraglottic obstruction after thyroid surgery. Can J Anesth. 2011; 58: 1029-1033.

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- 2. Ikeda, H. et al. Negative-pressure pulmonary edema after resection of mediastinum thyroid goiter. Acta Oto-Laryngologica. 2006; 126: 886-888.
- 3. Nakadate, Y. et al. Tracheomalacia after reoperation for an adenomatous goiter located in a unique position. J Anesth. 2011; 25: 745-748. **Learning points**:
- Tracheomalacia is a rare but potentially life-threatening complication after thyroid
- The identification of predictive risk factors for tracheomalacia after thyroidectomy should lead to appropriate airway management during extubation and immediate postoperative period in high risk patients, avoiding unnecessary respiratory complications and adverse outcomes.

#### 11AP02-11

#### Systemic hyalinosis and anesthesia - a case report

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Background: Systemic hyalinosis (SH) is a very rare autosomal recessive disease caused by mutations in the ANTXR2 gene and characterized by hyaline deposits in the papillary dermis and other tissues. Clinically, it usually presents at birth or in infancy. Signs and symptoms vary and include pain with movements, progressive joint contractures and motor disability, thickened skin, gingival hypertrophy, papules of the face and neck, skin nodules, hyperpigmented patches over bony prominences, perianal masses and protein-losing enteropathy. Severe cases are associated with death in early childhood (1). The disease can have specific implications during anesthesia, particularly in airway management.

Case Report: We present a 3 years old girl, with SH, scheduled for tonsillectomy and adenoidectomy due to repeated upper respiratory infections. She was 93.5 cm tall and 12.2 kg of weight. She had a limited neck retroflection, normal mouth opening, but massive gingival hypertrophy, Mallampati Class 2 airway and multiple joint contractures. Her preoperative evaluation was unremarkable. General anesthesia (GA) with sevoflurane induction, and venipuncture afterwards was performed, supplemented with fentanyl and rocuronium. Two hand face mask ventilation was good. After obtaining Cormack Leanne view 1 with Airtraq videolaringoscope No 1, trachea was intubated with cuffed reinforced endotracheal tube No 3.5. The course of anesthesia and surgery was good. After reversion of neuromuscular block with sugamadex 2 mg/kg, the child was extubated and observed in the post anesthesia care unit. She was discharged home the day after surgery. Few months later the orthopedic correction of knee contractures was performed under GA with the use of the supraglotic airway (I gel No 2) without neuromuscular blockade. Intraoral space was not limited due to prior tonsillectomy.

**Discussion**: The main aspect of SH pertinent to anesthesia is the airway involvement, which can compromise airway management. Various airway devices can be used with difficult airway chart and ENT surgeons on side in case of difficulty. Sugamadex can be safely used to reverse neuromuscular block and facilitate early extubation in the operating room.

#### References:

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**Learning points**: There are no described cases of sugamadex, Airtraq and I gel use in SH patients. With this case report we want to demonstrate the efficacy and safety of this anesthetic approach in a SH.

### 11AP03-1

## Efficacy of one-lung jet ventilation using an airway exchange catheter for removal of a migrated bronchial stent: a case report

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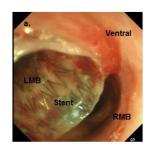
**Background**: Complete airway obstruction is a fatal condition during removal of an airway foreign body. Although extracorporeal membrane oxygenation (ECMO) is often used, ECMO has a risk of complications including bleeding. We report a case in which one-lung jet ventilation (JV) was successfully used to maintain oxygenation during removal of a migrated bronchial stent.

Case report: A 55-year-old woman (height, 160 cm; weight, 54 kg) underwent bronchial stenting to a stenotic left main bronchus (Fig. 1a), and mechanical ventilation via tracheostomy was continued due to post-tuberculosis sequelae. Three months after the stenting, the bronchial stent had proximally migrated to the trachea and complete airway obstruction was likely to occur (Fig. 1b); therefore, stent removal using rigid bronchoscopy was scheduled under general anesthesia. General anesthesia was induced and maintained with propofol and remifentanil.

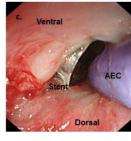
We prepared ECMO on stand-by and oral intubation with an endotracheal tube was performed after the removal of the tracheostomy tube. An airway exchange catheter (AEC) (OD, 3.7 mm) (Cook, Bloomington, USA) was advanced to the right main bronchus by passing it through the outside of the endotracheal tube under bronchoscope monitoring (Fig. 1c). One-lung JV through the AEC was then started. Since PaO2 was maintained at 95 mmHg after one-lung JV had been started (FiO2, 1.0; inspiratory time, 0.5-1.0 sec; respiratory rate, 15/min; oxygen pressure, 0.2 MPa), we removed the endotracheal tube and inserted a rigid bronchoscope. The bronchial stent was removed uneventfully under one-lung JV (Fig. 1d) and SpO2 was maintained at 99-100% during the procedure. The patient emerged from anesthesia without complications.

**Discussion and Learning Points**: In this case, a long and thin AEC was a suitable airway device and oxygenation was maintained by one-lung JV. Although JV has the potential to cause barotrauma, the incidence of the complication is relatively low in a non-emergency setting1); therefore, one-lung JV with an AEC is considered to be a valuable technique for airway management of distally located airway stenosis. **References**:

1. Br J Anaesth 2016; 117: 28-38







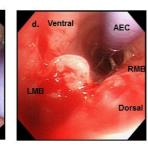


Fig. 1. Bronchoscopic view. a. Just after the stenting. b. Three month after the stenting. c. AEC insertion into the RMB. d. Just after the stent removal. LMB: Left main bronchus, RMB: Right main bronchus, AEC:

#### 11AP03-2

## Does clinical experience affect the relationship between tracheal and bronchial cuff pressures of double-lumen tubes?

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Background and Goal of Study: Appropriate management of the tracheal cuff (TC) pressure and bronchial cuff (BC) pressure of a double lumen tube (DLT) is important during one lung ventilation. However, the relationship between these pressures under general anesthesia remains unclear. We hypothesized that anesthesiologists' clinical experience does not affect this relationship.

Materials and Methods: After approval of the Institutional Review Board (IRB), a total of 31 adult patients who had left-sided DLTs inserted were retrospectively investigated from anesthesia records between September 2016 and March 2017. Anesthesiologists inflated cuffs without manometry. The BC was inflated via direct bronchoscopy through the tracheal lumen. Anesthesiologists were divided into a fellow group and a non-fellow group based on clinical experience. The cuff pressures were measured using a manometer at 5 cm H2O of positive end-expiratory pressure. The patient characteristics, the number of DLTs, and the difference between TC pressures and BC pressures were statistically evaluated. A p value < 0.05 was considered significant. Statistical analysis was performed using JMP®12.0.1 software (SAS Institute Inc., Cary, NC, USA).

**Results and Discussion**: The number of DLTs measured in the fellow and nonfellow groups were 17 and 14, respectively. The number of anesthesiologists in the fellow and non-fellow groups were 9 and 5, respectively. There were no statistically significant differences in patient characteristics. The difference between the TC and BC pressure (mean ± standard deviation: SD) was 14.4 ± 4.1cm H2O in the

fellow group (p = 0.003) and  $7.4\pm8.7$ cm H2O in the non-fellow group (p = 0.41). Paired t-test showed that the BC pressure was significantly lower than the TC pressure in the fellow group despite no significant differences between BC and TC pressures in the non-fellow group. More experienced anesthesiologists tended to avoid excessive BC pressures. It may be that clinical experience contributes to adjustment of cuff pressure.

**Conclusion**: Clinical experience affects the difference between TC pressure and BC pressure.

#### References:

1. Brodsky JB, Adkins MO, Gaba DM. Bronchial cuff pressures of double-lumen tubes. Anesth Analg. 1989; 69: 608-10.

#### 11AP03-3

## Individualized PEEP-adjustment in obese and non-obese patients undergoing laparoscopic abdominal surgery

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Background and Goal of Study: Induction of anesthesia frequently causes atelectasis and may increase pulmonary complications after surgery. During mechanical ventilation, tidal recruitment and collapse may occur due to insufficient positive end-expiratory pressure (PEEP) and may promote lung injury. Following a recruitment maneuver (RM), individualized setting of PEEP can be performed by Electric Impedance Tomography (EIT)-based regional ventilation delay index (RVD<sub>i</sub>). We hypothesized that individualized PEEP<sub>EIT</sub>+RM will improve lung aeration compared to a standard PEEP (5cmH<sub>2</sub>O) in obese and nonobese patients during general anesthesia for laparoscopic abdominal surgery.

Materials and Methods: After institutional ethical committee approval and written informed consent, patients were prospectively arranged in an obese group (BMI ≥35kg/m²) and a nonobese group (BMI 18.5-30kg/m²). Patients were randomized to receive ventilation (VT=8ml/kg predicted body weight, I:E ratio 1:2, respiratory rate of 12/min) with either standard (PEEP₅) or individualized PEEPॄ<sub>EIT</sub> PEEPॄ<sub>EIT</sub> patients received a RM (plateau pressure 40 or 50cmH2O for 10 breaths; PEEP of 20 or 26cmH₂O, higher values in obese patients) followed by decremental PEEP-titration (steps of 2cmH₂O). On every PEEP-step, a low-flow breath was performed to assess lung inhomogeneity by RVD, and PEEPॄ<sub>EIT</sub> was selected at the RVD, minimum. PaO₂/FiO₂ was measured before and after intubation, during pneumoperitoneum, before and 2b after extubation. Data were compared using repeated measures ANOVA except for PEEP, which was tested by Kruskal-Wallis-test.

**Results and Discussion:** 90 patients (PEEP $_{\rm s}$  n=45, PEEP $_{\rm EIT}$  n=45) completed the study. PEEP $_{\rm EIT}$  was significantly higher (nonobese: median 14cmH $_{\rm 2}$ O [8;20]; obese: 18cmH2O [10;26]) than the PEEP $_{\rm 5}$ . With PEEP $_{\rm EIT}$ , patients had significant better oxygenation, higher compliance and lower driving pressure intraoperatively.

		PEEPer (n=45)						PEEP <sub>5</sub> (n=45)					
	after intubation	Obese (n=25) PNP	before extubation	after intubation	Nonobese (n+20) PNP	before extubation	after intubation	Obese (n=25) PNP	before extubation	after intubation	Nonobese (n=20) PNP	before extubation	p-value
PEEP (cmH <sub>2</sub> O)	5.0 (0.0)	18.6 (4.8)	18.6 (4.8)	5.0 (0.0)	14.7 (3.3)	14.7 (3.3)	5.0 (0.0)	5.0 (0.0)	5.0 (0.0)	5.0 (0.0)	5.0 (0.0)	5.0 (0.0)	<0.001
Peak pressure (cmH <sub>2</sub> O)	25.9 (5.3)	34.3 (6.4)	31.9 (6.8)	23.5 (5.4)	34.9 (3.9)	30.0 (3.7)	24.1 (3.4)	27.8 (2.9)	24.2 (2.8)	24.2 (4.3)	30.7 (4.4)	25.5 (4.0)	<0.001
Plateau pressure (cmH <sub>2</sub> O)	18.8 (3.9)	28.3 (5.3)	25.7 (5.2)	15.8 (2.3)	26.4 (4.4)	22.2 (3.8)	17.4 (2.7)	21.9 (2.8)	18.8 (2.7)	16.5 (2.9)	22.5 (3.0)	17.3 (2.6)	<0.001
Driving pressure (cmH <sub>2</sub> O)	13.8 (3.9)	9.6 (1.7)	7.1 (1.3)	10.8 (2.3)	12.1 (2.8)	7.7 (1.8)	12.3 (2.7)	16.9 (2.8)	13.8 (2.7)	11.5 (2.9)	17.5 (3.0)	12.3 (2.6)	<0.001
Complianc e (ml cmH <sub>2</sub> O)	44 (12)	64 (16)	88 (20)	72 (17)	63 (18)	108 (29)	46 (12)	35 (8)	44 (11)	67 (10)	38 (6)	60 (14)	<0.001
PaO <sub>2</sub> /FiO <sub>2</sub> (mmHg)	256 (119)	502 (71)	521 (75)	478 (59)	481 (95)	517 (96)	290 (135)	341 (130)	357 (125)	416 (100)	391 (102)	418 (80)	<0.003

**Conclusion:** In patients undergoing laparoscopic abdominal surgery, inhomogeneity of lung inflation can be reduced by RM and PEEP-titration guided by EIT. This requires higher PEEP values than commonly recommended and improved oxygenation with reduced driving pressures.

#### 11AP03-6

## Endobronchial closure of bronchopleural fistula after esophagectomy using a cocoon septal occluder

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**Background**: Bronchopleural fistula (BPF) is a rare but severe complication of esophagectomy. Drainage tubes and intravenous antibiotics are often ineffective. Surgical treatment is not always possible due to the poor medical conditions of the patient. Endoscopic techniques can be a more suitable option. There are several reports of Amplatzer devices for closure of BPF associated with pulmonary resection, but this is the first case with a Cocoon septal occluder (CSO) in a patient with a lung abscess related to anastomotic leak after esophagectomy.

Case report:53-years-old man was admitted to hospital 17 days after esofaguectomy and intraoperative radiotherapy, with anastomotic leak and lung abscess. The patient had received neoadjuvant chemoradiotherapy, risk factors for these postoperative complications. Percutaneous TC-guide drainage was

performed and an esophageal endoscopic stent was placed. Three days later, physical patient status got worse and new TC exam showed distal migration of the stent.Emergent cervical esophagostomy was performed. The patient went then under mechanical ventilation and with norepinephrine perfusion. A 4-5 mm fistula in the right main bronchus 2 cm distal to carina was identified by flexible bronchoscopy. Thoracic and General Surgery Departments dismissed surgical treatment of the BPF. Interventional Pneumologists proposed an endobronchial deployment of a CSO through a flexible bronchoscope in collaboration with Interventional Cardiologists. The procedure was uneventful, with immediate air leak resolution. In the 16th postsurgery day, the patient was transferred to conventional ward, receiving hospital release in the 29th postsurgery day.

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**Discussion**: The CSO (Vascular Innovations Co Ltd. Nonthabury, Thailand is a self-expandable, double-disk device designed for the occlusion of atrial septal defects. CSO is compressible inside a catheter and returns into its shape when deployed in the BPF to occlude the defect by a self-centering waist. The device can be easily recaptured and redeployed for optimal placement. Endobronchial deployment of septal occluder devices can be quickly performed under mild or even conscious sedation in contrast with surgical treatment. This makes this endoscopic technique very useful for patients without surgical options.

**Learning point**: endobronchial deployment of CSO is an effective, non invasive technique useful to close BPF for patients in poor medical condition without a surgical treatment option.

#### 11AP03-7

## Breathing pattern and route of breathing during endoscopic retrograde cholangiopancreatography (ERCP) under sedation in elderlies

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Background and Goal of Study: Endoscopic retrograde cholangiopancreatography (ERCP) is one of the most invasive procedures of upper gastrointestinal endoscopy routinely performed under intravenous sedation and local anesthesia. We lack knowledge on incidence and nature of disordered breathings during sedation for the endoscopic procedures, while sedatives and local anesthetics to upper airway may significantly depress respiratory control and arousal responses. Nasal cannula pressure measurement may be clinically useful for detecting abnormal breathings during sedation as is in sleep medicine. The aims of this study are 1) to test a hypothesis that nasal pressure measurement alone reflects breathing even during insertion of an endoscope through the mouth, and 2) to describe breathing during ERCP procedure in elderlies.

Materials and Methods: With Institutional Ethics Review Board approval, we

conducted an exploratory observational study in elderlies undergoing ERCP under sedation. In addition to routine cardiorespiratory monitoring, close respiratory monitoring was performed by measurements of nasal cannula pressure and oral airflow with a thermistor. Four liter/min oxygen was administered via nasal prong throughout the sedation. Percutaneous carbon dioxide monitoring was also performed in some patients. Ramsey Sedation Score 5 and 6 were achieved and maintained by doses of midazolam 0.5-2mg, fentanyl 50 to 200 mcg, and continuous infusion of dexmedetomidine 0.7mcg/kg/hr.

Results and Discussion: Twenty-one elderly patients, aged 77±15 years old (mean±SD) and BMI 23.2±3.0 kg/m2, were recruited and completed the study protocol. Disordered breathings were common in all cases during sedation and apnea- hypopnea index (AHI) with and without insertion of endoscopy were 16.1±12.0 and 10.8±11.4 hour-1. Central apnea and hypopneas were less common and specifically limited immediately after injection of the sedatives and narcotics. Insertion of the endoscopy shifted predominant breathing route from the nasal (78.3±34.8% of the study time) to the oro-nasal (86.8±28.7%), and the nasal pressure signals were significantly weakened, but assessable 90% of time of the sedation. Flatten nasal pressure signals were helpful to determine the obstructive nature of the breathing abnormalities.

Conclusion: Our results indicate clinical effectiveness of the nasal pressure monitoring to diagnose disordered breathings during endoscopic procedure under sedation

### 11AP03-8

## The necessity of monitorng oxygen saturation during gamma knife radio surgery

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**Background and Goal of Study**: The gamma knife is a treatment for cerebral arteriovenous malformation or some types of brain tumor. Patients are received therapy in the treatment room where is separated from the medical staff room.

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There is no quideline about how to monitor patients during gamma knife, because patients are received only a little local anesthesia and sedation medicine before treatment, and don't feel any pain during therapy. So many brain surgeons of gamma knife believe that they can complete their therapy without any fear. We studied how gamma knife patients changes their respiratory condition and when we should pay attention during treatment.

Materials and Methods: We selected patients scheduled gamma knife treatment at Tokyo women's medical university hosiptal from April 2016 to March 2017, and checked patients' oxygen saturation using Capnostream (Covidien japan corp) during gamma knife irradiation. Capnostream can save saturation data every 5 second. After treatment, we made scatter plots from patients' data.

Results and Discussion: We got 171 patients data. Within that, 103 patients (60.2%) reduced their oxygen saturation under 93 during treatment, and 38 (22.2%) patients had oxygen desaturation under 90. And, by looking at the scatter plots. we found many patients start reducing their oxygen saturation from 15-20 minutes after entering the treatment room.

Conclusion(s): During the gamma knife therapy, many patients may have bad respiratory conditions. Especially, we should pay attention from 15 minutes have passed after starting treatment.

#### 11AP03-11

#### One lung ventilation pitfals on severe thoracolumbar scoliosis surgery

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Background: Idiopathic Severe Scoliosis (ISS) has a prevalence < 0.1%. Surgical correction is complex and may require multiple discectomy trough anterior thoracotomy with one lung ventilation (OLV) and extended posterior instrumentation under evoked potentials monitoring in a lung restricted patient. Our unique case highlights how pulmonary complications related to surgical and anaesthetic approach superimposed on severely restricted lungs can be successfully managed with a multimodal and multidisciplinary approach in perioperative period.

Case Report: Fifteen year old female, ASA III, with a severe thoracolumbar scoliosis and restrictive lung disease, Cobb's angle of 120°, proposed for anteroposterior scoliosis correction. Total intravenous anaesthesia was administered with propofol, remifentanil and ketamine, with a left double lumen tracheal tube insertion, confirmed with fiberscope. While on left OLV, patient developed severe bronchospasm, with important oxygenation and ventilation impairment. Ongoing ketamine, inhaled bronchodilators and corticoid therapy were ineffective, so sevoflurane targeting MAC 0.5, deep muscular relaxation, and pressure controlled ventilation (PCV) followed with favourable outcome. Upon transition to posterior approach right sided chest tube was inserted and double lumen tube was replaced by a reinforced tracheal tube. During spinal distraction, surgeon reported a left side pleural rupture. Surgical glue was applied and the left iatrogenic pneumothorax didn't translate in ventilatory or hemodynamic instability. After an 11 hours' procedure, patient was extubated and transferred to the ICU without immediate complications. After two days she developed a left total pneumothorax which was managed with insertion of a chest tube without further complications. After 20 days

Discussion: OLV in the setting of restrictive disease is a demanding task. In our patient severe bronchospasm and a second iatrogenic pneumothorax ensued and a multimodal strategy with PCV, multiple intravenous and inhalatory drugs and a close communication with surgical team were the key for the successful ventilatory management.

Learning points: Multiple surgical and anaesthetic complications can occur during OLV and in the postoperative period of ISS correction. Success on ventilation management requires a multimodal approach and close teamwork. Careful postoperative planning may minimize potentially catastrophic complications.

#### 11AP03-12

#### **Continuous Monitoring of Ventilation by Diaphragm** Ultrasonography with a New Tool During Procedural Sedation, A pilot study

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Background and Goal of Study: Respiratory monitoring allows for initiation of interventions to prevent complications during sedation. The respiration is primarily driven by the diaphragm motion and ultrasound can be used for assessment of the diaphragm (1). We report on a novel technique for continuous monitoring of ventilation by diaphragm ultrasonography with a new tool during procedural

Materials and Methods: After receiving local ethic committe approval and written informed consent of patients we conducted a prospective, observational study of patients (N=15) ASA I to III (>18) who were scheduled to undergo procedural sedation. We made a probe-holder for continuous visualization of diaphragm motion with simple materials. The probe is held with flexible soft rubber band without metal

parts. It has an adjustable velcro band according to different body shapes (figure 1). Visualization of changes in thickness of the diaphragm during inspiration and expiration used for detecting respiratory pauses by a clinician who was blinded to the capnography and patient. Another clinician retrospectively reviewed the records of ultrasonographic examinations and capnography.

Results and Discussion: Retrospective analysis showed 37 respiratory pauses were detected by capnography from 7 (46,6%) patients. Diaphragm ultrasonography was simultaneously detected all respiratory pauses when ensuring an open airway. Conclusion: Diaphragm ultrasonography may provide assessment of continuous monitoring of respiration during procedural sedation with a non-invasive tool which provides stable fixation of an ultrasound probe to the body. References

1. Sarwal A. Muscle Nerve. 2014

#### 11AP04-1

Usefulness of respiratory sound within respiratory circuit monitoring for detecting laryngeal narrowing in anesthetized children managed with supraglottic airway

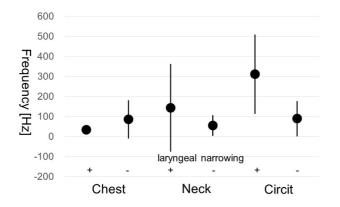
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Background and Goal of Study: Use of supraglottic airway (SGA) for securing patent airway becomes a common technique even for small children undergoing minor surgeries under general anesthesia. However, it is well documented that serious respiratory complications often occur particularly at anesthesia emergence. Accordingly, early detection of the disordered breathing would improve safety and ality of anesthesia management. In this context, respiratory sound monitoring (RSM) with using a stethoscope on the cheat wall has been used in pediatric anesthesia field. However, potential usefulness of the RSM at different sites have not been explored. We are assessing usefulness of RSM at various sites for detecting the larvngeal narrowing. Here we report our preliminary results of analyses of respiratory sounds at various sites for differentiating laryngeal narrowing.

Materials and Methods: With IERB approval and clinical registration (UMIN000025058), we so far completed a clinical study in 10 small children undergoing elective minor surgeries under general anesthesia while the airway was secured by a SGA. Endoscopic images of the vocal cords were continuously monitored to detect larvngeal narrowing. In addition to measurements of respiratory flow and airway pressure, microphones were placed for measuring respiratory sounds at three different locations: on the chest wall and neck, and within the airway circuit. Frequency analyses were performed for the respiratory sounds to detect laryngeal narrowing and to find out the best location for the purpose.

Results and Discussion: Three out of ten children developed laryngeal narrowing during spontaneous breathing at emergence of anesthesia. Microphones on the chest wall and neck did not clearly and accurately detect the laryngeal narrowing. In contrast, as presented in the attached table, significantly higher power spectrum was detected by a microphone placed within the respiratory circuit in children with

Conclusion: Although not conclusive at present, RSM by a microphone placed within a respiratory circuit can be used as a sensitive monitor of the larvngeal airway patency in children with SGA.



#### 11AP04-2

#### What we don't see with the laryngeal mask airway

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Background: The laryngeal mask airway (LMA) is commonly used in daily practice for fiberoptic bronchoscopy. Laryngeal tumors (LT) are present in 20-30% of patients with a tumor of the aerodigestive tract, and 5-8% of those with pulmonary carcinoma (1). The presence of unanticipated supraglotic lesions (SGL), can jeopardize the airway management with LMA.

Case Report: We describe 3 cases of SGL during general anesthesia with LMA during EBUS procedures. They were heavy smokers, moderate drinkers, and presented mediastinic adenopaties with a high probability of lung neoplasia, but no risk factors for difficult airway. Case 1 (67 year-old male) presented cough, hemoptysis and aphonia of 3 months of evolution, case 2 (67-year-old male) was asymptomatic, and case 3 (62-year-old male) had a mild hemoptysis and grade II dyspnea. After LMA insertion at the first attempt (case 1) and second attempt (cases 2 and 3), patients were ventilated correctly. The intracuff pressures (IP) were of 30 cmH2O, 90 cm H2O and 50 cm H2O respectively for patients 1, 2 and 3. When introducing the bronchoscope, a SGL was visualized in the 3 patients: a big mass of the epiglottis for patient 1, an infiltrating mass in the posterior surface of the epiglottis for patient 2, and a polyp in the anterior surface of the epiglottis. that closed the epiglottis over the glottis. The anatomic position of LMA was respectively of grade I (patient 1) and grade III (patient 2 and 3) (I to IV scale), but did not compromise ventilation and oxygenation. In the 3 cases, the exploration was stopped and the patients were woken up with no further complication.

Discussion: These 3 cases represent an incidence of SGL of 3.16% of the total EBUS performed in our center. Dysphonia and various attempts to place the MLA should make us suspect a SGL. The absence of ventilation compromise, allowed a correct oxygenation of patients, but in case of cannot intubate cannot ventilate scenario, waking up the patient or perform a cricothyrotomy are recommended (2).

1. Kurlakose MA; Laryngoscope Jan 2002; 112 (1): 120-23. 2-Frerk C. Br J Anaesth. 2015: 115 (6):827-48.

Learning points: The association of lung malignancies and head and neck tumours is well documented. An anaesthetic concern must be raised for the airway management of these patients if LMA is chosen for bronchoscopy, due to the risk of difficult insertion and ventilation

#### 11AP04-3

#### Safe extubation in Obese patient with Totaltrack VLM

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Background: Extubation may cause larvngospasm, bronchospasm, and elevated intracranial pressure in predisposed subjects (1). Nevertheless, extubation is often considered only a simple "reversal" of intubation. According to data from the NAP4 audit, serious complications during extubation following anesthesia occurred in 13% of cases and a 5% mortality was evidenced (2).

Case Report: We present a 41-year-old male, ASA 2, 35.65 BMI, smoker of 20 cigarettes/day not known allergies scheduled for left cholesteatoma surgery Mallampati 3, cervical mobility 90-100°, mouth opening 2, thyromental distance of 6 cm. approx., and upper lip bite test 1.

Intubation was performed with Totaltrack Video Laryngeal Mask (TT VLM) (Medcomflow, Spain) no 4, no 8 flexometallic tube (ETT), on the first attempt, and confirmed with capnography. We extract Videotrack (camera) and rigid blade from VI M Pack and deinflatable cuff of the flexible blade.

After five hours we perform a safe extubation in a TWO-PHASE extubation process with TT VLM in a Supraglottic Airway Device (SAD) mode (3) with the objective of a smooth eduction, without hemodynamic alterations or respiratory difficulty, and recover of spontaneous ventilation

We reconnect Videotrack to assess the larynx, reinflated the SAD cuff, and removed the FTT under direct vision

When the patient regained spontaneous ventilation, the TT VLM was withdrawn and patient was transferred to reanimation room with supplemental oxygen

Discussion: Patients with BMI>30 have low residual volume, low functional residual capacity and poorer response to apnea, OSA (up to 71%), increased risk of airway obstruction, and rapid oxygen desaturation after anesthesia induction. Several techniques have been described within an extubation strategy. TT VLM allows a monitored extubation over two phases, going from intubation to supraglottic ventilation mode, and monitoring extubation under continuous viewing or continue the awakening by SAD means.

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3 Hurtado EM Merchante MS Safe Extubation with Totaltrack® VI M Acad Anesthesiol Int 2016:1(1):3-5

Learning points: Extubation is an elective procedure and must be a well-planned, ensuring the minimum interruption in the administration of oxygen.

#### 11AP04-4

Comparison of the Baska Mask, I-Gel laryngeal mask airway and Classical laryngeal mask airway for effectiveness and complications in non-paralysed anaesthetised adult patients undergoing ambulatory

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Background: In this prospective randomised study, we compared the Baska Mask with I-Gel Laryngeal Mask Airway (LMA) and Classical LMA in patients undergoing general anesthesia for an elective varicose vein operation.

Methods: In this clinical trial, after approval of local ethics committee and patient consent, 135 patients aged 18-64years of American Society of Anesthesiologists group I-II were randomised into three groups as providing airway via Baska Mask (Group I), I-gel LMA (Group II), and Classic LMA (Group III). Same anaesthesia protocol was used (Induction; 1.5 μg kg<sup>-1</sup> IV fentanyl and 1–2mg kg<sup>-1</sup> IV propofol, no muscle relaxant, maintanance; 1%-2% sevoflurane and 50%-50% mixture of O, Jair, 5 L min<sup>-1</sup>). The allocated LMA was inserted by the same anaesthetist when bispectral index was between 40% and 60%. Data recorded by unblinded observer as regarding number of attempts, ease of insertion (first time success rate, reposition, second attemps success rate) insertion time, haemodynamic and respiratory parameters, amount of leakage, oropharyngeal and systemic complications. NumberCruncherStatisticalSystem 2007, One-way anova test, Tukey HSD, pearson chi-square test and Fisher-freeman-Halton tests were used for statistical anlyses. A value ofp<0.05 andp<0.01 were considered to be statistically significant. Results and Discussion: The study conducted 128 patient (49.2%males and 50.8%females and mean age of 41.34±11.28). First time success rates of groups were 50, 81.8, 70.5 respectively. First time success rate of the group II was significantly higher (p=0.038, p<0.05), Reposition rate and second attemps success rate were insignificantly lower in group II. So ease of insertion rate of the group II was higher than other groups (p=0.038, p<0.05). Mean insertion time was significantly longer in the Groupl as compared to GroupII(25.73±6.94 vs.21.98±4.88,p=0.018;p<0.05). Amount of leakage in the groupII was significantly lower than other groups(p<0.01). All other parameters showed insignificant differences between the three divices.

Conclusion: Baska Mask, I-Gel LMA and Classical LMA can be used in airway establishment during short surgeries but we suggest that; I-Gel is better than others as provides better seal with lower leakage, has short placement time and high ease of insertion rate

#### 11AP04-5

Changes of laryngeal airway patency in anesthetized children with supraglottic airway devices

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Background and Goal of Study: Insertion of Supra Glottic Airway (SGA) as a conduit during general anesthesia became a standard for maintaining the airway even in small children. Because SGA doesn't bypass the vocal cords, hypoxemia is often developed due to laryngeal narrowing and closure. There are some case reports documenting larvngospasm immediately after reversal of the muscle relaxant with sugammadex. We wondered if sugammadex per ser influence the laryngeal patency by changing the laryngeal muscle contraction. Accordingly, we planned to study effects of sugammadex on the laryngeal patency and determine effective monitoring to detect the laryngeal narrowing. The abstract of the latter preliminary analyses is separately submitted to this conference.

Materials and Methods: We are currently testing a hypothesis that use of sugammadex for reversal of muscle paralysis changes larvngeal airway patency during emergence from general anesthesia in children with SGA. Here we report the preliminary results in 10 children while 20 children are planned. A written informed consent was obtained from the parent(s) of the child. General anesthesia was induced by inhalation of sevoflurane and nitrous oxide and maintained by sevoflurane, fentanyl and remifentanil while the airway was secured by SGA. When the anesthesiologist used rocuronium, muscle paralysis was reversed by appropriate dose of sugammadex based on the neuromuscular monitor. Ventilation was controlled during operation and spontaneous respiration was restored after injection of sugammadex. Endoscopic images of the vocal cord to obtain vocal cord angle as well as respiratory variables were continuously measured while the SGA was inserted. Comparisons of the baseline variables and vocal cord angle between

the groups were performed by Mann-Whitney Rank Sum Test. P values were twotailed and P<0.05 was considered to be significant.

**Results:** As presented in the attached Table, no significant difference of the background variables and vocal cord angles were indicated between the groups. Interestingly, incidence of the laryngeal stridor was 30% and much higher than we expected.

**Conclusion:** Although not conclusive at present, the preliminary results indicate that sugammadex does not influence the laryngeal airway patency.

#### 11AP04-6

Gastric distension and airway management during laparoscopic cholecystectomy comparing Ambu Aura Once LMA and endotracheal tube: a randomised study

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**Background and Goal of Study**: The use of the laryngeal mask airway (LMA) for laparoscopic cholecystectomy is still indication with controversial data and results of studies.

The goal of this randomized study is to compare Ambu Aura Once LMA and endotracheal tube with respect to intensity of gastric insufflation and distension in such indication.

Materials and Methods: This was a prospective, single blinded study with 90 adult patients ASA I-II, scheduled for elective laparoscopic cholecystectomy, randomly allocated into two groups: ETT and Ambu Aura Once LMA group. Non fasted patients for 6 h, with BMI >30 kg/m<sup>2</sup> and with hiatus hernia or gastrooesophageal reflux were excluded. Following induction of anesthesia, airway devices were placed by a single experienced anaesthesiologist, without bag and mask ventilation before placing. Anaesthesia was maintained with sevoflurane in N<sub>2</sub>0 and oxygen (Fio, 0,3-0,4) with positive pressure ventilation. In LMA group just seal intracuff pressure was used with tidal volume of 6-7ml/kg. Standard non-invasive monitoring was applied. The surgeon blinded to the type of airway scored stomach size (0-10) at insertion and before of laparoscope removal. Any complications were recorded. Results and Discussion: Device placement was successful in all patients and adequate ventilation was achieved in both groups. Incidence and degree of change in gastric distension were similar in both groups (p=0.392), without disturbing surgical view. Mean oropharyngeal leak pressure in the LMA group was 22 cm H<sub>2</sub>O and central position of vocal cords were seen fiberoptically in 89 % of cases There were not statistically significant differences between two groups for SpO2 and EtCO No specific complications were noted. Ambu Aura Once LMA with serious selection of patients, in the hands of experienced anesthesiologist is an appropriate airway device in a such indication, confirmed in many previous works, even though consensus has not been reached vet.

**Conclusion**: A correctly placed and maintained by experienced anaesthesiologist, Ambu Aura Once LMA provides an efficient airway for positive pressure ventilation during laparoscopic cholecystectomy. Gastric distension occurs with equal frequency and intensity with either airway devices.

#### 11AP04-7

#### A comparison of airway trauma following laryngoscopeassisted and standard laryngeal mask airway insertion techniques

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Background and goal of Study: Although airway morbidity with laryngeal mask airways (LMAs) is less than with endotracheal tubes, the prevalence of sore throat and hoarseness remains high. This impacts patient satisfaction. Reduction of complications with various LMA placement techniques have been studied but no study has primarily assessed laryngoscope-assisted placement to this effect. A single study has reported, as secondary outcome, a reduction in sore throat with the use of a laryngoscope.

Materials and Methods: This randomised controlled trial was conducted in a tertiary hospital. Eighty-one non-obese adult patients with no airway pathology or bleeding disorders were recruited. Consecutive patients scheduled for elective surgery of 30 - 120 minutes duration under general anaesthesia with LMA, were included and randomized electronically into either the S (standard technique) or L (laryngoscope-assisted placement) group. In group S, LMAs were placed according to manufacturer's guidelines. Those in the L-group were placed by displacing the tongue with the laryngoscope; avoiding contact with the vallecula. Correctly sized Unique™ LMAs were lubricated and placed by a single operator. Cuff pressures were maintained at 30mmHg. The prevalence of sore throat, hoarseness and collective airway morbidity were recorded postoperatively.

**Results and discussion**: Fisher's exact test found sore throat to be significantly different between groups; 12% patients in group L vs 35% in group S (p = 0.019), but failed to show statistical difference for hoarseness (7% in group L vs 23% in Group S; p = 0.067) or collective morbidity (32% in Group L vs 48% in group S; p = 0.176). The odds ratios (95% confidence intervals) for sore throat, hoarseness and collective morbidity were 3.88 (1.24-12.11), 3.68 (0.92-14.77) and 1.95 (0.79-4.81)

respectively. Our study shows that laryngoscope-assisted placement of Unique™ LMAs significantly reduces postoperative sore throat. It reduces postoperative hoarseness to a clinically significant but statistically marginally non-significant degree and does not have a significant effect on collective airway morbidity. We recommend that the aid of a laryngoscope be considered when the Unique™ LMA is placed.

**Conclusion**: We recommend laryngoscope-assisted placement of Unique™ LMAs as this technique reduces postoperative sore throat. Future research should assess the effect of this technique on other types of LMA.

#### 11AP04-8

## Factors influencing choice of laryngeal mask airway size in adults in clinical practice

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Background and Goal of Study: Weight based recommendations for laryngeal mask airway (LMA) size have no scientific base and have never been clinically validated. In a previous retrospective study we showed, that LMA size choice in adults is based on sex and different weight size ranges that those recommended. The goal of this study was to inquire whether they are other factors than weight and age that influence LMA size choice.

Materials and Methods: This study was approved by the Hadassah IRB (HMO-16-0552). After recording data on LMA use into the anesthesia information management system (Metavision, iMDsoft, Tel-Aviv, Israel) an automatic email was sent to the investigators informing them about LMA use. The following data were then collected from the anesthesiologists who inserted the LMA: Age, sex, ASA classification, weight, height, body shape (if height not available) and factors influencing LMA size choice (age, sex, weight, height, body shape, mouth opening or other).

Results and Discussion: Data on 714 patients were recorded for 6 months (05/2017-10/2017). Demographics are summarized in Table 1. In 537 (75.2%) patients, weight was at least one of the factors for LMA size choice (single factor: 196 (27.5%), as one of multiple factors 341 (47.8%)). In those cases where weight was one of the multiple factors, habitus (172 (50.4%)), sex (170 (49.9%)), height (122 (35.8%) and mouth opening (51 (15.0%)) were the most important co-factors influencing LMA size choice. In those patients were weight was not a factor, body shape (103 (58.2%)), sex (90 (50.8%)), mouth opening (36 (20.3%)) and height (31 (17.5%) were the most important factors influencing LMA size choice. The distribution of factors for all patients are summarized in Table 2. Weight is the most important factor for anesthesiologists choosing LMA size in adults, but not in almost one fourth of all patients. Only in about one third of patients, weight is the only factor. Habitus, sex, height, mouth opening and age are other factors influencing the LMA size choice.

Conclusion: We conclude that anesthesiologists often use factors other than body weight to choose the LMA size in adults.

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#### 11AP04-9

## A learning curve for LMA ProSeal insertion: an analysis of cumulative sum method

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Background and Goal of study: Supraglottic airway devices (SADs) have become an essential tool in airway management strategies, particularly in cases with a difficult airway. However, the number of insertion procedures necessary for proficient SAD insertion is unclear. In this study, we used the cumulative sum (CUSUM) method to construct a learning curve for LMA ProSeal (pLMA) insertion and assessed how learning influences success rate, insertion time, bleeding and movement during insertion.

Materials and Methods: This prospective observational study recruited 15 junior residents without prior experience of SAD insertion and was conducted from January 2016 to February 2017 at a single, tertiary care, teaching hospital. Staff anaesthetists recorded procedural information such as success or failure, insertion time, bleeding and movement during insertion. A successful pLMA insertion was defined as effective ventilation within two attempts and with an insertion time of up to 120 s. In cases of desaturation, bradycardia or other difficulties during the insertion, the procedure was stopped at the discretion of the attending staff anaesthetist. To construct the CUSUM chart, we set an acceptable failure rate of 20% and an unacceptable failure rate of 40%. The probability of type I and II errors were set at 0.1. The success rate, insertion time and incidence of bleeding and movement were compared between 4 groups (1–10 vs 11–20 vs 21–30 vs 31– cases).

Results and Discussion: Each junior resident performed 45 ± 5 pLMA insertions,

and 14/15 achieved an 80% success rate after 21 ± 9 procedures. The overall success rate was 87% (587/676 procedures). As the number of procedures performed increased, there was a significant increase in success rate and significant decrease in insertion time but no change in the incidence of bleeding or movement. Our results showed that 30 cases were required to acquire proficiency in pLMA insertion; this was similar to the number required for other airway management procedures such as tracheal intubation or mask ventilation. pLMA insertion may be more difficult than other SADs owing to the frequent bending or trapping at the pharynx resulting from the relatively large and soft cuff. Therefore, the learning curve for pLMA may differ from that of other SADs.

**Conclusion**: Our results suggest that anaesthetists should perform about 30 cases of pLMA insertion to acquire necessary proficiency. Further studies using other SADs are warranted.

#### 11AP04-10

## Efficiency and safety of ventilation and intubation through the intubating laryngeal tube: a pilot study

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**Background:** The intubating laryngeal tube (iLTS-D) is a relatively new device that offers ventilation and secondary fiberoptic intubation.

**Goal of Study:** to evaluate the effectiveness and safety of using iLTS-D for ventilation and trachea intubation of patients without difficult airways.

Materials and Methods: 70 adults, ASA 1 and 2 patients with normal airway undergoing elective laparoscopic surgery were included. After induction of anesthesia the iLTS-D was placed with jaw thrust maneuver performed by assistant, and ventilation checked. An endoscopic assessment of the distal ventilation aperture position was performed in all cases. The endoscopic view was classified as optimal, where the vocal cords were seen at least partially, and non-optimal where the vocal cords were not visualized with normal ventilation. After the endoscopic assessment, the bronchoscope was removed and an attempt of blind trachea intubation was made. Then iLTS-D was removed, leaving the ETT in place. 'Time to ventilation', 'time to trachea intubation', success rates and number of attempts of ventilation and intubation, endoscopic view, oropharyngeal leak pressure (OLP) at the level of 60 cm H2O cuff pressure, presence of blood on the device, postoperative sore throat and hoarseness were recorded.

Results and Discussion: insertion of iLTS-D was successful during the first attempt in 67 patients (95.7%), and during the second attempt in 2 patients (2.9%), insertion failed in 1 case (1.4%). The median time to ventilation was 21.0 s (interquartile range 15-40 s). The optimal endoscopic view was in 60 cases (85.7%). The first attempt of intubation was successful in 55 patients (78.,6%), second attempt – 11 cases (15.7%), intubation failed in 4 cases (5.7%). The median time to trachea intubation was 20.0 s (interquartile range 12-35 s). The mean OLP was 31.5 cm H2O (interquartile range 26-34 cm H2O). Minor blood stains on iLTS-D were observed in 5 patients (7.1%). 9 patients (12.8%) complained of a mild sore throat, 2 patients (2.9%) - of hoarseness.

Conclusion: iLTS-D ensures easy insertion and effective ventilation with high success rate at the first attempt, high oropharyngeal leak pressure superior or comparable to other 2nd generation EGA, and low airway morbidity. The high success rate of the first intubation attempt and the overall success rate of intubation is comparable to that of other intubating EGA.

#### 11AP04-11

A randomized study comparing the Laryngeal Mask Airway Supreme with the Laryngeal Mask Airway Protector in the ambulatory surgery unit

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Background and Goal of Study: LMA Protector™ is the newest generation laryngeal mask airway. LMA Protector has a dual gastric drainage channel. Airway tube and cuff are 100% silicone and there are no aperture bars. Silicone cuffs have shown to reduce risk of sore throat and achieve higher seal pressures. The tube of LMA protector is more flexible. An integrated cuff pressure indicator enables continuous cuff pressure monitoring. The cuff of LMA Supreme is polivinylchloride, has one gastric drainage channel and has aperture bars. The tube is more rigid. The primary hypothesis is: the oropharyngeal leak pressure of the LMA Protector is 5 cm H20 higher than the oropharyngeal leak pressure of the LMA Supreme. Secondary outcome measures are: ease of insertion, fibreoptic position, ease of gastric tube placement and complications.

Materials and Methods: ASA I, II or III, outpatients planned for minor surgery, aged 19-71 years, were recruited after informed consent and were randomized in an LMA Supreme (15 patients) or Protector group

(17 patients) (recruitment incomplete). The insertion technique for both LMA types included neck flexion and head extension and full deflation of the cuff. The expiratory valve of the ventilator was closed and fresh gas flow was set at 3 l/min. Oropharyngeal leak pressure was determined at 0, 10, 20, 30 and 40 ml cuff volume, when an audible noise was detected at the mouth. The corresponding airway pressure was measured using an digital manometer. Finally cuff pressure was set at 65 cmH20 using a manual cuff pressure monitor and the corresponding leak pressure was again measured. Subsequently patients lungs were ventilated at a tidal volume of 10ml/kg at a respiratory rate of 12/min.

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Results and Discussion: At the different cuff volumes, the leak pressure was significantly higher for the LMA Protector compared to the LMA Supreme. Mean leak pressure (cmH20) (SD) at 0 ml cuff volume was 18 (7) for LMA Protector vs 9 (5) for LMA Supreme. Leak pressure at 10,20,30,40 ml cuff volumes are 24(9) vs 13(3) and 30(10) vs 19(5) and 30(9) vs 22(7) and 32(8) vs 24(8), respectively for LMA Protector vs LMA Supreme. At cuff pressure of 65 cmH20 leak pressures are 30(9) vs 21(6).

Conclusion: At different cuff volumes, oropharyngeal leak pressures are consistently higher (> 5 cm H20) for LMA Protector vs LMA Supreme. LMA Protector therefore allows effective ventilation at higher airway pressures than LMA Supreme.

#### 11AP04-12

The effect of chin lift and jaw thrust maneuvers during insertion of intubating laryngeal tube on the distal ventilation aperture position relative to the glottis - endoscopic evaluation

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Background and Goal of Study: An important factor, determing the possibility of trachea intubation through iLTS-D is the positioning of the distal ventilation aperture opposite the glottis, which facilitates the intubation through a device. Goal of study: to perform endoscopic assessment of the effectiveness of the chin lift and jaw thrust maneuvers during insertion of iLTS-D to ensure the optimal position of the distal ventilation aperture relative to the glottis for trachea intubation through a device.

Materials and Methods: totally 40 adult. ASA 1 and 2 patients without any signs of difficult airways, scheduled to undergo laparoscopic cholecystectomy with general anesthesia during controlled ventilation via ETT were included in study. After standardised induction of anaesthesia the iLTS-D was placed and proper ventilation checked. In the first group (20 pat.) the doctor applied the chin lift maneuvers during the insertion of iLTS-D, in the second group (20 pat.) - the assistant performed the jaw thrust maneuvers. Next step was an endoscopic assessment of the distal aperture position. The endoscopic view was classified as follows (classes): 1 - full visualization of the glottis: 2 - visible vocal cords, ventral surface of epiglottis and arytenoid; 3 - visible dorsal surface of epiglottis, arytenoid and part of vocal cords ; 4 - the vocal cords is not visualized, normal ventilation. In the case of 1-3 classes of the endoscopic view, fiberoptic intubation was performed. In case of inadequate ventilation after two attempts of insertion of iLTS-D or the presence of a 4-th class of endoscopic view, the anesthesiologist performed direct laryngoscopy and intubation of the trachea. In each group, the time to ventilation was recorded, the first attempt of ventilation success rate, the rate of different endoscopic view.

**Results and Discussion**: in both groups, all cases of iLTS-D® insertion and ventilation were successful from the first attempt. There was no difference in time to ventilation between groups (median: group 1 - 15.7 s., group 2 - 17.1 s., p = 0.16). A significant difference in the rate of the optimal (1-3-th) class of endoscopic view between the groups was revealed (40% in the group 1 vs. 85% -in the group 2, p <0.05).

**Conclusion**: The application of the jaw thrust maneuver during the insertion of iLTS-D provides a optimal positioning of the distal ventilation aperture of the device in front of the larynx and facilitates the FOI.

#### 11AP05-1

The effect of different positive-end expiratory pressures on elastance of respiratory system and ventilation distribution during robot-assisted laparoscopic radical prostatectomy

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Background and Goal of Study: It has been demonstrated that pneumoperitoneum and steep Trendelenburg position during laparoscopic surgery increase elastance of the respiratory system and impair gas distribution in the lung, resulting in hypoxia. In this study, we investigated the effect of different PEEP on elastance of respiratory system and regional ventilation distribution using Electrical Impedance Tomography (EIT) during robot-assisted laparoscopic prostatectomy (RALP).

Materials and Methods: Forty-seven patients undergoing RALP were randomly

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assigned to be ventilated with PEEP 5 cmH<sub>2</sub>O (PEEP<sub>5</sub>) or with PEEP 15 cmH<sub>2</sub>O (PEEP<sub>15</sub>). After induction of anesthesia (T1), tidal volume was set at between 6 to 8 ml/kg/PBW and each PEEP was applied after lung recruitment maneuvers before the establishment of pneumoperitoneum and the Trendelenburg position (T2). Airway and esophageal pressures were measured and elastances of respiratory system, chest wall, and lung were calculated at T1, T2 and 20 min (T3), 60 min (T4), 120 min (T5) after the patients being placed in the steep Trendelenburg position and at end of surgery (T6). Differences in elastances and fraction of regional ventilation distribution of the dependent part monitored by EIT were compared at each time point. Data was analyzed by one-way ANOVA with repeated measures and Tukey test as post-hoc analysis for the comparison within group. Independent t-tests or Mann-Whitney U tests were used for the comparisons between the groups.

**Results and Discussion**: Elastances of chest wall and respiratory system increased at T3, T4 and T5 compared to T2 (p < 0.05) in both groups, and were significantly higher in PEEP $_{\rm 5}$  compared to PEEP $_{\rm 15}$  (p < 0.05). The fraction of ventilation distribution of the dependent part at T3, T4 and T5 was significantly lower than at T2 in PEEP $_{\rm 5}$ , but not in PEEP $_{\rm 15}$ . The intergroup comparisons showed significantly higher distribution in PEEP $_{\rm 5}$  than in PEEP $_{\rm 5}$  at T3, T4 and T5. P/F ratio was higher in PEEP $_{\rm 15}$  between T2 to T6, especially there was significant difference at T3 and T6. However, the lung elastane revealed no statistical differences between the two groups at any time point.

**Conclusion**: Elastance of chest wall increased during pneumoperitoneum and Trendelenburg position, leading to the impairment of the ventilation distribution at dependent part of the lungs. Higher PEEP could prevent lung collapse and keep the better ventilation distribution, which leads to maintenance of oxygenation.

#### 11AP05-3

Does pressure-controlled ventilation-volume guaranteed differ from volume-controlled ventilation in anesthetized patients under deep neuromuscular block undergoing robotic surgery

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Background and Goal of Study: The purpose of this study was to investigate the changes in airway pressure and arterial oxygenation between pressure-controlled-volume guaranteed (PC-VG) and volume-controlled ventilation (VC) in anesthetized patients under deep neuromuscular block (DNB) undergoing robotic surgery.

Materials and Methods: After approval by the local ethics committee and after obtaining informed written consent, a total of 30 patients scheduled for robotic surgery under general anesthesia were included. After pneumoperitoneum (12 mmHg) and Trendelenburg (25°), mechanical ventilation was started with VC for 60 min, then PC-VG was applied to all patients with the same parameters, targeting the obtained tidal volume (Vt). All patients were ventilated with a Genesis Anesthesia Workstation (Hersill, Spain). DNB (PTC 1-3) was maintained using continuous infusion of rocuronium. I:E ratio 1:2, PEEP of 5 cmH<sub>2</sub>O and FiO<sub>2</sub> of 60% was applied to all patients.

Arterial blood pressures, heart rate, ETCO2, SpO2, pH, PaCO2, and PaO2 were measured after 30 and 60 min. of VC and after 30 and 60 min. of initiation of PC-VG. Tidal volume, mean airway pressure (MAP), and peak airway pressure (PAP) were also recorded. PAFi (PaO2/FiO2) and Oxygenation index (OI) [PaO2/(FiO2\*Pmean)] calculation was performed at the preset times. The pressure sensors in the ventilator measured the patient airway pressures. Continuous variables are expressed as mean +/- SD. Data were compared using ANOVA. P-value of 0.05 or less was considered statistically significant.

#### Results and Discussion

Results all	u Discussion	l.			
PAP	VC 30 min.	VC 60 min.	PC-VG 30 min.	PC-VG 60 min.	P-value
	29.06+/-5.42	28.78+/-5.06	26.66+/-5.09	26.04+/-5.14	p≤0.05
cmH <sub>2</sub> O MAP					
	10.95+/-1.91	10.90+/-1.94	11.46+/-2.12	11.73+/-2.12	p≤0.05
cmH₂0 OI					
(cmH <sub>2</sub> O/	281.05+/- 53.8	274.61+/-68.96	281.00+/- 86.86	271.83+/- 65.94	p≥0.05
mmHg) PAFI					
	4.06+/-1.14	4.33+/-1.77	4.54+/-1.94	4.64+/-1.93	p≥0.05
mmHa					

**Conclusion:** While maintaining constant Vt and I/E ratio and under DNB there are significant differences in airway pressures. PAFI and OI were comparable between both VC and PC-VG modes of ventilation.

#### 11AP05-4

Diaphragm ultrasound as a method to predict ventilation outcome in children: the prospective observational cohort study

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Background and Goal of Study: Diaphragm dysfunction worsens outcomes in mechanically ventilated patients. However, the clinical impact of changes in diaphragm structure and function due to mechanical ventilation (MV) is unknown. The hypothesis was that in children the duration of MV and the duration of stay in the intensive care unit, the frequency of complications depend on the degree of diaphragm atrophy. The aim of the study was to determine whether diaphragm atrophy developing during MV leads to prolonged ventilation.

Materials and Methods: We investigated data of 54 patients at the age 1 month-1 year admitted in Lviv Regional Children Clinical Hospital "OCHMATDYT", who needed invasive MV and were eligible for measurement of diaphragm function. 4 patients were excluded due to the neuromuscular disease and bronchopulmonary dysplasia, in the 2 patients ultrasound investigation was impossible. 48 patients were included in the study results analysis and all of them had two or more diaphragm thickness measurements. Diaphragm thickness (Tdi) at end of inspiration and diaphragmatic excursion were measured daily by ultrasound in children requiring invasive MV, evaluating an inspiratory effort was assessed by thickening fraction. The primary outcome was time to liberation from ventilation. The secondary outcomes included complications (reintubation, tracheostomy, prolonged ventilation, or death). We use Statistical Package for the Social Sciences and results were presented using adjusted hazard ratio (HR), duration ratio, and odds ratio (OR).

Results and Discussion: Thickness decreased to more than 10% in 30 patients (63%) by median day 6 (IQR 5-7). Development of decreased thickness was associated with a lower daily probability of liberation from ventilation (adjusted HR 0.47, 95%CI 0.38-0.62, per 10% decrease), prolonged ICU admission (duration ratio 1.63, 95%CI 1.25-2.44), and a higher risk of complications (OR 2.14, 95%CI 1.21-4.72). Development of increased thickness (n=8, 17%) also predicted prolonged ventilation (duration ratio 1.38, 95%CI 1.00-1.90). Decreasing thickness was related to abnormally low inspiratory effort; increasing thickness was related to excessive effort. Patients with thickening fraction between 15-30% during the first 4 days had the shortest duration of ventilation.

Conclusion: Diaphragm atrophy developing during MV strongly impacts clinical outcomes

#### 11AP05-5

# Automated control of mechanical ventilation during general anaesthesia –preliminary results of a bicentric observational study

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Background and Goal of Study: Several systems for automated control of mechanical ventilation exist on intensive care ventilators that were successfully applied in clinical studies (1-2). The goal of this study is to examine the safety and efficacy of a novel system for automated control of ventilator settings on an anaesthesia machine.

Materials and Methods: The novel system called Smart Ventilation Control (SVC) controls automatically the mechanical breathing frequency, inspiratory pressure, pressure support, inspiratory time and trigger sensitivity with the aim to keep the patient stable in user-adoptable target zones. Patients are eligible for study inclusion when all of the following criteria are met: American Society of Anaesthesiologists (ASA) physical status I, II or III, elective surgery of the upper or lower limb or for peripheral vascular surgery in general anaesthesia, written consent for study participation. Primary endpoint of the study is the frequency of the following adverse events: Severe hypopnea defined as minute ventilation lower than 40 ml/kg predicted body weight for longer than 5 minutes, appea for longer than 90 seconds hyperventilation defined as end-tidal partial pressure of CO2 (PetCO2) lower than 5 mm Hg of the lower target setting for SVC for longer than 5 minutes, hypoventilation defined as PetCO2 higher than 5 mm Hg of the upper target setting for the SVC for longer than 5 minutes, respiratory rate ≥ 35 breaths/minute for longer than 5 minutes, any override or stop of the automated controlled ventilation settings by the anaesthesiologist in charge if the settings are clinically not acceptable

Results and Discussion: The analysis of the first 14 included patients with a mean age ±standard deviation of 52±17 years and a mean height of 172±8 cm revealed that SVC performed well and no interruption of the study protocol occurred. Regarding the primary endpoint, no adverse event was noted. We plan to recruit a total of 100 patients.

Conclusions: This is the first clinical study of a system that automatically controls

most of the ventilator settings on an anaesthesia machine. Our preliminary results suggest that this novel system is safe.

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- 2. Arnal, J. M., et al. Crit Care 17:R196 (2013).

#### 11AP05-6

Sudden ventilation failure during left one lung ventilation for robot-assisted right upper lobectomy in a patient after left upper division segmentectomy

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Background: In patients after left upper lobectomy (LUL), U- or V-shaped angulation of the left main bronchus (LMB) develops with expansion of the left lower lobe. We reported that a standard left-sided double-lumen tube (LDLT) cannot be used to achieve successful one-lung ventilation (OLV) for right lung surgery in post-LUL patients with remarkable LMB angulation, characterized by a combination of a wide angle (> 140°) between the trachea and LMB and a narrow angle (< 100°) between the LMB and left lower bronchus, whereas it can be used safely in patients with unremarkable angulation (J Cardiothorac Vasc Anesth. 2016;30:961-6). Herein, we present a female after left upper division segmentectomy (LUDS) with unremarkable LMB angulation scheduled for robot-assisted thoracic surgery (RATS), in whom ventilation failure occurred with a standard LDLT immediately after she was placed in a lateral jack-knife position required for RATS.

Case Report: A 73-year-old female was scheduled to undergo RATS for right lung cancer. She had undergone LUDS for adenocarcinoma 5 years before. A chest X-ray revealed that she had LMB angulation, albeit unremarkable. After induction of general anesthesia, a standard LDLT (35Fr Portex blue line®) was placed correctly with video laryngoscopy and bronchoscopy. Pressure-controlled ventilation was used for OLV. Adequate OLV could be achieved during test OLV while she was placed in the supine position, and also in the left lateral position. However, ventilation failure occurred as soon as she was placed in the lateral jack-knife position with the waist raised. Fiberoptic examinations revealed that the tip of the bronchial lumen was completely obstructed by the LMB wall despite correct LDLT placement. The LDLT was exchanged to another type of LDLT with a soft, flexible, wire-reinforced tip (Silbroncho®, 37Fr) using a tube exchanger and video laryngoscopy while she remained in the lateral position. Thereafter, adequate OLV could be achieved even after she was replaced in the lateral jack-knife position. The scheduled RATS could be completed uneventfully.

Discussion and Learning points: Our experience suggests that ventilation failure with a standard LDLT can occur more easily when a patient with LMB angulation is placed in a lateral jack-knife position than simple lateral position probably due to more significant posture-induced exacerbation of bronchial angulation, and that Silbroncho® tube is useful to overcome this problem.

#### 11AP05-7

## Evaluation of a non-invasive respiratory volume monitor without patient-specific calibration

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Background: Continuous monitoring of respiratory status is important for identifying potentially life-threatening respiratory compromise, performing clinically appropriate interventions, and monitoring patient recovery. A recently developed non-invasive Respiratory Volume Monitor (RVM) has been shown to have better than 10% accuracy for minute ventilation (MV), tidal volume (TV), and respiratory (RR) in both non-intubated and intubated patients. The current RVM requires a patient-specific calibration with a spirometer. To facilitate broader use, the RVM has been updated to measure MV and TV without the need for a patient-specific calibration. Here, we evaluated the accuracy of the RVM without patient-specific calibration compared to three FDA-cleared devices.

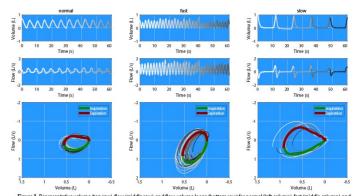
Methods: 20 subjects from a broad ambulatory population (11 males, BMI=26.8 kg/m2 (18-41), 49.2 yrs (22-80)) had MV, TV, and RR simultaneously recorded by the RVM without a patient-specific calibration and a comparison device: Pneumotachometer (Heated FVL, Morgan Scientific), Wright Respirometer (Mark 14, nSpire Health), and RVM with patient-specific calibration (ExSpiron, Respiratory Motion). Subjects completed 3 trials on Day 1 and repeated them on Day 2, wearing electrode pads continuously for 24 hours. Relative errors in measurements of MV, TV, and RR were calculated. Bias, precision, and accuracy were calculated using Bland-Altman analyses. Paired-difference equivalence tests were performed with equivalence margins of 10% relative error.

Results: The RVM's mean measurement biases for MV and TV were within 2.2% compared to all three comparison devices and within 0.2% for RR (Table 1). The mean measurement accuracies were better than 11.6% for MV and TV and better than 4.1% for RR (Fig 1A). Equivalence tests showed that MV, TV, and RR were equivalent within ±10%.

Conclusion: We demonstrated that the RVM can deliver accurate MV, TV, and RR

measurements without the need for patient-specific calibration. This new capability streamlines the workflow of the RVM and enables healthcare providers to provide continuous and non-invasive respiratory assessments in a broader variety of clinical settings.

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#### 11AP05-8

Assessing the effects of duration of apnea on adequacy of ventilation across a broad cohort of surgical patients in the post-operative environment

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**Background**: Maintaining respiratory sufficiency is a vital component of postoperative care, yet clinicians often rely on subjective clinical assessments or secondary indicators of respiratory status. Patients with apneic episodes are often considered to have "respiratory insufficiency" regardless of whether these apneic episodes impact overall respiratory status or are compensated by large recovery breaths. We used a non-invasive respiratory volume monitor (RVM) to quantitate minute ventilation (MV) to assess ventilation in patients experiencing apnea in the PACU and on the general floor.

**Methods:** We used an RVM (ExSpiron1Xi, Respiratory Motion, Waltham, MA) to continuously monitor MV for 48 hr following elective abdominal surgery. MV was expressed as percent of MV predicted (MVPRED) based on body surface area and sex; Low MV (hypoventilation) was defined in previous work as MV<40% MVPRED. For each apnea, defined as a pause >10 s, we calculated the patient's MV over 30, 60, 90, and 120 second windows following the start of the apnea.

Results: 216 patients (110 males, BMI: 26.7 (15-41) kg/m2) were monitored for 42.0±0.9 hr. We recorded a total of 49,985 apneas ranging in length from 10-117s (Fig 1A). Apnea >10sec was observed in 99% of patients, suggesting that apnea per se is a poor indicator of respiratory insufficiency. The average MV was 73±2.4% MVPRED, as patients were often sleeping or mildly sedated. We assessed the effects of each apnea on the temporally associated MV (Fig 1B). While apneas lasting 10-18 s decrease instantaneous MV by as much as 30%, their effect over the course of 1 minute is less than 10%. On a 2-minute time scale, even 60 s apneas lead to Low MV just 20% of the time (Fig 1C).

**Conclusion**: While apneas were ubiquitous, they seldom led to sustained Low MV over clinically relevant time scales. Compensatory breaths following an apnea generally restored MV to near pre-apnea levels. Nonetheless, some apneas can become dangerous when ignored, as when sedation decreases compensatory breath size. RVM data provides a better overall metric of respiratory competence, driving better assessment of patient risk and individualization of care.

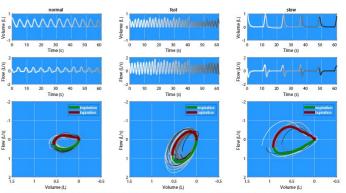


Figure 1. Representative volume (top row), flow (middle row), and flow-volume loops (bottom row) for normal (left column), fast (middle column), and slow (right column) breathing trials. The flow-volume loops display all breaths during the breathing trials as well as the average inspiratory (green) and

#### 11AP05-9

# Comparative effects of variable ventilation and a stepwise recruitment maneuver on atelectasis and hemodynamics in an experimental model of ARDS

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Background and Goal of Study: Variable volume controlled ventilation (VV) has the potential to reverse atelectasis. We hypothesized that VV is superior to a conventional stepwise recruitment maneuver (RM) to open atelectatic lung tissue. Materials and Methods: In total, 9 pigs were anesthetized and ventilated in airway pressure release ventilation (APRV) mode with positive end-expiratory pressure (PEEP) and driving pressure of 15 cmH2O, as well as respiratory rate (RR)=20/ min. Four saline lung lavages were performed and lungs recruited in APRV by stepwise increase of PEEP to 45 cmH2O (10 cmH2O increments, RR=20/min driving pressure=15 cmH2O) (stepwise RM). Then, a decremental PEEP trial was conducted in volume-controlled ventilation with VT=6 mL/kg and RR=30/min to determine the PEEP that resulted in the highest compliance (optimal PEEP) Animals were submitted to two recruitment strategies (random sequence): 1) stepwise RM followed by 30 min of volume-controlled ventilation with VT=6 mL/kg, RR=30/min and optimal PEEP; and 2) VV, consisting of 30 min volume-controlled ventilation with random variation of VT (mean=6mL/kg, normal distribution, coefficient of variation of 30%) RR=30/min and optimal PEEP Before recruitment strategies, animals were disconnected from the ventilator for 30 seconds and volume-controlled mechanical ventilation resumed during 5 minutes with constant VT=6 mL/kg, RR=30/min and optimal PEEP to reset lung history. I:E ratio and FIO2 were kept constant at 1:1 and 1.0, respectively. Before and after each recruitment strategy, lung aeration was assessed by computed tomography, and the center of aeration along the ventral-dorsal gradient was determined.

Results and Discussion: Both recruitment strategies increased the amount of normally aerated tissue and decreased the amount of poorly and non-aerated lung tissue (Table 1). The reduction of non-aerated lung tissue was greater after VV than stepwise RM. The stepwise RM, but not VV, resulted in significant reduction of mean arterial pressure (76 [71...84] to 42 [38...43] mmHg, P<0.001) and increase of heart rate (111 [80...111] to 121 [106...131] bpm, P=0.004, median [1st ...3rd quartile])

Conclusion: In this model of ARDS, VV more effectively reduced non-aerated lung tissue, with less effects on hemodynamics as compared to a stepwise RM.

#### 11AP05-10 Validation of a capnodynamic method for measuring Effective Lung Volume in healthy volunteers

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Background and Goal of Study: Effective lung volume (ELV) can be calculated continuously using a capnodynamic method utilizing a breathing pattern with intermittent cyclic prolongation of inspiratory pauses and correlates well with functional residual capacity (FRC) in healthy lungs in a porcine model. (1) The aim of this study was to evaluate and validate ELV as a volume correlated to FRC in healthy volunteers.

Materials and Methods: 10 healthy volunteers were passively ventilated in an upright position using the capnodynamic methods breathing pattern without PEEP. ELV was measured in at least three consecutive minutes where breaths were showing a good fit (low error) to a mathematically predicted ELV volume. The mean ELV were then compared to FRC measured on the same study subjects using body box plethysmography (FRCbp), considered to be the golden standard in lung volumetrics. In four out of ten study subjects we also measured FRC by a nitrogen wash out method for measuring FRC in spontaneous breathing subjects (Exhalyzer), (FRCex).

Results and Discussion: Three of the study subjects were excluded since they were not able to let themselves be passively ventilated by the capnodynamic breathing pattern.

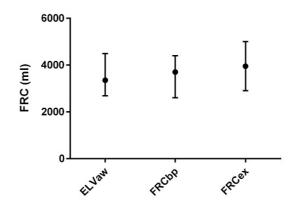
ELV showed a FRC (median (range)) of 3350 ml (2700-4500 ml). FRCbp in the same objects were 3700 ml (2600-4400 ml). FRCex was slightly higher 3950 ml (2900-5000 ml). Blant-Altman statistics showed high agreement between ELV and FRC with a bias (95% limits of agreement of) of 21 (-754 to 796 ml) ml and a percentage error of 22 %.

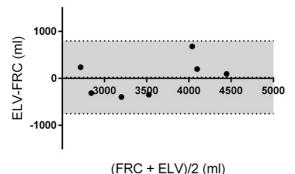
Conclusion: In healthy subjects in the up-right position ELV and FRC showed

a high agreement. This indicates that ELV could be used as a continuous online measurement of FRC during mechanical ventilation. Further, ongoing, studies will evaluate the performance of ELV on anaesthetized patients.

#### References:

 Capnodynamic assessment of effective lung volume during cardiac output manipulations in a porcine model. Hällsjö Sander C, Lönnqvist PA, Hallbäck M, Sipmann FS, Wallin M, Oldner A, Björne H. J Clin monit Comput 2015 Sept: 1-9





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#### 11AP06-1

## Comparison of remifentanil versus dexmedetomidine in sedation for fibreoptic intubation

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**Background and Goal of Study**: Intubation vigil fiberoptic requires adequate sedation for the procedure without inducing the patient's apnea. The aim of our study was to compare two ways of sedation for tracheal intubation under fibreoptic (TTE)

Materials and Methods: A prospective study including 40 adult patients admitted for scheduled reconstructive surgery of the face burns requiring ITF. They were randomized into 2 groups: - GR: under sedation remifentanil - GD: dexmedetomidine sedation All patients underwent a gargle by the lidocaïne 5%, and then practice a bilateral laryngeal nerve block according to the technique of Vannier. Then three lidocaïne sprays are made at each nostril. Finally, the endoscope is lubricated by the lidocaïne gel. Oxygenation was maintained through a nasal tube (61 / min). Then, patients GR received sedation with a remifentanil bolus 0.75 µgkg-1 followed by an infusion at a rate of 0.075 µgkg-1 min-1. In GD, intravenous sedation with a dexmedetomidine bolus of 0.4 µgkg-1 followed by an infusion at a rate of 0.7 µgkg-1 hr-1. Then we proceeds to ITF. Statistical analyze is ensured by SPSS 22 (n < 0.05)

Results and Discussion: no difference between the 2 groups for age (GR:  $44.7 \pm 11,9$ years vs GD:  $41.6 \pm 15.3$ ; p = 0.39) and BMI (kg / m²):  $23.9 \pm 1,3$  in GRvs24,8  $\pm 1,7$ dans GD, p = 0.33. The ease of intubation (0à10): 4.3 /10 in GR vs 3.4/10 in GD, p = 0.11. Successful ITF from the 1st attempt: 75% (GR) vs85% (GD); p = 0, 21. Sédation deep (RAMSAY>3): 5% (GR) vs 9% (GD); p = 0.09; bronchospasm: 30% GR vs 10% GD(p = 0,11. respiratory distress (bradypnea, SpO2 < 90%): 10% GR vs. 5% GD(p = 0, 22. cough: 20% GR vs. 15% GD p = 0.45.

**Conclusion**: Dexmedetomidine or Remifentanil associated to local anesthesia; allow ITF in good conditions

1. HUI-HUI LIU et al. Comparison between remifentanil and dexmedetomidine for sedation during modified awake fiberoptic intubation. Exp Ther Med. 2015 Apr; 9(4):

#### 11AP06-2

## Difficult airway management in emergency surgery: fibrobronchoscope intubation through laryngeal mask

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**Background**: Prediction of difficult intubation and ventilation is essential and challenging. Airway devices have been favorable for managing these situations but, sometimes, a secure airway is not possible. Endotracheal intubation through laryngeal mask with fibrobronchoscope is an effective and secure way to ensure airway permeability and ventilation.

Case Report: 51-year-old woman was required emergency laparoscopic cholecystectomy. Past medical history: bipolar syndrome, fibromyalgia and necrosis of temporomandibular joint which required surgery in 2014, with prosthesis implantation. Airway examination: regular neck length with excellent cervical extension, thyromental distance higher than 6 cm, mouth opening of less than 4 cm, Mallampati III.

We used rapid sequence intubation with fentanyl, Propofol and rocuronium and first attempt was done with laryngoscope, and no structures couldn't be visualized. We chose Airtraq number 3 with endotracheal tube 7 for second attempt and, due to limited mouth opening, manipulation of airtraq wasn't possible and intubation was unsuccessful. We performed manual ventilation and we decided to place a laryngeal mask Ambu Auregain #3. After starting mechanical ventilation, we tried to introduce a stomach tube through laryngeal mask gastric channel, being this attempt unsuccessful and gastric content with air couldn't be aspirated. Due to this finding, possible misplacement of supraglottic device was considered and we decided to perform fibrobronchoscope intubation through laryngeal mask. Intubation with ET was successful, and aspiration was performed. No other incidences were found during extubation. We explained the situation to our patient and we wrote an alert of difficult airway management for future intubations.

**Discussion**: Features for difficult airway intubation were found in this patient. Using supraglottic devices and others are essential in our daily practice for these cases, but sometimes, a total correct placement is not possible. Endotracheal intubation with fibrobronchoscope through laryngeal mask is a safe and effective option for intubation and ensuring airway permeability when objective findings about misplacement are seen during ventilation.

**Learning points**: Supraglottic airway devices can help us both for effective ventilation and intubation, both in emergency and non-emergency situations and for fibrobronchoscope intubation.

#### 11AP06-3

## The impact of post intubation laryngotracheal stenosis on quality of life: a qualitative study

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**Background and Goal of Study**: Post Intubation Laryngotracheal Stenosis (PILTS) is a serious debilitating complication of invasive ventilation. Estimated incidence varies widely from 0.6% to 21% following endotracheal intubation or tracheostomy. Information on the impact this condition has on its sufferers is scarce in the literature. Our aim was to identify the themes emerging around the impact on quality of life reported by PILTS patients.

Materials and Methods: Members of an international social media group set up by a foundation established to promote awareness and provide support for the patients affected by tracheal stenosis were invited to take part in a short online survey. It included free text option on the impact the condition has on quality of life, the responses to which were evaluated using thematic analysis assisted by the software package NVivo-11 (QSR International Pty Ltd.; Melbourne, Australia). Results and Discussion: Ninety one participants completed the survey, the majority of which were from the USA. Sixty seven of the respondents have had or currently have larvngotracheal stenosis, while the rest comprised carers and one healthcare professional with interest in LTS. Forty eight percent were diagnosed with PILTS several years after developing symptoms with 90% respondents indicating there was confusion over the diagnosis. Seventy percent needed multiple endoscopic dilatation procedures and 60% had had more than 10 outpatient appointments. Ninety one percent of respondents agreed or strongly agreed with the statement that PILTS has a major impact on their quality of life. The thematic analysis found PILTS affected the individual's quality of life in the following multiple areas: physical activity, psychological and emotional wellbeing, financial costs, social context with impact on work, family and community

Conclusion: This qualitative study suggests that PILTS is usually misdiagnosed for several years. The majority of those diagnosed undergo multiple procedures and surgeries and numerous outpatient appointments, with ninety percent reporting a significant impact on their quality of life. Impact on quality of life varies from personal relating through to work and family and the wider community, extending over time. This survey has highlighted the need for further in-depth research into the lived experience of patients with post-intubation laryngotracheal stenosis.

#### 11AP06-4

Effect of head position on orotracheal intubation using fibre-optic bronchoscopy, a randomised cross over study

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Background and Goal of Study: Prompt fibre-optic orotracheal intubation relies on an optimal view of the vocal cords. This study hypothesised that the neutral position would provide a better fibre-optic view of the vocal cords and examined the effects of head position on fibre-optic orotracheal intubation, assessed using the percentage of glottic opening (POGO) score.

Materials and Methods: Fifty-four consenting patients scheduled to receive general anaesthesia by orotracheal intubation, were eligible for the study. After proper head positioning was confirmed depending on the group, the FOB was inserted until the best view of the vocal cord was acquired. Changing the head position from the first to the second position according to the patient group, second vocal cord image was acquired and an endotracheal tube was advanced smoothly into the trachea. Another anaesthesiologists reviewed the image data later.

Results and Discussion: 106 images of the vocal cord view from 53 patients were obtained. The mean POGO score was 26.65 (±30.18) for the sniffing position (position S) and 37.29 (±32.56) for the neutral position (position N) (P = 0.002). There was no significant difference between both head position about the intubation time, the degree of convenience and the lowest SpO2 value at the time of endotracheal intubation

**Conclusion**: The POGO score of the neutral position was significantly higher than that of the sniffing position during fibre-optic orotracheal intubation. The difference could be attributed to the epiglottis which is closer to the posterior pharyngeal wall especially under general anaesthesia and anterior movement of laryngeal inlet. The authors recommend the neutral head position during the fibre-optic orotracheal intubation

#### 11AP06-5

#### Benzalkonium chloride can be used to create a hygienic nasotracheal intubation environment with sustained sterilizing effects

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Background and Goal of Study: Nasotracheal intubation(NTI) potentially involves in contamination of microbes in the upper respiratory tract into the lower respiratory tract. However, the disinfection method has not been determined. Therefore we investigated the sterilizing effects of benzalkonium chloride (BZK) and povidone iodine (PVI) in NTI.

Materials and Methods: The study was pre-registered on UMIN-CTR (UMIN000023506) after being approved by the Institutional Review Board of the School of Dentistry, Aichi Gakuin University, and written consent was received from the patients. The subjects were 46 patients who were aged 20 to 70 years, classified as 1 to 2 in ASA-PS, and scheduled to undergo general anesthesia with NTI. They were randomly divided into Group BZK (n=23) and Group PVI (n=23). BZK and PVI were applied at concentrations used clinically, 0.025 and 5%, respectively. The subjects' nasal cavities before sterilization (A) and after sterilization (B), and the internal surface of the intubation tube after extubation (C) were swabbed, and the swabs were subjected to culturing in a selective medium for staphylococci. The number of bacteria (CFU) per cotton swab was measured, and the rates of change in bacterial count (B/A, C/B) were calculated. We also investigated the growth inhibitory effect on Staphylococcus aureus in vitro. For statistical testing, the X2 test of independence and the Mann-Whitney U test were used, and a difference with P<0.05 was considered statistically significant.

Results and Discussion: While initial disinfection effects (B/A) were inferior for

**Results and Discussion:** While initial disinfection effects (B/A) were inferior for BZK compared to PVI, the effects were sustained (C/B) (see Figure). BZK inhibited the growth of Staphylococcus aureus even when it was diluted 29 times, while PVI inhibited it when diluted 29 times. This suggests that BZK is used at a concentration higher than PVI on inhibitiory effect on the bacterial growth. Even though the disinfectant was inactivated or diffused/diluted over time, BZK maintained the threshold concentration showing antimicrobial effect longer than PVI, which seemed to show better sustaining effect.It is unclear as to why the initial sterilizing effects in Group BZK were somewhat inferior to those observed in Group PVI, and alterations to sterilization methods or the time allowed for effects might be necessary.

**Conclusion**: BZK can be used to create a hygenic NTI environment with sustained sterilizing effects.

#### 11AP06-6

## The change of tube tip position for tracheotomy during head extension

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Background and Goal of study: In the case of head and neck surgery for oral cancer including neck dissection and/or reconstruction with free flap, tracheotomy is occasionally performed to prevent postoperative airway obstruction. In tracheotomy under general anesthesia, the tracheal tube is first intubated through the nasal cavity, and it is exchanged to the tracheostomy tube. We have to pay attention not to rupture the cuff of the tracheal tube during incision to the trachea as mechanical ventilation become difficult. However, we experience some cases of rupture of tube cuff. We hypothesized that the tube tip might move backward and the cuff end get close to the incision site. In this study, therefore, we investigated the changes of tube tip position during head extension for tracheotomy.

Materials and Methods: 12 patients (ASA-PS: I-II, 40-80 yrs) participated in this study. They underwent tracheotomy due to surgery for oral cancer including neck dissection and reconstruction with free flap. After nasotracheal intubation, the distance between the tube tip and the first carina were measured by using fiberscope. After neck extension, the distance was measured again. The difference between the first measurement and the second measurement was analyzed statistically by paired t-test.

**Results and Discussion:** Patients were  $69.5 \pm 9.0$  yrs,  $157.6 \pm 8.4$  cm in height, and  $56.0 \pm 11.0$  kg in weight. The distance between the tube tip and the first carina at the second measurement  $(38.2 \pm 10.7$  mm) was significantly longer than that at the first measurement  $(16.1 \pm 9.6$  mm) (p<0.001). The difference was  $22.0 \pm 7.8$  mm (range: 9-40 mm). In three cases, the cuff was ruptured during incision of the trachea. These data suggested that the cuff end might backed to the vocal code side by around 2 cm and might become close to the incision site. Therefore, the tube should be advanced again after neck extension sufficiently to avoid rupture of the cuff during tracheostomy.

**Conclusion:** After neck extension for tracheotomy, the cuff end of tracheal tube may get back to the vocal code side by around 2 cm. Therefore, we have to confirm that the cuff end should be sufficiently away from the incision site by fiberscope.

#### 11AP06-7

## Hypodermic needle in main bronchus: a strange case of foreign body

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**Background**: We frequently get patients with foreingn bodys in the aero-digestive tract.A variety of these have been reported but lower airway foreign matter is uncommonly encountered in adults

Case Report: A 53-year-old man is brought to hospital reporting moderate hemoptysis from one week before, dyspnea, cough with greenish expectoration and fever. As PA, it highlights posttraumatic pneumothorax in 1985 due to a knife wound that required surgery. In chest X ray, metallic linear image is seen.

He is put under anesthesia with propofol, remifentanil and rocuronium, and ventilated with jet through a bronchoscope. a rigid bronchoscopy is performed, where a foreign body is observed that comes from LSD with a metal prolongation that suggests a needle, up to an intermediate bronchus. The needle is unclamped and extracted by bronchoscope.

After the extraction, n5 igel mask is introduced, the patient is reverted with sugammadex and extubation is carried out without any incidents. The patient joined regular hospitalization and was discharged the next day.



Discussion: Foreign bodies in children are usual but in adults are infrequent. The most common cause is aspiration, and although iatrogenic causes are rare, we can find from surgical gauzes to accupunture needles. Surgical needles are extremely rare. In this patient, in a bronchoscopy performed in 2014, the metallic material already existed, but located in the upper left lobe. It was interpreted as surgical osteosynthesis material, and it was not removed. But the needle migrated to the contralateral lung, beginning to

produce symptoms.

**Conclusion**: Causes fo foreign bodies in adults are mainly iatrogenic or traumatic. The recognition of atypical radiological features can help us to achieve correct diagnosis. The removal of these objects usually involves the rapid recovery of the patient.

#### References

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#### 11AP06-8

First human trial of a non-occlusive dilatation balloon allowing continuous oxygenation and ventilation in the management of tracheal stenosis

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Background and Goal of Study: Tracheal stenosis often presents as an emergency, and is a debilitating condition which is difficult to treat. Dilatation may avoid costly resection/reconstruction/tracheostomy. Traditional dilators cause complete occlusion, preventing oxygenation/ventilation, limiting safe duration of dilatation, and increasing risk of hypoxic injury or barotrauma. We undertook the first trial of an innovative non-occlusive balloon in humans, which could improve patient safety by allowing continuous oxygenation/ventilation during tracheal dilatation.

Materials and Methods: Institutional, ethical and written informed consent was obtained for a prospective, interventional study of twenty dilatation procedures in adult patients presenting with acquired tracheal stenosis. Patients underwent general anaesthesia with manual and mechanical ventilation. Flexible endoscopic airway assessment and measurement was performed. Access was maintained by rigid bronchoscope, endotracheal tube or supraglottic airway as deemed appropriate by the surgeon and anaesthesiologist. Continuous ventilation was provided during 3-minute dilatations. Heart rate, airway pressure, end-tidal carbon dioxide and peripheral oxygen saturation were continuously measured, and adverse events recorded. Primary outcomes were ability to ventilate during dilatation, and preservation of peripheral oxygen saturation. Secondary outcomes included improvement in stenosis measurement and Cotton-Myer grading, and procedure-related adverse events. Observations were assessed with descriptive statistics, and continuous data were compared using the Wilcoxon signed-rank test.

Results and Discussion: Satisfactory ventilation was achieved throughout. Peripheral saturation remained >97% at all times in 95% (19/20) of procedures. In one case a saturation nadir of 82% occurred, on the background of severe respiratory disease. Median (IQR) stenosis diameter increased from 5 (4-6) to 12 (11-14) mm (p<0.001). Median Cotton-Myer grade improved from 3 to 1. Two patients had minor reversible adverse events (coughing and laryngospasm), which did not prevent completion of the procedure

**Conclusions**: This was the first clinical trial of the device in humans. Ability to maintain continuous oxygenation and ventilation was demonstrated, with significant improvement in post-procedure stenosis diameter. Larger trials to confirm improved patient safety and comparative efficacy must be undertaken.

#### 11AP06-9

## When dysphonia speaks for itself: reconsidering the airway plan despite a previous grade I laryngoscopy

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**Background**: A comprehensive examination of the airway and previous intubation history should be a primary focus when evaluating a patient. Fiberoptic intubation was a major change regarding the anaesthesiologist's limited options to approach a predictably difficult airway. With proper sedation or after induction, this is a rather safe procedure when considering the benefits and outcome provided.

Case Report: Male patient, 58 years-old, with history of arterial hypertension, type II diabetes mellitus and active smoking habits. He was admitted to the emergency department (ED) with worsening dysphagia for 3 months. Diagnostic rigid laryngoscopy in the ED revealed a mass in the right vocal cord with extension to the homolateral arytenoid, right larynx hemiparesis and acceptable glottic inlet. Later the patient underwent a first biopsy of the lesion through a suspension microlaryngoscopy, and no difficulty regarding airway management was documented in this intervention (Cormack-Lehane grade I laryngoscopy). Histologic examination revealed a polymorphic inflammatory process as part of a fungal infection and the patient complied with two weeks of treatment with fluconazole.

Due to maintenance of complaints the patient underwent a second biopsy four weeks after the initial intervention. At our pre-operative evaluation, the patient reported worsening of dysphonia and dyspnoea since the first time and we decided to manage the situation as a predictably difficult airway. Fiberoptic intubation was chosen as the first-line approach and was conducted under sedation with remifentanil 0,1 ug kg-1min-1 and topic analgesia of the naso and oropharynx with lidocaine 10% spray. This approach allowed visualization of the glottis with an extensive mass spreading from the right glottic inlet to the supra and infra-glottic regions with important narrowing of the glottic opening. Intubation was achieved with a microlaryngoscopy 5mm cuffed tube. Pathologic analysis of this biopsy confirmed the diagnosis of verrucous carcinoma of the larvnx.

Conclusions: Predicting a difficult airway is a necessary skill to every anaesthesiologist. Previous successful intubation attempts with direct laryngoscopy are not always a guarantee of future safe intubation attempts, specially regarding laryngeal tumours. Fiberoptic laryngoscopy (with subsequent intubation) can be an accurate method to predict a difficult airway and should be elicited more often as a first approach to a patient.

#### 11AP06-10

## Awake fibreoptic intubation for drainage of a thyroid abscess in a pregnant lady

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Background: Airway management of a thyroid mass in a pregnant lady

Case report: A 33-year old lady presents with a thyroid mass at 25 weeks of pregnancy. 2 FNACs performed revealed abscess contents. The mass increased in size post FNAC. MRI neck showed a 4x5cm left neck mass with tracheal displacement. She was planned for incision & drainage.

Airway examination revealed a large left neck mass, Mallampati score of 2, good thyromental distance & mouth opening, & mild decreased neck extension. She was not in respiratory distress. Examination was unremarkable apart from a gravid uterus. She was counselled for awake fibreoptic intubation (AFOI) & GA. A pre-op Doptone was performed by O&G.

She was nebulized with 5ml 2% Lignocaine & given IV Glycopyrrolate 0.2mg. Oral & nasal passages were sprayed with 3 sprays of 10% Lignocaine & Cophenylacaine. TCI Remifentanil was uptitrated to 1ng/ml. An Olympus 3.8mm fibreoptic bronchoscope was introduced via the right nostril. Aliquots of Lignocaine 2% were given above, at, & below the vocal cords via an epidural catheter as the scope was advanced. A pre-loaded size 6.5 ivory RAE tube was railroaded. Once the trachea was intubated under bronchoscopic vision & good capnography waveform was achieved. GA was induced.

Intra-op MAP was kept >70mmHg. Direct laryngoscopy (DL) performed at the end showed no airway swelling, bleeding or pus. Vocal cords were well visualized with ETT in situ. She was reversed & extubated. The right nostril was packed with Merocel due to mild bleeding. Post-op Doptone was reassuring & she was sent to high dependency. Nasal bleeding resolved by POD 2. She was discharged POD 14. Discussion/learning points: AFOI should be considered in patients with possible difficult airways, as in this lady who was pregnant with a large thyroid mass. AFOI can be performed nasally & orally. Nasal route is generally better tolerated & technically easier. On hindsight, we should avoid the nasal route in peripartum patients as nasal passages are engorged. It is good to perform a DL prior to extubation to exclude airway swelling/bleeding & assess visibility of cords.

In pregnancy, we should avoid teratogenic drugs which could affect development of the fetus. We should manage pain & anxiety to prevent pre-term labour. Maintenance of BP peri-operatively is also paramount to ensure adequate uterine perfusion. Consultation with O&G is essential. A multidisciplinary approach ensured a successful perioperative course for her.

#### 11AP07-1

#### Intubation difficulty scale and time in clinical practice

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Background and Goal of Study: Intubation difficulty is an important issue in daily clinical practice for anesthesiologists. Intubation difficulty scale (IDS) was introduced in 1997 to capture 7 major factors comprehensively, but there has been no estimation on relative impacts of time for each one of them. This study aims to quantify the time required to tackle every factor.

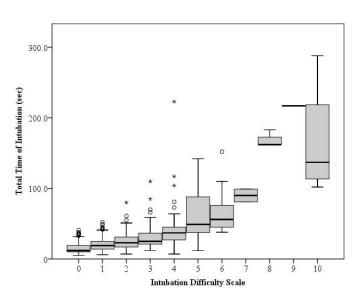
Materials and Methods: After approval from the IRB, we collected written informed consent from each patient (CYCH IRB: 097028). Preoperatively, a complete medical history was obtained from every patient that would receive general anesthesia under direct laryngoscopy with a Macintosh 3# blade.

After induction, the anesthetists recorded the direct view score according to the 7 IDS factors. A research assistant independently recorded the duration of each attempt until a successful intubation. Multiple linear regression and mixed effects models were built to determine the relative time impact of each factor.

Results and Discussion: Studied were a total of 1095 patients, whose IDS score ranged from 0 to 10. Of them, 37.1% showed IDS=0 and 1.8% had IDS>5, which were lower than those reported by Adnet (5.3%). The mean duration of intubation was 23.9±21.8 seconds.

The final linear regression equation was as follows: Duration of intubation time in seconds = 15.2 + 31.1 (no. additional attempts) + 26.2 (no. additional operators) + 11.4 (no. alternative techniques) + 7.9 (intubation with increased lift force) + 4.9 (intubation with external laryngeal pressure) + 3.5 (Cormack grade - 1). After adjustment for anesthesiologists with mixed effects model, we found the regression coefficients were largely the same, indicating the robustness of this model.

Figure 1: Correlation between total time of intubation and intubation difficulty scale (IDS).



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**Conclusion:** All factors included in the IDS contribute to the time required for intubation except vocal cord adduction. After more corroboration in different settings, the equation would be useful to predict the required time as a feedback on training sessions of tracheal intubation.

#### 11AP07-2

Naso-laryngeal distances correlate with body size and are not correctly reflected in commercially available preformed nasal tubes

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Background and Goal of Study: Preformed nasal endotracheal tubes (NET) enforce a certain insertion depth due to design. Tube lengths rise as the internal diameter of the tube increases, however, a significant size variability between various manufacturers is evident and questions the basis of manufacturers' decision of length. In clinical practice NET are often either too long comprising the danger of one-sided intubation or too short, carrying the risk of cuff inflation at the vocal cord level. Therefore, we sought to investigate the currently undetermined naso-laryngeal distances using high resolution CT and MRI scans and compare these distances to standard NETs of several manufacturers.

Materials and Methods: After ethics board review 388 randomly selected MRI and

CT scans of head, neck and upper thorax in a heterogeneous cohort with respect to age and body height were included and statistical analysis was performed. Images of both children and adults were included and data concerning age, gender, weight and height was collected. Mean distances from the nares to the lower border of the thyroid cartilage were measured. NET of different brands were then measured and compared to the naso-laryngeal distances derived from the radiographic analysis. Results and Discussion: Mean naso-laryngeal distance for patients with a height of 150 to 160cm was 160.3mm (SD 10.4), for patients from 161 to 170cm 170.1mm (SD 12.1), for 171 to 180cm 184.5mm (SD 12.2) and for 181 to 190cm 189.9mm (SD 11.5), respectively. Overall, naso-laryngeal distances correlated strongly with body height. NETs from various manufacturers with the same internal diameters differed significantly in outside diameter, lengths, proportions and intubation guide marks. Compared to the measurements taken from the MRI and CT scans, naso-

Conclusion: Naso-laryngeal distances significantly correlate with body height. Since standard deviations were small we were able to define mean distances for different body height groups. NETs from different manufacturers vary substantially regarding their preformed lengths and intubation guide marks and -more importantly-these lengths often do not correlate with the radiographic measurements, hence carrying the danger of cuff malposition due to an often too short distance from the nasal bend to the cuff.

laryngeal distances of the preformed tubes were often too short to ensure a correct

#### 11AP07-3

## Airway approach characteristics in anaesthetized patients outside the operating room

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Introduction: Anesthesia applications for increasingly complex procedures outside the operating room have increased significantly in recent years. In order to maintain high levels of safety and quality, it is essential to understand the characteristics of this population. The purpose of this audit is to describe the characteristics of the airway examination and the incidence of difficult airway in the anesthetic population of our institution, in order to anticipate and improve the care provided to the patient. Methods: Implementation of anesthetic recording in all places outside the operative block. Prospective audit of these anesthetic records during the years 2014 and 2015. Variables analyzed: Sociodemographic (age, sex), clinical (comorbidities, allergies, smoking), airway evaluation (AE), ASA-PS score. Descriptive statistics. Results: The total number of patients anesthetized at remote sites was 2821 Gastroenterology (45.9%), Cardiology (24.5%), Neuroradiology (13.9%), Magnetic resonance imaging (11.8%), evoked potentials (0.8%) and others (3.2%). 60% as ambulatory procedures, 33% with hospital admission and 7% as emergen procedures. 10% of patients younger than 15 years, 69% older than 50. 22.5% of the patients were obese, 4% had a BMI greater than 40 kg / m2. 40% ASA III score, 4.5% ASA score 4 and two ASA V patients. 18% had respiratory disease. Incidence of difficult airway of 5.8%. Airway evaluation: 6.5% thyromental distance <6.5cm 11.5% Mallampati score> 2, 4.4% reduction in mouth opening, 10.6% with cervical extension <90°. 17.2% with cervical diameter> 40cm, 19.5% with upper lip bite test> 1 28% with oral prosthesis 97% maintained spontaneous ventilation during the procedure, 4.4% with orotracheal intubation, 5.2% with supraglottic device Laryngoscopy Grade III (Cormack Lehane) in 3.5% and grade IV in 8.6%.

**Discussion:** Most procedures outside the operative block were performed under continuous monitoring anesthetic technique and the patients maintained spontaneous breathing. We found a significant incidence of difficult airway predictors, despite the subjectivity inherent in this evaluation. Although most procedures require only mild to moderate sedation, a significant number of cases required general anesthesia and orotracheal intubation, with laryngoscopy grade greater than 2 in 12%. These findings highlight the need to improve safety and preparation parameters, especially in the possible resolution of difficult VA cases.

#### 11AP07-4

## A weighted simplified point score for prediction of difficult facemask ventilation – a cohort study

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**Background and Goal of Study**: Difficult face mask ventilation (DMV) is associated with increased risk of complications. Our aim was to 1) assess risk factors associated with DMV and 2) evaluate the diagnostic accuracy of a weighted simplified point score (WSPS) for predicting DMV.

Materials and Methods: A cohort of 46 804 adults undergoing facemask ventilation was retrieved from the intervention group of the cluster randomized DIFFICAIR trial (1). The associations between DMV and 13 risk factors for DMV were assessed by logistic regression and converted to a WSPS. The model was built from a population with complete data of the predictors in two consecutive steps. Initially, all the predictors were included in a multivariate regression analysis using stepwise backward elimination. Secondly, the regression coefficients (beta-values) of the risk factors from the final logistic regression model were converted to a clinically applicable WSPS. The predictive ability of both the original regression equation using the beta-values and WSPS was evaluated by discrimination (area under the receiver operation curve (AUC). The optimal cutoff value of the WSPS was defined by the Youden index.

Results and Discussion: The prevalence of DMV was 1.1% (1.0 − 1.2%). With odds ratios ranging from 3.9 to 7.5, high age, increased BMI, and previous radiation of the neck were especially associated with DMV. The conversion of beta-values into points for the WSPS resulted in possible score ranging from 0 to 20 points. The accuracy of both the WSPS and the accumulated beta-values demonstrated AUC of 0.82. The Youden index indicate a cut off value ≥ 6, at which DMV was predicted with a sensitivity of 0.85 (0.81-0.89) and a specificity of 0.61 (0.61-0.62). These findings differ from the initially reported findings in The DIFFICAIR trial, where the individual clinicians' non-weighted prediction after assessment of the same risk-factors resulted in a sensitivity of 0.14 and a specificity of 0.99.

**Conclusion**: The WSPS may prove a useful tool for predicting DMV. We will validate the model in all randomized patients using multiple imputation. **References**:

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#### 11AP07-5

### Is there any new parameter as difficult airway predictor in TMJ disorders?

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Background and Goal of Study: Airway management is safer when potential problems are identified before surgery. Temporomandibular joint disorders (TMJD) are characterized by deterioration of the articular cartilage, disc, synovium and subcondral bone. Wilke's stages is a classification system to categorized the progressive symptoms of TJMD. These patients usually have a interincisor distance < 3,8 cm, a difficult airway (DA) predictor. The aims were to describe the incidence of DA and trying to find others DA predictors in this subgroup of patients.

Materials and Methods: We design an observational study, after ethic committee approval, 120 TMJ disorder patients were included. There were recorded demographic data, airway predictors, MRI and arthroscopic finding and airway management data.

Results and Discussion: There was no difference in demographic data; only in gender (females/males) (89,4 vs 10,6%). Cormack: I 51%, II 36%, III 9%, IV 3%; Interincisor distance: 3,4 (±1,09). Clinical symptoms weren't DA predictors. Neither MRI findings or arthroscopic findings could be considered DA predictors. Nevertheless, BMI, (0,01) Mallampati (0,000), Wilke's stages (0,009), cervical mobility (0,001) and bite test (0,001) are associated with Cormack III and IV. All patients could be easily ventilated. One patient had needed awake fibrobroncoscopy. 60% patients were intubated in the first attempt. Fibrobroncoscopy intubation was performed only in 3% patients. As alternative intubation techniques were used BURP manoeuvre and videolaryngoscopy (McGrath©) in 13,5%.

#### WILKES STAGES

CLINICAL
Clicking during opening. No pain
Pain tenderness, headache, Clicking and occasional locking
Pain, major mechanical symptoms
Reduced motion, chronic symptoms
Decreased motion, reduced function

Conclusion: According to these results, we could suggest that TMJ disorders patients have an easy airway management and can easily be intubated with conventional laryngoscopy. MRI and clinical symptoms aren't good DA predictors. As previous studies showed, Mallampati score, BMI, cervical mobility and bite test are good predictors. We can add, as new DA predictor, Wilke's stages.

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#### 11AP07-6

## Evaluation and management of the difficult airway: Fiberoptic intubation in a patient with glottic tumor

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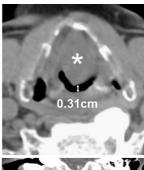
**Background**: Evaluation and management of the difficult airway: Fiberoptic intubation in a patient with glottic tumor.

Case Report: A sixty year-old man suffered from dyspnea and expiratory stridor for one week. The man had dysphonia and needed oxygen supplement while supine. Sagittal, axial and coronal views of the computed tomography showed a tumor (figure1) nearly obstructing the glottic opening. Tumor biopsy and protective tracheostomy were planned.

We measured the diameter of the airway in the CT scan and presumed the 5.0-mm ID endotracheal tube (ETT) should pass through.

After light sedation with midazolam and local anesthesia in the supraglottic airway with lidocaine 4%, we performed oral fiberoptic intubation while the otolaryngologist scrubbed up for emergent tracheostomy. Bronchoscopy showed a rounded tumor nearly covering up the vocal cord.

A gap between the tumor and glottic opening appeared during inspiration that allowed the doctor to pass through the 3.1-mm OD bronchoscope and gently advance the ETT over the scope.









**Discussion**: Difficult airway management is often unpredictable. Although many devices exist to assist with intubation, being able to evaluate the anatomy thoroughly under more accurate guidance, such as CT scan, would be safer for patients and make doctors more confident while manipulating the airway. Unfortunately, anesthesiologists may have to deal with the gap between the static preoperative image and the dynamic degree of airway obstruction. We should always be cautious and keep the second plan handy, such as fully-prepared surgeon for emergent tracheostomy, if the first one failed.

**Learning points**: This case highlights the importance of preoperative evaluation and coordination with the surgeon. In the future, we may perform fiberoptic examination preoperatively in order to evaluate the severity of airway obstruction in real-time and come up with a more precise plan ahead.

#### 11AP07-7

Correlation of preoperative findings in computerized axial tomography with the presence of difficult airway in patients undergoing head and neck otorhinolaryngological surgery

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**Background and Goal of Study**: To establish a correlation between 4 measurements performed on postoperative computed axial tomography with the presence of difficult airway and with the clinical prediction of the same in patients undergoing otorhinolaryngologic surgery.

Materials and Methods: A retrospective, observational study was carried out using as background information the histories of 104 patients undergoing general anesthesia and endotracheal intubation of oncological Otorhinolaryngological pathology during a period of 36 months. In Based on the findings in the preoperative imaging tests, a multivariate logistic regression analysis is performed, where the dependent variable is the presence of extreme degrees of visualization of the glottis (Cormack III-IV) or the presence of predictors of difficult intubation (Mallampati III-IV), a total of 4 tomographic and clinical factors of difficult airway were introduced in this model (distance of the vocal cords, epiglottis and tongue base (CVV, EPI and BL/PFP) and laryngotracheal angle °Alaring).

Results and Discussion: In the Cormack III-IV group, the results were not statistically significant in the multivariate model when compared to the predictors (p> 0.05) 95% CI (0.030-2.31 EPI / PFP, 0.018-1.37 BL / PFP). In the Mallampati III-IV group, in the multivariate model only the CVV / PFP showed clinically significant results (p <0.05) 95% CI (0.104-8.53). In our study we obtained favorable results in the univariate model when we analyzed in the group of patients with extreme degrees of visualization of the glottis, the physical predictors (Cormack III, IV) with respect to the tomographic predictors of distance epiglottis and base of tongue to pharyngeal wall later. Subsequently, in the multivariate model, the results and diagnostic performance did not favor these predictors. Considering the methodological limitations and the imaging tests used in our study, it would be interesting to consider in the future a design that would facilitate extrapolation of the results to clinical practice.

**Conclusion**: In the approach of the airway we can now rely on predictors to physical examination to anticipate situations that put oxygenation and ventilation of our patients at risk. There are still insufficient data to recommend imaging tests in this area, however it seems that in the future they may add to the diagnostic performance as predictors of physical examination.

#### 11AP07-8

### A survey of induction techniques amongst UK bariatric anaesthetists

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**Background and Goal of Study**: Induction and emergence are the most dynamic periods during anaesthesia and remain the times of greatest risk.

Recommendations exist and newer technologies have been introduced, but uptake of these techniques in LIK is not known

This study was performed to get a snapshot of current practice.

**Materials and Methods**: A survey link was sent to the Society for Obesity and Bariatric Anaesthesia (SOBA UK) membership in April 2017 to ascertain the current practices of pre-oxygenation and induction when anaesthetising morbidly obese patients for bariatric surgery.

Questions were on the topics of pre-oxygenation, THRIVE, equipment for laryngoscopy, the delivery of muscle relaxants (and their reversal). The scenarios included use of these techniques in routine and predicted difficult airways.

**Results and Discussion**: Ninety-two members responded representing a combined experience of >22,000 cases.

In predicted non-difficult airways, pre-oxygenation via a standard anaesthetic facemask was preferred (75%), followed by face mask with CPAP (28%). Respondents could choose more than one option.

In predicted 'awkward or potentially tricky' airways, pre-oxygenation via a standard facemask was still preferred (58%) followed by face mask CPAP (43%).

Seventy five percent (75%) had never used the THRIVE technique. There was an increase in the use of Optiflow and the THRIVE technique in the 'awkward or potentially tricky' group from 4% to 8% and 4% to 9% respectively.

The first choice for laryngoscopy was the standard Macintosh blade (64%) followed by a videolaryngoscope (20%).

The timing of muscle relaxant (NMB) was variable: 34% give NMB after loss of consciousness, 31% reported delivering Propofol and NMB together.

Forty-one percent (41%) stated they never check the ability to bag-mask-ventilate (BMV) before giving NMB.

**Conclusion(s)**: Bariatric anaesthesia is an area where new techniques are embraced and implemented rapidly. Many of the lessons learnt in the obese are passed across into other spheres of practice.

passed across into other sprieres of practice.

This study is somewhat disappointing. It appears that implementation of new technologies and recommendations is not as rapid as we hoped.

We aim to repeat this survey in 2018. It will be fascinating to correlate the attendance at SOBA UK meetings with rates of uptake amongst our members. As these techniques become standard it will be much easier for departments to justify the investment.

#### 11AP07-9

## Is the body mass index a reliable predictor of difficult airway in bariatric surgery?

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**Background and Goal of Study**: This study aimed to determinate the effectiveness of the body mass index (BMI) and other parameters as predictors of difficult airway in patients who underwent bariatric surgery in our hospital.

Materials and Methods: This was a retrospective and observational study of patients (n = 107) who underwent bariatric surgery in our hospital from January to December 2016. Firstly, a multidisciplinary evaluation was completed to establish the indication for bariatric surgery in each case. Then, an airway examination was performed in the preanaesthesia evaluation including interdental distance (ITD), thyromental distance (TMD), Mallampati score, head extension and difficult airway scores (DAS): OBESE (mask), LEMON (intubation), RODS (LMA), SHORT (surgical airway). Finally, in the operating room (OR), cases of difficult airway were registered (primary endpoint). The following parameters were recorded: airway predictors in preanaesthesia evaluation, BMI, difficult airway in the OR and postoperative pulmonary complications after surgery. The study was carried out after the approval of the Hospital Ethic Committe. The data were analyzed with 95% confidence by SPSS20, using descriptive and analytic statistics.

Results and Discussion: No statistically significant association between BMI and difficult airway in the OR was founded (p= 0.10). Likewise, Mallampati score, interdental distance and thyromental distance could not be considered as significant predictors in our group. In 11 cases (10,2%), difficult intubation devices were necessary. During immediate postoperative period respiratory failure was diagnosed in two patients.

Conclusion: BMI was not able to be considered as a reliable predictor of difficult airway in our morbid obesity group. Using algorithms and different devices for difficult airway is essential to secure quality and safety in clinical practice.

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#### 11AP07-10

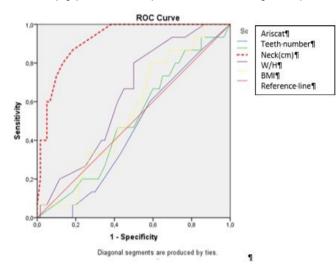
## Identifying predictors of difficult intubation among obese oral surgical patients

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Background and Goal of Study: Obesity, definied as body mass index(BMI) $\geq$ 30kg/  $m^2$  is associated with significant increase in perioperative complications. Moreover, obese patients undergoing oral surgery may provide a unique set of anesthetstic challenges assosiated with airway management. The aim of the study was to evaluate possible predictors of difficult intubation among obese patients sheduled for short oral-surgical procedures under general anesthesia.

Materials and Methods: This was an explorative single-center prospective observational study. Following ethical approval (protocol 05-PA-26-1/2016) and signed written informed consent, 75 obese patients (30-65 yr old, ASA II-III) undergoing oral surgery were enrolled. The number of front teeth (incisors and canines), neck circumeference (NC), waist-to-hip (W/H) ratio, BMI and the risk for postoperative pulmonary complications (PPC) determinated by ARISCAT score was assessed. Difficult intubation was a priori defined as any intubation with > 2 attempts and/or requiring alternative techniques. Receiver operating curve (ROC) analyses were performed to identify predictors of difficult intubation and their cut-off values.

**Results and Discussion**: The average BMI was 34.6 (SD 3.6), average W/H ratio > 1.1 (w 0.99 +/- 0.19, m 1.11 +/- 0.18). The mean value of the NC was 54.2 (SD 6.9) cm, significantly higher in males (p = 0.003). Patients did not have increased risk of PPC (mean Ariscat score 9, range 0-31). The average number of front teeth was 6. Difficult intubation was observed in 15 (20%) patients (9.3% w, 10.7% m, p=0,72). ROC analysis showed that values of NC above 57 cm had 86.7% sensitivity and 81.7% specificity in prediction of difficult intubation (area under the curve AUC=0,918 (Fig1), whereas other parameters showed no significant prediction.



**Conclusion:** In our population of obese patients undergoing oral surgery we found that a NC above 57 cm had a high specificity and sensitivity in the prediction of difficult intubation. We recommend routine measurement of NC in obese patients during assessment before general anesthesia requiring tracheal intubation.

#### 11AP07-11

## Characterizing post-extubation negative-pressure pulmonary edema in the operating room- a retrospective matched case-control study

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Background and Goal of Study: The development of negative-pressure pulmonary edema (NPPE) after extubation of airway device is a true urgent post-anesthesia adverse event in the operating room (OR) that can lead to unanticipated tracheal reintubation and admission to intensive care unit for mechanical ventilatory support. Since NPPE is a rare post-anesthesia event, there are currently no large scale comparative clinical studies available in the literature. This study investigated the incidence and associated risk factors for post-extubation NPPE during emergence. Materials and Methods: This retrospective, matched case-control study was conducted by reviewing the post-anesthesia records in Tzu-Chi General Hospital, Taiwan. Patients reported of having acute hypoxemia (SpO2<92%) shortly

after removal of the endotracheal tube or supraglottic airway, associating with radiographic evidence of pulmonary edema and/or pink frothy sputum were identified as definite NPPE cases. The potential risk factors were compared with the matched controls, who were randomly selected from the same database.

Results and Discussion: A total of 85561 patients received general anesthesia with airway instrumentation during the 8.5-year study period. A total of 16 patients were identified as definite cases of NPPE. Compared with the matched controls (n=131), males, active smokers, emergency operation, endotracheal intubation, use of desflurane and prolonged operation time carried significantly higher risks of developing NPPE (P< 0.05). Multivariate logistic regression analysis illustrated that active smoking (AOR 7.66, 95% CI 1.67-35.3; P=0.009) and endotracheal intubation (AOR 10.87, 95% CI 1.23-100; P=0.03) were the two most significant independent variables of post-extubation NPPE.

Conclusion(s): We present the first comparative clinical study reporting the incidence and risk factors for NPPE during the emergence phase of anesthesia. The overall incidence of post-extubation NPPE in OR is about 0.019%. Multivariate logistic regression analysis indicates that active smokers and anesthesia with ETGA are the two most important independent risk factors for developing NPPE in the post-anesthesia setting. We also highlight that male gender, younger age and prolonged operation time should be considered as precipitating factors in the development of NPPE in OR, especially in active smokers and patients receiving endotracheal intubation.

#### 11AP08-2

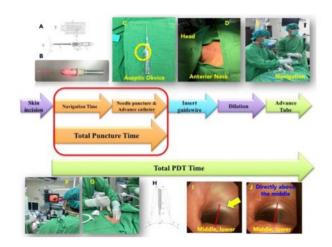
# Safer and Faster Tracheal Puncure During Percutaneous Dilational Tracheostomy: The Overall Report of The Invention of Optic-fiber Guided Needle Puncture Device to Faciliate Percutaneous Dilational Tracheostomy

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**Background and Goal of Study**: Percutaneous dilatational tracheostomy (PDT) has become an increasingly popular option to standard open tracheostomy. Accurate tracheal puncture is the most important and dangerous step during PDT. There are still many miss-leading problems by using convential method. We invented a new guiding system to facilitate the trachea puncture.

Materials and Methods: We invented a handheld optic fiber guided punctureneedle assembly and animal study was performed. Patients undergoing PDT were randomly allocated to conventional and optic-fiber guided group. After the anterior neck skin incision, the assembly was used to locate the optimal puncture site as a round luminescent spot and puncture simultaneously under bronchoscopy in the optic-fiber guided group while standard technique applied in the control group.



#### Figure Legend:

- A. The Structure of the optic-fiber guided system: the present invention provides a puncture needle device assembly, comprising light source assembly, optic fiber and ejection assembly
- B. The infrared light source is used as the light source.
- C. Before using, the optic-fiber is inserted into the guiding needle to over the needle for 1 cm as the needle-over-optic fiber method. Yellow circle: trigger of ejection sleeve.
- D. Locate the anterior neck as thyroid cartilage, cricoid cartilage, sternal notch.
- E. After the anterior neck skin incision, the optic-fiber guided assembly was used to locate the optimal puncture site under bronchoscopy in the optic-fiber guided group while standard technique applied in the control group. The bronchoscope was advanced to the orifice of the endotracheal tube (ETT). Starting the navigation of the accurate puncture site, the bronchoscope and ETT were pulled out simultaneously and slowly to observe the round luminescent spot in the optic-fiber guided group while tracheal compression by the instrument in the control group.
- F. Bronchoscopy during PDT.
- G. The optic-fiber guided assembly was used to locate the optimal puncture site under bronchoscopy.
- H. Navigation with the device to make sure the round luminescent spot was located in the directly above the middle of the trachea.
- I. The round luminescent spot was located in the right of the trachea and then adjust the puncture site.
- J. The round luminescent spot was located in the directly above the middle of the trachea.

The puncture attempts, navigation time, puncture time, total puncture time, total PDT time and complication were recorded.

Results and Discussion: The measured power densities through the assembly were under 3.3mW. The average puncure time were ranged from 8.2 to 4.3 seconds in animal study. We obtained the patents in Taiwan, China and United States. 54 patients were enrolled. The optic-fiber guided group tended to have shorter navigation time, needle puncture time, total puncture time, total PDT time and higher successful and accuracy rate.

Table Patients' characteristic and operational outcome

	Control (n= 27)	Optic-Fiber (n= 27)	P
Age, years	59.0 ± 16.3	64.75 ± 13.5	8-
Male	13 (48.1)	13 (48.1)	
Body mass index, kg/m <sup>2</sup>	$23.9 \pm 3.8$	24.3 ± 3	
Hemodynamics after intubation			
Heart rate, beats/ sec	$90.0 \pm 16.1$	$90.5 \pm 18.2$	
Systolic blood pressure, mmHg	$119 \pm 17.6$	$124.8 \pm 20.1$	
Diastolic blood pressure, mmHg	$68.6 \pm 18.6$ .	$749 \pm 18.8$	
SpO <sub>2</sub> , %	$98.9 \pm 1.4$	$98.9 \pm 1.2$	
Puncture attempts			4
First Attempt	18	27	< 0.001
Second Attempt	7	0	< 0.001
Time interval			
Navigation time, seconds	$16.5 \pm 4.0$	$8.0 \pm 0.5$	< 0.001
Needle puncture time, seconds	$25.1 \pm 4.8$	$9.0 \pm 0.9$	< 0.001
Total puncture time, seconds	$41.2 \pm 6.9$	$18.0 \pm 2.1$	< 0.001
Total PDT time	$112.1 \pm 8.2$	$74.2 \pm 3.6$	< 0.001
Accuracy puncture site	13	27	< 0.001
Late complication	0	0	

Data on insertion outcome and FOB outcome are shown as frequency (%) and tested by chi-square test or Fisher's exact test; others are presented as mean  $\pm$  standard deviation and tested by independent two-sample t-test. Bold values indicate significant difference between two groups, p < 0.05.

Navigation time: from withdrawing the endotracheal tube to decide the puncture site; Needle puncture time: from puncture to completion of advance of catheter; Total puncture time: from withdrawing the endotracheal tube to completion of advance of catheter; Total PDT time: whole PDT procedure time.

Accuracy puncture site was defined as needle passing within one eight of the traches circle

In the control group, if the first attempt was failed (could not decide the puncture site), the endotracheal tube was advanced. And the time intervals were calculated from the second attempt.

We introduced a new optic fiber guided system (needle-over-optic fiber) to facilitate guiding-needle puncture and advance of guiding-needle. The infrared light source is optimal for the light source assembly with invulnerable power, great penetration and faster procedure time.

**Conclusion**: We advocate that the new optic fiber guided technique is a trusted method to facilitate safer guiding needle puncture and will improve the performance of PDT.

#### 11AP08-3

# Novel mandibular advancement bite block improve oxygenation during sedative esophagogastroduodenoscopy

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Background and Goal of Study: Drug-induced respiratory depression is a major cause of serious adverse events. Adequate oxygenation is very important during sedated esophagogastroduodenoscopy (EGD). Nasal breathing often shifts to oral breathing during open mouth EGD. A mandibular advancement (MA) bite block was developed for EGD using computer-assisted design and three-dimensional printing techniques. The mandible is advanced 6 mm when using this bite block to facilitate airway opening. The device is composed of an oxygen inlet with one opening directed towards the nostril and another opening directed towards the oral cavity. The aim of this study was to compare the inspired oxygen concentration (FiO<sub>2</sub>) provided by nasal cannulas and MA bite blocks in sedated EGD.

Materials and Methods: For bench study, a manikin head was connected to a ventilator to mimic "patient" inspiratory effort. FiO<sub>2</sub> was evaluated continuously via the endotracheal tube connected to manikin under different oxygen flow rates, tidal volumes, and different mouth opening sizes. For clinical study, eligible patients

undergoing sedative EGD were randomly assigned to standard bite block with nasal cannula and MA bite block groups. The primary endpoint was the oxygen saturation nadir. The secondary endpoints were upper airway obstruction and rescue event enjandes.

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Results and Discussion: In bench study, the MA bite block provided higher  $\mathrm{FiO}_2$  under the same supplemental oxygen flow and the  $\mathrm{FiO}_2$  were not as influenced by nasal or oral breathing compared to nasal cannulas. The measured  $\mathrm{FiO}_2$  using the MA bite block at oxygen flow of 5L/min was 62% during normoventilation. A low respiratory rate with a smaller tidal volume has a relative high  $\mathrm{FiO}_2$ . In clinical study, oxygen saturation nadir was significantly higher for MA bite blocks vs. the standard bite block (95.42 vs. 93.57%, p= 0.025), as well as a significant reduction in adverse events such as subclinical airway obstruction, severe airway obstruction, or airway rescue interventions (p= 0.007). Patients with moderate risk for obstructive sleep apnea syndrome benefitted best (p=0.040).

**Conclusion**: In conclusion, the MA bite blocks deliver a higher FiO<sub>2</sub> during EGD. The orifice size of the mouth opening, supplemental oxygen flow, tidal volume, and respiratory rate influenced the FiO<sub>2</sub> provided. The MA bite block could decrease hypoxemia, prevent airway obstruction and decrease the need for rescue intervention during sedative EGD.

#### 11AP08-4

## Minimum incision length for vertical incision cricothyroidotomy – An observational study

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Background and Goal of Study: A vertical incision is recommended for cricothyroidotomy when anatomy is indistinct but no evidence-based guideline exists regarding optimum site or length. The Difficult Airway Society (DAS) guidelines, which are based on expert opinion, recommend an 80-100mm vertical caudal to cephalad incision. However the guidelines do not advise the point from where one should commence this incision. We sought to determine both the minimum incision length and starting point above the suprasternal notch (SSN) required to ensure the cricothyroid membrane (CTM) would be accessible within the margins of the incision.

Materials and Methods: The distance between the suprasternal notch and the CTM was measured using ultrasound in both neutral and extended positions. We assessed 'capture' of the CTM within theoretical incisions of 0-100mm in length made at 10mm intervals above the suprasternal notch. Our aim was to determine the optimum length of incision and the point from which the incision should commence. Results and Discussion: There were 80 patients included in this study, 40 male and 40 female. In total 160 CTM assessments were performed across both patient groups. There was a large variation in the location of the CTM in relation to the suprasternal notch across all patients and head positions (27 – 105mm). The minimum incision required for the male group was found to be 70mm commencing 30mm above the SSN. In the female group the minimum incisions were 70mm and 80mm, commencing 20mm and 30mm above the SSN, for the neutral and extended head positions respectively.

**Conclusion**: The maximum distance between the most caudal and cephalad CTM location was 78mm. This distance is in keeping with the DAS guidelines of performing an 80-100mm incision. Using 10mm intervals above the suprasternal notch an incision size of 90mm commencing 20mm above the suprasternal notch would capture all CTM locations in all male and female patients in both neutral and extended head positions.

#### 11AP08-5

## Cricothyroidotomy incision length in female subjects - Are the Difficult Airway Society guidelines justified?

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Background and Goal of Study: An 8-10cm vertical incision is recommended for cricothyroidotomy when anatomy is indistinct as per the Difficult Airway Society Guidelines 2015. These guidelines are based on expert opinion. At present no evidence-based guideline exists regarding optimum site or length. We investigated clinician accuracy in identification of the cricothyroid membrane (CTM) of female patients.

Methods: We asked clinicians to identify the CTM, in both the neutral and extended head positions. The distance between the actual (measured using ultrasound) and estimated location of the CTM was measured for both patient positions. We assessed 'capture' of the CTM within theoretical incisions of 0-10cm in length using the best clinician estimate as the midpoint around which the incision would be performed. Our aim was to determine the optimum length of incision to capture all measured CTM locations.

Results and Discussion: 90 patients were recruited for this study. 66 patients were assessed in both the neutral and extended head position. A further 24 patients had 36 assessments in the neutral head position. In total 168 CTM assessments were performed. The CTM was correctly identified in 19/102 (18.63%) neutral position assessments and 15/66 (22.73%) of the extended position assessments. Clinician inaccuracy ranged from 3.2cm above and 4cm below the actual CTM location

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across both patient groups.

Conclusion: Using theoretical incisions of increasing length (1cm intervals), an incision size of 8cm with the best clinician estimate as the midpoint would capture all CTM locations in both neutral and extended head positions. Our data thus validates the DAS guidelines

#### 11AP08-7

#### Dyspnea and neck pain 4 days after a fall - should we hurry? - A case report

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Background: Cervical trauma can be associated with C-spine injury and the airway may be compromised by disruption, edema or hematoma. It can cause lifethreatening airway obstruction, but sometimes the clinical onset may be delayed

Case Report: 77 years old man with ankylosing spondylitis, hypertension, CPOD, on anti-platelet therapy, was admitted on hospital due to neck pain 4 days after a fall. At arrival he had GCS 15, respiratory distress, dysphonia and dysphagia. He had a cervical collar, limited mouth opening, Mallampati IV and an exuberant cervical and periorbital hematomas. We called ENT and Neurosurgery teams. Cervical CT scan revealed a C4 fracture and a C3-C6 prevertebral soft tissue mass compressing the airway. The multidisciplinary team decided to perform an urgent tracheotomy under monitored anesthesia care, with spontaneous breathing and bimanual in-line stabilization of cervical spine. A following videolaryngoscopy showed an extremely narrowed supraglottic opening. 3 days later a posterior C2-C6 cervical fixation was performed. He stayed in the ICU 3 weeks under ventilatory support for hematoma's reabsortion, transferred to the neurosurgical ward and 2 months later he was discharged with reestablished airway and respiratory functions and mild neurologic deficits.

Discussion: Retropharyngeal space hemorrhage is commonly associated with blunt cervical trauma and anticoagulant therapy and can cause airway obstruction. The choice between primary surgical airway, awake intubation, rapid sequence induction and watchful waiting without intubation is a clinical decision that depends on patient's condition, material and human resources. Awake fiberoptic intubation is usually the first strategy, however, without the anesthesiologist expertise and with severe glottic stenosis, the risk of hematoma's dislodge was too high. In teamwork we decided surgical airway was the best approach.

References: 1. Lazzot L et al. Severe upper airway obstruction due to delayed retropharyngeal hematoma formation following blunt cervical trauma. BMC Anesthesiology. 2007; 2. Levy J. Management of the Traumatized Airway. Anesthesiology. 2016 Jan; 124 Learning points: Cervical hematoma may rapidly progress to lethal airway obstruction

Be aware of associated spinal injuries.

The first step is establishing definitive airway control.

A multidisciplinary approach privileging patient's security is the key for success.

### 11AP08-8

### Comparison of a conventional bite block with a new type bite block which is intended to protect the tongue, lip, and

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Background and Goal of Study: We developed and commercialized a bite block (Bite Guard®) which is intended to protect the tongue, lip and teeth in collaboration with a local company. The major characteristics are as follows;

- 1. The shape and material can withstand the chewing pressure
- 2. The brim protect the tongue against bitten by a tooth
- 3. The thickness and hardness that tracheal tube does not deform due to chewing force are made of silicone

We compared the new bite block (Bite Guard group, n=25) for protection of teeth and soft tissue and the conventional bite block (conventional group, n=25). Approval for this study was obtained from the Ethics committee in Hamamatsu University School of Medicine

Materials and Methods: We conducted a research with patients scheduled for surgery in the spine position without motor evoked potential monitering. Questionnaires were given to anesthesiologists in charge. Either type of bite block was inserted after intubation, removed after extubation. We evaluated ease of insertion, protective performance of the teeth and soft tissue, rigidity, and protective performance of tracheal tube.

Results and Discussion: The anesthsiologists inserted in all cases of Bite Guard groupe, but did not insert in 5 cases of conventional groupe due to loose teeth. More cases of Bite Guard groupe were easy to insert than of conventional groupe

because of flexibility, although Bite Guard is bigger than conventional bite block. There was no damage in all cases of Bite Guard groupe, while bleeding from the soft tissue was observed in 3 cases of conventional groupe. There was no deviation at extubation except for one case in which the usage was mistaken in Bite Guard group. It was necessary to hold the bite block by hand at extubation so as not to be displaced in conventional groupe, still there was deviation in some cases. Protective performance of tracheal tube was equivalent in both groupe.

Conclusion: The new type bite block, Bite Guard revealed has better protective performance of the teeth and soft tissue, equivalent safety, compared with conventional tubular type bite blocks.



#### 11AP08-10

#### A case series of Safe Extubation with Totaltrack® VLM (Video Laryngeal Mask) and literature review

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Background: Extubation has an important role in optimal patient recovery after surgery, but, although elective, is often fraught with complications. TotalTrack® VLM (Video Laryngeal Mask) (TT VLM) (Medcom Flow, Spain) allows minimally interrupted ventilation during tracheal intubation and extubation under continuous video guidance.

Case Report: We report twenty (20) cases of TWO-PHASE extubation plannification with TT VLM in Supraglottic Device (SAD) mode (1). All patients were ASA 2-3, BMI>30. Arne test>11, with pre-existing airway concerns, such as difficult mask ventilation, history of difficult intubation, hypertension, ENT diseases, obstructive sleep apnoea (OSA), etc.

Our objective was a smooth eduction, without hemodynamic alterations, without respiratory difficulty, recovering spontaneous ventilation, and a safe transfer to the post-anesthetic recovery unit (PACU).

Discussion: Algorithms recommend an extubation strategy as a logical extension of the intubation process, preventing haemodynamic and cardiovascular reflex responses, presence of difficult airway at initial airway management, or delayed recovery after the surgical intervention.

In a non-systematic review regarding extubation management, using databases, Google Scholar and expert opinions, the incidence of extubation failure varies between 6 and 47%, with an overall increase in the duration of mechanical ventilation, increased mortality, a greater need for tracheostomy, and higher medical costs (2). In NAP4, serious complications during extubation following anesthesia occurred in 13% of cases and a 5% mortality was evidenced (3).

We used TT VLM as SAD to allow a viable and safety extubation strategy with continuous visualisation and uninterrupted ventilation, controlling gradual awakening, achieving to remove it once the patient is seen to be ventilating correctly. References:

1. Hurtado EM, Merchante MS. Safe Extubation with Totaltrack® Video Laryngeal Mask. Acad. Anesthesiol. Int. 2016;1(1):3-5.

2. Metzner J. et al. Closed claims'analysis. Best Pract Res Clin Anaesthesio

3. Cook TM. et al. Fourth National Audit Project. Major complications of airway management in the UK. Part 1: anaesthesia. Br J Anaesth. 2011 May;106(5):617-

Learning points: Extubation is an elective procedure and must be a well-planned, controlled, gradual and "reversible" process, ensuring the minimum interruption in

#### 11AP08-11

#### A rare cause of "cuff leak" in an endotracheal tube with an intact cuff

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Background: Endotracheal tube leaks are common: the consequences may range from trivial to life threatening. We report an unusual cause of endotracheal tube leak caused by a defect at the join between the inflation valve and pilot balloon of the cuff inflation system, which was not detected during initial check and is something that could be easily missed.

Case Report: During a routine elective case in a day surgery unit, the trachea was intubated using a Portex 7.0mm cuffed endotracheal tube. After 10 minutes, the anaesthetist noticed that a tracheal seal leak had developed accompanied by partial deflation of the pilot balloon. Surgery was halted and the endotracheal tube was replaced without the patient coming to any harm. On examination of the suspected faulty endotracheal tube, there was no identifiable rip or tear to the cuff. Submersion of the inflated tube in water revealed bubbles issuing from the join between the one-way inflation valve and the main body of the pilot balloon



Discussion: The likely primary cause of the airway leak was a defect in the endotracheal tube at a location where leak has not been previously reported. Potential sequelae include difficulty in ventilation and failure to protect the airway from aspiration. Previous authors have suggested that a large proportion of endotracheal tubes removed for a presumed defect are flawless (1) and hence that most air leaks are due to malposition. However in this case physical evidence of a defect was identified and we have reported this to the manufacturer. References

1. Kearl RA, Hooper RG. Massive airway leaks: an analysis of the role of endotracheal tubes. Crit Care Med. 1993 Apr;21(4):518-21.

Learning points: Whilst endotracheal tube cuff leaks are commonly related to malposition, clinicians should consider the possibility of damage or defect in the inflation system.

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#### 12AP01-1

Comparison between coagulation standard laboratory tests and rotational thromboelastometry baseline results in orthotopic liver transplantation: a cross sectional study

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Background and Goal of Study: End stage liver disease (ESLD) patients are characterized by a rebalanced haemostatic system. This represents a paradigm shift, abandoning the concept of "auto- anticoagulation" based on alterations of standard laboratory test (SLTs). In this context, whole blood viscoelastic tests emerge as a more suitable alternative. However, anaesthesiologists still frequently rely on SLTs for quiding transfusion decisions, leading to diagnostic inaccuracy and risk of overtreatment. The aim of this study was to evaluate the correlation between SLTs and ROTEM results at the beginning of orthotopic liver transplantation (OLT). Materials and Methods: We reviewed the electronic medical records of patients of all ages undergoing OLT for all causes between January 2016 and August 2017 and included 69 patients. SLTs (Clauss Fibrinogen, PT, aPTT, TT, Platelet count) and ROTEM baseline results were reviewed and compared. The correlations between aPTT/INTEM CT: PT/EXTEM CT: TT/INTEM CT-EXTEM CT: Clauss Fibringen/ FIBTEM A10: Platelet count/PLTEM A10 (PLTEM A10= EXTEM A10-FIBTEM A10) were evaluated using Spearman's correlation coefficient. Also, ROC curves were

Results and Discussion: We observed a strong and significant correlation between fibrinogen levels and FIBTEM A10 (r=0.77, p <0.0001); also a very strong correlation between platelet count and PLTEM A10 (r=0.83, p<0.0001). Of those patients with a platelet count below 50 000/mcl 30% had normal ROTEM amplitude parameters (EXTEM A10 >35 mm). This indicates that not all thrombocytopenic patients have a reduced clot strength. There was a moderate correlation (r=0.63, p<0.0001) between aPTT and INTEM CT. However, while 19% and 18% of the patients had a aPTT and INTEM CT above threshold, 38% of patients with a prolonged aPTT remained within INTEM CT normal range. The rest of the variables analyzed showed a weak correlation. PLTEM A10 was highly predictive for platelet count below 50.000/mcL (AUC:0,90) as was FIBTEM A10 for a fibrinogen below 150 mg/dL (AUC:0.90)

Conclusion: FIBTEM and PLTEM A10 values may be used to diagnose and predict hypofibrinogenemia and thrombocytopenia at the beginning of OLT. We do not recommend using aPTT and INTEM CT interchangeably for making transfusion decisions, despite having a moderate correlation. PT and TT do not appear to correlate with ROTEM parameters and may be of limited value in assessing haemostatic potential in this patient population.

#### Postoperative time course of INR values in laparoscopic and open liver surgery: a retrospective analysis

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#### Background and Goal of Study:

A growing number of patients undergo liver surgery using an enhanced recovery after surgery protocol. Epidural analgesia is widely used in such programs. However in liver surgery there are some safety concerns for epidural analgesia<sup>1</sup> as major liver surgery may impair postoperative coagulation<sup>2</sup>. The aim of this study is to evaluate potential different effects of the surgical approach on INR during the first 4 postoperative days.

#### Materials and Methods:

After ethical committee approval, the database of all liver surgery patients between 2010 and 2016 was screened for retrospective analysis of INR. Patients were divided into two groups depending on the method of surgery (laparoscopy versus laparotomy). Postoperative INR measurements were collected for the first 4 postoperative days and analyzed. Due to non-normality, non-parametric alternatives to ANOVA for repeated measures (Friedman test), mixed ANOVA and pairwise comparisons were used for statistical analyses

#### Results and Discussion:

A total of 970 patients were screened. 248 patients were eligible for analysis, of which 172 underwent an open procedure and 76 a laparoscopic procedure. For the total group, INR significantly increased over time, peaking at postoperative day 2 (1.00 vs 1.35, p < 0.001). Overall values of INR were higher in the laparotomy group (p = 0.045). The pattern of perioperative changes, however, failed to reach significance (p = 0.25) between the two surgical techniques (figure 1).

#### Conclusion:

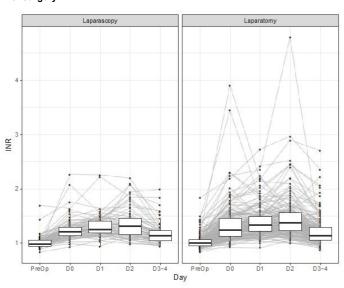
In liver surgery, INR values alter over time, with the highest INR on postoperative day 2 for both laparoscopy and laparotomy. However the time course of postoperative INR values did not differ between both techniques.

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Figure 1: Pattern of perioperative INR changes during laparacopic and open liver surgery



#### 12AP01-3

Comparison between the measurement of surface pressure produced by HemaClear® surgical tourniquet and the pressure estimated by the manufacturer. Study in human cadavers

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Background and Goal of Study: HemaClear® combines exsanguination and tourniquet function in orthopaedic surgery. The actual pressure produced by HemaClear® and related devices, is unknown and uncontrollable by clinical users¹. In order to know the applied pressure, the manufacturer provides tables of estimated pressure, according to the HemaClear® size, distance from fingers, and the limb¹s circumference. The purpose of this study is to measure the surface (skin) pressure produced by Hemaclear® and to compare it with the manufacturer estimate pressure.

Materials and Methods: The lower limb of eight adult cadavers were used as experimental model. HemaClear® Large Brown size was chosen in all cases. The skin pressure was measured by an electronic device made with a microcontroller ATMega 328 in a Arduino Nano® card, connected to a resistive force sensor SSR®model 402². In each case we registered gender, limb circumference (LimbØ), distance from fingers(Lenght), estimated pressure(E.Press) and measured pressure(M.Press). The variables E.Press, M.Press and it difference were analysed using the statistical software R (R foundation Vienna, Austria)

#### Results and Discussion:

Case	Gender	Limb ⟨	Lenght	M. Press	E. Press	Difference	Difference
		cm	cm	mmHg	mmHg	mmHg	%
1	V	45	73	481,73	412	69,73	16,9
2	М	43	73	500,1	389	111,1	28,6
3	M	43	79	426,04	389	37,04	9,5
4	М	42	75	527,04	389	138,04	35,5
5	М	41	80	574,12	389	185,12	47,6
6	V	37	90	492,04	354	138,04	39
7	V	36	95	343,58	320	23,58	7,4
8	V	34	77	442	337	105	31,1

The mean Measured Pressure was 473,3 mmHg (SD 69,93); The mean Estimated Pressure was 372,4 mmHg (SD 31,64); the mean pressure difference was 100,96 mmHg (SD 54,77 mmHg)

Conclusions: In our cadaveric experimental model, the Measured Pressure was always unpredictable higher than the Estimated Pressure. The Measured Pressure was greater than current recommendations for pneumatic ischemia cuff³. The clinical implications of this high surface pressure is unknown. We need new studies about HemaClear® skin pressure applied "in vivo" not cadavers.

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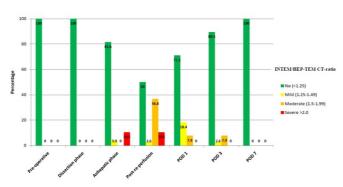
#### 12AP01-4

Perioperative heparinase rotational thromboelastometry monitoring during and after adult living related liver transplantation

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Background and Goal of Study: Heparin like effect (HLE) can affect coagulation variably during transplantation. Primary aim is to monitor incidence and severity of HLE with rotational thromboelastometry (ROTEM) and standard laboratory tests (SLT) in our center. Materials and Methods: A diagnostic clinical trial among recipients (2015-2017) (PACTR201712002839259). No heparin was given prior to surgery and liver donor vessels were flushed. Unfractionated heparin was infused (60-180 U/kg/day) postoperatively for 2 days and then was replaced by low molecular weight heparin (LMWH) (20 mg/12 h). ROTEM (INTEM and HEPTEM) and SLT (aPTT) were performed pre-operative, anhepatic, post-reperfusion, and on post-operative day (POD) 1, 3 and 7. HLE is identified when CT INTEM is >240 sec and CT INTEM/CT HEPTEM ratio >1.25. Blood transfusion was ROTEM-guided Results:39 recipients included (1 excluded), with age 49.53±6.11 v. graft body weight ratio 1.01+0.08 g/kg, operation duration 11.00±2.0 h, MELD 15.00±3.0. Prolonged CT INTEM was observed in 7/38 during anhepatic phase (range: 257-1523 sec), in 19/38 at reperfusion (range: 270-3312 sec) and in 10/38 at POD 1 with heparin infusion (range: 257-344 sec). A mild to moderate HLE in 4/38 on POD 3 and no HLE on POD 7 was detected on ROTEM with the shift to LMWH. Grades and percentages of HLE are presented in the figure.



Total 3-month survival was 78.9% (30/38) and mortality, 21.1% (8/38) (2/6 with severe HLE, died 3 weeks postoperative). No blood was transfused in 26.32% (10/38) during surgery, in contrast to recipients with severe HLE (median [IQR]: red blood cells 8 [6-10], plasma 6.5 [6-7.5] units). Weak correlation existed between aPTT and CT INTEM (r=0.12, p=0.04). aPTT was only prolonged after reperfusion and on POD1.

Conclusion: HLE mainly accompanies reperfusion, but when identified in a severe form, it carries a high risk of mortality. CT INTEM and CT INTEM/CT HEPTEM-ratio are more sensitive to identify HLE than aPTT. This is important since HLE during the anhepatic phase is associated with worse outcome.

#### 12AP01-5

Influence of Thromboelastometry in making clinical decisions in a patient with an intra aortic balloon pump and severe Thrombocytopenia

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**Background**: Haemorrhage is a significant risk during the Intra Aortic Balloon Pump (IABP) removal, with an increased risk in patients with Thromobocytopenia. However, the platelet count should not be the sole consideration in whether or not to remove the IABP before transfusion. Viscoelastic tests can provide a wider perspective about the patient's capacity to form a clot, despite the platelet count. **Case Report**: A woman in her 60s underwent a mechanical aortic valve replacement

Case Report: A woman in her 60s underwent a mechanical aortic valve replacement due to severe stenosis. This was complicated with an intraoperative isquemia and cardiac arrest, requiring an emergency bypass to the anterior descending coronary artery. Severe bleeding presented upon intensive care admission, requiring reintervention. In the immediate postoperative situation the patient developed cardiogenic shock associated with akinesia of the anterior wall and a new severe tricuspid insufficiency. Subsequently, emergency cardiac catheterization was performed, finding a left coronary sinus dissection that mildly affected the ostium of the common trunk, without compromising the flow. Implantation of the IABP

was considered necessary. The patient improved from the cardiogenic shock during the following 6 days, allowing for the removal of the IABP. At this point the patient had normal partial thromboplastin time and prothrombin time, but moderate thrombocytopenia (37x10E9/L) was present, which could be secondary to the device or to heparin-induced thrombocytopenia. This influenced the decision to not transfuse platelets, and to initially study the clot formation with Tromboelastometry. This test showed a normal maximum clot firmness, leading to the removal of the IABP, without platelet transfusion. The patient did not have any complications, during or after the procedure.

**Discussion**: Thrombocytopenia is a significant risk factor for bleeding during the IABP removal, and therefore platelet transfusion prior to the procedure must be considered. However, the transfusion is not without risks, particularly if heparin-induced thrombocytopenia is suspected. Thromboelastometry may be able to predict more accurately the bleeding tendency, rather than the platelet count as an isolated test. This is due to Thromboelastometry being a global assay that determines whole blood clot formation, thus helping to decide whether or not to transfuse prior to an invasive procedure.

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#### 12AP01-6

#### Thromboelastometry prophyle after major liver resection

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**Background and Goal of Study**: Hypocoagulability observed after major hepatic resection in conventional coagulation tests withhold thromboprophylaxis administration, despite being this surgery one with the highest risk of thrombotic events. It has been shown that thromboelastometry (TEM) indicates a balanced coagulation status in this clinical context (Mallet 2016). The aim of the study is to document serial changes over time of conventional coagulation tests and TEM in patients undergoing major hepatic resection.

Materials and Methods: Patients undergoing major hepatic resection for metastatic colorectal cancer were prospectively included. Standard coagulation test and TEM (ROTEM®) were measured simultaneously at baseline and day 5 after surgery. EXTEM and FIBTEM test were performed. Patients received standard thromboprophylaxis with enoxaparin starting in the first 24h after surgery. Values were expressed as a mean and SD. Non parametric and Spearman's rho test were

**Results and Discussion**: Eight patients (5 male, 3 female),  $50 \pm 10$  years old, constituted the study population. TEM parameters were normal at baseline and despite a trend to shorter clot formation, they did not change significantly 5 days after surgery (Table 1). To the contrary, prothrombin time decreased along this period  $(83\% \pm 10\%)$  vs  $(65\% \pm 12\%)$  p= 0.02. Either thrombotic nor bleeding events were observed postoperatively

were observed postoperatively.

Conclusion: These results confirm that TEM reflects better the coagulation state following major liver surgery. Standard thromboprophylaxis may not be effective in reducing the thrombotic risk in these patients.

BASELINE 5 DAYS AFTER SURGERY

	DASELINE	5 DATS AFTER SURGERT	p
CT (s)	82±41	65±16	0.39
CFT (s)	104±76	85±40	1
ANGLE (°)	64±11	75±8	0.37
MCF (mm)	68 ±13	68 ±10	0.61
FIBTEM	25 ± 15	25 ±9	1
LY30 (%)	99 ±0.3	100± 0	1
PT (%)	83 ±10	65 ±12	0.02
APTT ()	26 ±3	29 ±2	0.09
Platelets x10 <sup>9</sup> /L	267 ± 165	249± 86	0.86
Fibrinogen (g/L)	3.6 ±2.1	4.7± 2.7	0.24

#### 12AP01-7

## A Novel Differential Assay to Quantify Fibrinolytic Function in Whole Blood with the Quantra Hemostasis Analyzer

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Background and Goal of Study: Abnormal fibrinolysis has been associated with increased patient mortality in major trauma and other critical care conditions. However, it is recognized that fibrinolytic defects are often underdiagnosed and that there is a lack of reliable and rapid diagnostic assays to detect and guide the appropriate therapies. The goal of this study is to present a novel fibrinolysis assay for the Quantra™ Hemostasis Analyzer.

Materials and Methods: The Quantra is a cartridge-based viscoelastic analyzer that measures changes in clot stiffness during coagulation and fibrinolysis using ultrasound detection of resonance. The Quantra fibrinolysis assay is based on the differential rate of reduction in clot stiffness with and without inhibition of fibrinolysis. The assay was evaluated on a research use only version of the Quantra using citrated whole blood samples from normal volunteers under an approved IRB protocol. These samples were spiked with various levels of plasminogen activators to mimic a broad range of fibrinolytic responses. For a subset of these experiments, the ROTEM (EXTEM, APTEM) and the TEG (RapidTEG) assays were performed in parallel.

Results and Discussion: Assay reproducibility of moderate fibrinolysis induced by 30 U/mL of t-PA was estimated in the range from 6-9%. Furthermore, titration of t-PA in the range from 0 to 100 U/mL generated a monotonic response showing a greater than 10-fold difference over that range. TEG and ROTEM assays demonstrated equal or lower response compared to the Quantra, especially in the range from 0 to 20 U/mL of tPA. Standard linear regression with RapidTEG's LY60 indicated very strong correlation with r-value greater than 0.8. Time to results with the Quantra assay depended on the degree of fibrinolysis, with runtimes ranging from 16-26 minutes in cases of pronounced fibrinolysis.

**Conclusion**: The results demonstrate the ability of the Quantra fibrinolysis assay to rapidly and precisely assess fibrinolytic activity in in vitro models. This new assay, which is implemented in a multi-test cartridge, provides additional clinical coagulation parameters and is targeted for trauma, liver disease, and peri-partum care.

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#### 12AP01-8

The role of thromboelastography (TEG) in postoperative bleeding in patients undergoing Coronary Artery Bypass Grafting (CABG) with Cardiopulmonary Bypass (CPB)

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Background and Goal of Study:Postoperative hemorrhage in cardiothoracic surgery results in longer length of hospital stay, higher mortality rates and higher healthcare costs. Thromboelastography (TEG) measures viscoelastic properties of clot formation and is currently known for perioperative management of blood transfusion limitation and optimize the administration of blood products in cardiac surgery. The purpose of this study is to examine the immediate postoperative thromboelastography (TEG) results of patients who had bled after CABG with CPB and demonstrate its predictive value on postoperative hemorrhage.

Materials and Methods:Our study includes 20 patients with excessive postoperative bleeding with or without chest re-exploration. Blood loss was measured by calculating the volume of mediastinal and pleural drainage for the first 18 hours. Baseline kaolin-activated TEG was performed before the induction of anaesthesia and just before the transportation to the ICU, using the same TEG coagulation analyser, the same personnel, and manufacturers guidelines. The TEG parameters analyzed were: R value, K value, A angle, MA (Maximum Amplitude), G value, CI (coagulation index) and LY30 index.

Results and Discussion: The preanesthesia TEG was normal at 60% of patients and hypercoagulable at 40% of the patients included. Prior to ICU departure. 25% of bleeding patients had normal TEG, 65% had shown hypercoagulability and 10% had shown bleeding tendency based on TEG measurements. All investigated patients experienced severe bleeding and 10% needed surgical reopening. In our study, neither the normal nor the hypercoagulable TEG results offered predictive protection against bleeding. Current literature shows that normal TEG curve does not exclude defects in the haemostatic process, but also in cases of patients with more complex disturbances of haemostasis, TEG is likely to disclose hypercoagulability. Conclusion(s):Perioperative regular TEG is not helpful in the assessment of bleeding risk. TEG could be used as a tool in complex coagulopathy, complicated cardiac surgical procedures, ongoing hemorrhage, which require extensive blood products utilization. However, the presence of an experienced anaesthesiologist with knowledge of hemostasis, anticoagulation and transfusion medicine leads an important role in the perioperative management of the bleeding patients especially in cardiac surgery.

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#### 12AP01-9

#### Clinical implications of the accuracy of non-invasive haemoglobin monitoring

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Background: Blood loss is a major concern in hip replacement, and may lead to allogeneic red blood cells (RBC) transfusion, associated with increased mortality and morbidity (1). Current guidelines recommend a restrictive RBC transfusion threshold of 8 g/dL to patients undergoing orthopedic surgery (2). To decide when to transfuse, accurate haemoglobin concentrations values are required. Traditionally they are obtained through the laboratory automated analysis (Lab Hb), but new technologies have allowed for noninvasive and continuous haemoglobin measurement (SpHb). In this study we compared the SpHb with the laboratory haemoglobin and assessed if there would be a different decision on whether to transfuse, based on the different values obtained.

Methods and Materials: We present preliminary data from a prospective observational study with EC and IRB approval. Lab Hb was determined in the hospital laboratory using an automated analyser, and the non-invasive haemoglobin measurements were done using the Masimo's Radical-7® Pulse CO-Oximeter and rainbow® R1 25 revision F. Randomly selected patients undergoing elective total hip replacement were monitored with the SpO2, and whenever blood was collected for Lab Hb, the concurrent SpHb was recorded. Correlation analysis was done using Pearson test. Bland-Altman was also employed.

Results and Discussion: 59 paired measurements were obtained. There was a good correlation (fig.1) between SpHb and Lab Hb (Pearson R= 0,742, p<0,001). Bland-Altman test (fig.2) revealed a bias of -1,15, meaning Lab Hb was recurrently higher than the SpHb. The limits of agreement were [-3,89; 1,59]. Considering the restrictive RBC transfusion threshold of 8 g/dL for these patient population we found that in two cases, the decision to transfuse would differ based on the measurement taken into account. In one case, the SpHb was below the threshold while the Lab Hb was above, and in the other case, it was the reverse.

Conclusions: We found a good correlation between SpHb and Lab Hb. The bias was superior to one found in the literature (3), although we were using a more recent version of the sensors. However, this difference between measurements would have a clinical significant impact in two situations (3,4%). Solely based on the Hb threshold (2) this would have resulted in the decision to transfuse one patient that didn't need, and not to transfuse one that needed

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#### 12AP01-10

#### Low-frequency piezoelectric thromboelastography method in studying of haemostatic system

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Background and Goal of Study: The problem of an accurate operative and inexpensive method of studying the hemostatic system remains relevant. Especially in intensive care units and operation rooms.

Materials and Methods: 117 patients, with different states affecting coagulation system (ischemic stroke, myocardial infarction, sepsis, etc.) and after different surgical interventions included into study. Monitoring of hemostasis performed by low-frequency piezoelectric thromboelastography (LPTEG method; MEDNORD) platelet aggregation test (PAT), standard coagulation tests (SCT) and thromboelastometry (TEM method; ROTEM Sigma). We studied the correlation by the Pearson's Correlation Coefficient.

Results and Discussion: The following LPTEG values were compared with standard coagulation tests and TEM indices: a constant thrombin activity (CTA) with thrombin time of SCT (0.78) and clotting time of TEM (0.92); maximum activity of the clot (MA) with fibrinogen level of SCT (0.67) and maximal amplitude of TEM (0.74); the intensity of coagulation drive (ICD) compared with activated partial thromboplastin time of SCT (0.76) and reaction time to initial fibrin formation of TEM (0.74), , and the intensity of the retraction and clot lysis (IRCL) with the total fibrinolytic activity of SCT (0.83) the intensity of the contact phase of coagulation (ICC) were correlated with PAT indexes as the spontaneous platelet aggregation (0.61 - 0.78)

Conclusion:LPTEG can show us all parts of hemostasis in real-time: from initial viscosity and platelet aggregation to coagulation and lysis of clot, as well as their interaction. We can use the indexes ICC, for control aggregation, ICD, MA, CTA for control coagulation and IRCL for control fibrinolysis. Method has high correlation with the performance of traditional coagulation tests methods

#### 12AP01-17

Which blood measurements were lower for post-operative cardiovascular patients who required transfusion in the intensive care unit?

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Background and Goal of Study: The only specialty department which consumed more than 10 units of blood products per patient in Japan is cardiovascular surgery Therefore, we anaesthesiologists have sometimes experienced a shortage of transfusion stock postoperatively in the intensive care units (ICU). To avoid these situations, we investigated which measurements—complete blood count (CBC), coagulation test, rotation thromboelastmetry (ROTEM™) were useful at the end of surgery to identify patients who might need transfusion in the ICU.

Materials and Methods: Patients scheduled cardiac surgery with cardiopulmonary bypass (CPB) were assessed for eligibility. The criteria of perioperative blood transfusion were indicated below, such as hemoglobin >9~10g/dl, fibrinogen > 150~200mg/dl, platelet count > 5~100,000/µL. High risk patients(e.g., total arch replacement, re-do operation, or with CPB time > 3h) were targeted to the upper limit of these criteria2 based on the measurements indicated above during operation. The heparin dose during CPB was administered 300~400U/kg to target activated clotting time (ACT)>450sec. The hemostatic therapies included concentrated red cells, fresh frozen plasma, and platelet concentration. We collected the blood samples at the end of surgery and measured CBC, coagulation test, and ROTEM™ to determine which measurements were significantly different between the patients with or without transfusion in the ICU.

Results and Discussion: Altogether, 60 patients were enrolled in the study and we found significance between the two groups for Hemoglobin (Hb), APTT, EXTEM A10, EXTEM-FIBTEM A10, Clotting Elasticity (CE)3 (see Table).

Table: The comparison of measurements with or without transfusion in the ICU \*Student t test, p<0.05

Measurements		Transfusion(n=17)	No transfusion(n=43)	P-vale
Hemoglobin (g/dl)		10.5 ± 1.0	11.2 ± 1.0	0.016*
Platelet counts (x10 <sup>4</sup> / $\mu$	L)	9.1 ± 0.9	11.3 ± 0.6	0.06
Fibrinogen (mg/dl)		188 ± 48	198±73	0.59
APTT(s)		38±6	42 ± 4	0.016*
ROTEM Values	ExtemA10 (mm)	44 ± 9	49 ± 7	0.03*
	FibtemA10 (mm)	10±3	9 ± 5	0.55
	Ex-FibA10 (mm)	39±6	34 ± 7	0.017*
	IntemA10 (mm)	43±8	47 ± 6	0.074
	IntemCT (s)	222 ± 34	220±56	0.932
	CE(Clotting Electicity)	70 + 7	97 + 4	0.044*

Conclusion: Hemostatic therapy based on point-of-care testing is useful intraoperatively<sup>4,5</sup> and in the ICU. APTT is more useful than ACT because it is more sensitive for detecting residual heparin or heparin rebound

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#### 12AP02-1

#### Plasma fibrinogen increase due to polymorphism rs2066865 in FGG gene as a risk factor for thrombosis in microvascular free flap surgery

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Background and Goal of Study:To cover tissue defects caused by trauma, burns, chronic inflammation, malignancies microvascular free flap surgery is used. Thrombosis with consequent loss of free flap is seen as detrimental sequel resulting in convalescence delay. We aimed to evaluate plasma fibrinogen increase due to single nucleotide polymorphism (SNP) in Fibringgen gamma chain (FGG) gene reported to be associated with dysfibrinogenemia as a risk factor for thrombosis in

Materials and Methods: We enrolled 95 patients undergone free flap microvascular surgery in observational case control study. Plasma fibrinogen concentration, SNP rs2066865 (G>A) in FGG gene, platelet count were analysed. Thromboelastometry (ROTEM) was performed for MCF (Maximal Clot Firmness) Fibtem MCF Internand FPR (fibrinogen/platelet ratio) evaluation. Patients demographic data as well as a history of comorbidities, family history were collected.

Results and Discussion: In 18/95 (19%) patients free flap thrombosis occurred with complete failure in 15/95 (16%). We found 20 patients out of 95 with FGG mutation, 16/20 were heterozygous (A/G) and 4/20 were homozygous (A/A) for polymorphism rs2066865. Patients with SNP in rs2066865 (G>A) in FGG gene had a higher plasma fibrinogen concentration (G/G- 3,9g/L ±1,15; G/A- 4,75g/L ±1,31; A/A- 6.11a/L ±1.41) even in time period overrun 30 days (recent trauma time period). In 4/20 patients with FGG gene mutation thrombosis with complete flap failure eventuated, all were heterozygous (G/A). In all 20 patients with FGG mutation thromboelastometry confirmed increased MCF Fibtem values (G/A-27,77 ±12,02;

Conclusion: Patients with SNP rs2066865 (G>A) in FGG gene had a higher plasma fibringen concentration, however no clear association with increased risk for thrombosis was found. Further data and greater sample size are needed.

#### 12AP02-2

#### Main risk factors analysis and effect of anticoagulation on development of free flap thrombosis

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Background and Goal of Study: Perioperative anticoagulation strategy in microvascular free flap transfer remains a controversial issue, particularly considering the risk of bleeding. Nowadays, anticoagulants are randomly tailored to the risk profile patients. Moreover, it is still unclear which patients are at higher risk of free flap thrombosis. We aimed to analyse main risk factors for thrombosis and the role of anticoagulation in free flap transfer surgery.

Materials and Methods: Patient demographical characteristics, including main risk factors for free flap thrombosis (recent trauma, smoking, thrombogenic comorbidities) were collected. Standard coagulation tests, as well as rotational thromboelastometry (RTE) were performed; hypercoagulation was defined as functional fibrinogen to platelet ratio (FPR) ≥ 42. Thromboprophylaxis was provided with enoxaparine 40 mg once a day, starting on the 1st postop day as decision of surgeon. Incidence of free flap thrombosis was analysed as primary outcome, secondary main risk factors and role of anticoagulation were evaluated.

Results and Discussion: Totally, 89 patients were included in the prospective observational study. Recent trauma (<1 month) was detected for 29/89 patients. The hypercoagulability in RTE (FPR ≥42) was found for 21 patients. n = 14 with recent trauma, n = 7 with delayed surgery, p <0.001. Free flap thrombosis developed in 18, free flap necrosis in 16 patients postoperatively. We found slight association between FPR ≥ 42 detected by RTE and free flap thrombosis, AUC 0.597, p = 0.2, sensitivity 33%, specificity 78.6% and free flap necrosis AUC 0.628, p = 0.11, sensitivity 37.5%, specificity 81.3%. Thromboembolic prophylaxis demonstrated correlation with decreased rate of free flap thrombosis OR 0.21 (CL95% 0.054-0.86): p = 0.030. Additionally, raised platelet count was found as potentially thrombogenic factor in our series (p = 0.023). For recent trauma patients, prolonged operation time correlated with higher thrombosis risk (p = 0.021). In contrast, association was not found for other factors such as smoking (p = 0.94), recent trauma (p = 0.902),  $FPR \ge 42 (p = 0.283).$ 

Conclusion: Anticoagulation should be under consideration in free flap reconstructive surgery. Patients with thrombocytosis have to be supposed at higher risk for pedicle thrombosis. Role of other preoperative risk factors, including RTE data is still unclear

#### 12AP02-3

#### Variation on Thrombosis detection in neurosurgical patients after updating the perioperative thromboprohylaxis protocol

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Background and Goal of Study: Perioperative thromboprophylaxis strategy for neurosurgical procedures is beyond to be solved and it is a matter of discussion among anaesthesiologists and neurosurgeons. At the end of 2015 we developed in our Hospital a consensus protocol with neurosurgeons following the latest published recommendations. Our aim was to analyze the effect of the protocol on Thrombosis detection and treatment.

Materials and Methods: We retrospectively analyzed all charts of patients scheduled for neurosurgical intervention before the protocol (2014-2015) and

afterwards (2016). We search for clinical diagnostic confirmation of postoperative thrombosis by means of a venous Doppler study in every suspected case. We recorded patient characteristics, thrombosis location, vena cava filter insertion and pulmonary embolism. In the new protocol, patients were preoperatively stratified as low, middle and high risk for thrombosis. In low and middle risk patients compression stocks were used intraoperatively and during the first 48 hours. In the high risk group, other than compression stocks, low weight heparin was started 48 hours after surgery

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Results and Discussion: In 2014-2015, clinical venous thrombosis was detected and confirmed with venous Doppler in 5 patients out of 435 craniotomies (0.9 %); one patient required the implantation of a vena cava filter. In 2016, 8 patients out of 212 patients who underwent craniotomies (2.6%) were diagnosed with venous thrombosis after surgery. One patient required the implantation of a vena cava filter; one patient died at home from pulmonary thromboembolism 30 days after surgery. All patients with thromboembolism were treated with low molecular weight heparin at anticoagulant doses for 3 to 6 months. Our findings are similar of those found in neurosurgery patients from 2006 to 2011 American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) (1,7%) or 2011 to 2012 ACS-NSQIP (3.2%).

Conclusion: The introduction of an updated venous thrombosis Consensus prophylaxis protocol in neurosurgery patients has increased the awareness of this complication in our Hospital and probably has increased the degree of suspicion of venous thrombosis. Results in accordance with the standards of quality health care.

#### 12AP02-4

#### Thrombotic danger in patients in bariatric surgery. Ways of diagnosis, prevention and correction

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Background and Goal of Study: Reducing excess body weight in patients with morbid obesity, with a body mass index ≥35, by bariatric surgery, has a high risk of thromboembolic complications. Obesity interferes with internal and external coagulation pathways, as well as in anticoagulant mechanisms, which leads to a hypercoagulable state. Factors contributing to the development of thromboembolic complications include the expansion of the scope of surgical intervention, the duration of the operation and postoperative immobilization, the use of general

Materials and Methods: A hemostatic system was studied in 55 patients with a BMI> 35 body mass index, subject to prompt treatment by bariatric surgery. All patients were divided into groups: the 1st group (n-25) received Enoxaparin sodium 0.1% 0.2 ml SC every 12 hours and Pentoxifylline 100 mg every 12 hours during two days before surgery. Group 2 (control group) -30 people with body mass index BMI> 35, subject to bariatric intervention, and didn't receive specific preventive therapy. The study of the hemostasis system was carried out with the help of low-frequency piezoelectric thromboelastography (LPTEG) immediately after hospitalization and at 1, 3, 5 days after baryria.

Results and Discussion Next constants of blood coagulation have been checked -Intensity of contact coagulation (ICC), Intensity of coagulation drive (ICD), clot maximum density (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRCL). In both groups before therapy ICC was increased by 23.57%, ICD- more than normal at 32.68%, MA was increased by 74.52%, IRCL was 91,18% above the norm. Patients of 1st group on 5th day according to LPTEG had ICC reduced by 15.22%, 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 at the same time had ICC increased by 25.62%, ICD increased by 19.97%, MA was increased by 24.22%, compared to the norm and IRCL was in the normal range. As the result, in patients of the 1st group were no thrombotic complications, as patients of the 2nd group had 2 episodes of thrombotic complications.

Conclusion: The use Enoxaparin sodium in combination with Pentoxifvlline can reduce the severity of disorders of blood coagulation in patients with obesity towards complex influence on all parts of hemostasis system

#### 12AP02-5

and TKA.

Frequency of symptomatic thromboembolic events with thromboprophylaxis only during hospitalisation in fasttrack total hip and knee arthroplasty, a prospective followup study

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Background: Total hip (THA) and knee arthroplasty (TKA) are considered high risk procedures for venous thromboembolic events (VTE) such as deep venous thrombosis (DVT) and pulmonary embolism (PE). Consequently, guidelines recommend chemical thromboprophylaxis for 10-35 days after surgery [1] However, reports of 90-days VTE rates of about 0.4% in fast-track THA and TKA with only in-hospital prophylaxis [2] have led to suggestions of only in-hospital prophylaxis in selected fast-track procedures [3], despite a current lack of follow-up studies.

Goal of Study: To investigate 90-days symptomatic VTE and arterial thromboembolic events (ATE) with only in-hospital prophylaxis in fast-track THA

Methods: Prospective cohort study from 2012-2015 in elective unilateral THA and TKA with only in-hospital thromboprophylaxis when length of hospital stay (LOS) ≤5 days. Prospective information on comorbidity and 90-days follow-up on readmissions/mortality from the Danish National patient registry. Evaluation of discharge and medical records in case of VTE or ATE. Patients with preoperative use of anticoagulants were excluded (≈5%).

Results: Of 18241 procedures, 17474 (96%) had LOS ≤5 days (median 2 days (IQR 2-3)), with 6.8% readmission and 0.2% mortality rates. Median age was 68 yrs, 59% were women and 52% had THA. VTE and ATE rates were 0.3% and 0.4%, respectively.

Table 1. Frequencies of thromboembolic evens within 90-days of fast-track THA and TKA

rable 1. Frequencies of the	TOTTI BOTTO CTCTIS TETETIN	iso days or last track irintar	10 110 1	
	All patients (n:18241)	LOS ≤5 days (n:17474)	LOS >5 days (n:767)	
	n (%; 95%CI)	n (%; 95%CI)	n (%; 95%CI)	
Any TEE	165 (0.9; 0.8-1.1)	118 (0.7; 0.6-0.8)	47 (6.1; 4.6-8.1)	
Any VTE	90 (0.5; 0.4-0.6)	72 (0.4; 0.3-0.5)	18 (2.4; 1.5-3.7)	
<ul><li>DVT</li></ul>	44 (0.3; 0.2-0.3)	39 (0.2; 0.2-0.3)	5 (0.7; 0.3-1.5)	
- PE	41 (0.2; 0.2-0.3)	29 (0.2; 0.1-0.2)	12 (1.6; 0.9-2.7)	
<ul><li>Both</li></ul>	5 (0.0; 0.0-0.1)	4 (0.0; 0.0-0.1)	1 (0.1; 0.0-0.7)	
Any ATE	75 (0.4; 0.3-0.5)	46 (0.3; 0.2-0.4)	29 (3.8; 2.6-5.4)	
- MI	33 (0.2; 0.1-0.3)	23 (0.1; 0.1-0.2)	10 (1.3; 0.7-2.4)	
<ul><li>Stroke/TIA</li></ul>	42 (0.2; 0.2-0.3)	23 (0.1; 0.1-0.2)	19 (2.2; 1.4-3.5)	
All-cause mortality	47 (0.3; 0.2-0.4)	34 (0.2; 0.1-0.3)	13 (1.7; 1.0-2.9)	
<ul> <li>Fatal PE</li> </ul>	3 (0.0; 0.0-0.1)	3 (0.0; 0.0-0.1)	0 (0.0; 0.0-0.0)	
<ul> <li>Fatal MI</li> </ul>	5 (0.0; 0.0-0.1)	5 (0.0; 0.0-0.1)	0 (0.0; 0.0-0.0)	
<ul> <li>Fatal stroke/TIA</li> </ul>	4 (0.0; 0.0-0.1)	1 (0.0; 0.0-0.0)	3 (0.4; 0.1-1.0)	
- Unknown	17 (0.1: 0.1-0.2)	15 (0.1: 0.1-0.2)	2 (0.3: 0.1-0.9)	

THA: total hip arthroplasty TKA: total knee arthroplasty TEE: thromboembolic events ATE: arterial thromboembolic events VTE: venous thromboembolic events DVT: deep venous thrombosis PE: pulmonary embolism MI: myocardial infarction TIA: transient ischemic attack.

The 716 patients with LOS >5 days (median 8 days (IQR 7-10)), had 15% readmission and 1,7% mortality rate. VTE and ATE rates were 2.4% and 3.8%, respectively.

Conclusion: We found similar results as in our previous study [2], confirming the safety of only in-hospital prophylaxis in fast-track THA and TKA with a LOS of ≤5 days

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#### 12AP02-6

Perioperative haemostatic management of patients with FXI deficiency: a single center retrospective study

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**Background and Goal of Study**: Factor XI (FXI) deficiency is a rare inherited bleeding disorder characterized by bleeding manifestations of variable severity not correlated with the baseline FXI:Act. The aim of this study was to evaluate the perioperative management of patients with FXI deficiency. We investigated haemorrhagic complications according to the surgery and the applied prophylactic measures. This study has been approved by our Ethical Committee.

Materials and Methods: Medical files of patients with FXI deficiency diagnosed at Cliniques Universitaires Saint-Luc, Brussels, Belgium between 2005 and 2017 (56) were analyzed. All haemostatic challenges that the patients underwent before and after diagnosis were analyzed retrospectively.

Results and Discussion: We investigated 56 FXI-deficient patients; 19 patients with a mild (FXI:Act: 50-70%), 30 patients a moderate (15-49%) and 7 patients a severe deficiency (<15%). 21 patients (38%) had an associated haemostatic disorder and only 37 (66%) had a prolonged APTT. Reasons for diagnosis were prolonged APTT (30%), family screening (36%) and bleeding history (34%). Prior to diagnosis, 35 patients had undergone 77 procedures with 31 (40%) of them associated with excessive bleeding. 28 (90%) of these procedures occurred on sites with high fibrinolytic activity. There was no significant difference in FXI:Act between bleeders and non-bleeders (P=0.62). After diagnosis, 31 patients underwent 35 surgeries. All surgeries, except for 4, were prophylactically treated with tranexamic acid (TA) alone (n= 27) or combined with fresh frozen plasma (FFP) (n=4). 5 (14%) patients presented a haemorrhagic complication and were treated with FFP; 2 patients needed surgical revision whereas 2 others needed RBC transfusion. 3 bleeding events occurred during surgeries on sites with high fibrinolytic activity and 2 occurred in patients with an associated haemostatic disorder.

**Conclusion:** Patients with FXI deficiency may present variable bleeding risks not correlated with FXI:Act. Optimal perioperative haemostatic management requires attention to the bleeding tendency, the nature and the site of the procedure and the presence of associated haemostatic disorders. Prophylactic treatment with TA is certainly needed to reduce the risk of bleeding complications. In case of excessive bleeding, treatment should include FFP and/or FXI-concentrate.

#### 12AP02-8

The effects of preoperative discontinuation of antithrombotic medications on the risks for thrombosis and bleeding in patients undergoing thoracic surgery

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Background and Goal of Study: Antithrombotic agents are often discontinued 5 to 10 days preoperatively in patients undergoing non-cardiac surgery to avoid perioperative bleeding, though discontinuation may also increase the risk for stent thrombosis, myocardial ischemia or infarction, and sudden death. A meta-analysis found that discontinuation of aspirin was associated with a three-fold increase in the incidence of major cardiac events. The American College of Clinical Pharmacy (ACCP) recommends that aspirin use not be interrupted before non-cardiac surgery. This retrospective study sought to determine the incidence of thrombotic complications that may be associated with preoperative discontinuation of anticoagulants in patients undergoing thoracic surgery.

Materials and Methods: After obtaining the approval of the institutional review board, the study included 126 patients who underwent thoracic surgery between January 2014 and June 2017. The patients were divided into two groups based on no medication and discontinuation of anticoagulant agents prior to surgery. Data were collected on demographic features, cardiac reserves, pre- and postoperative hemograms and other laboratory tests, the frequency, duration and type of anticoagulants used, type of thoracic surgery, the amount of blood and blood products transfused, the need for re-exploration, length of hospital and ICU stay, complications, and mortality.

Results and Discussion: There were no significant differences between the two groups in demographic characteristics, length of hospital and ICU stay, levels of Hb, Htc, and creatinin, the amount of perioperative fluid, platelet suspension, the use of ES, postoperative events (DVT, MI, and stroke), and the rates of severe arrhythmias, re-exploration, and mortality (p>0,05, Table 1). Postoperative DVT and MI incidences were 2.9% in patients with discontinued antithrombotic agents. Patients who discontinued antithrombotic medication had a significantly higher preoperative INR value than no medication group (p<0,05).

Conclusions: Although there was no statistically significant difference between groups, it seems that the discontinuation of antithrombotic agents may be related with thrombotic serious complications in patients undergoing thoracic surgery.

#### 12AP02-9

Low molecular weight heparin in patients undergoing lung transplantation with periprocedural ECMO support - a retrospective, observational cohort study

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Background: In selected patients with end-stage lung disease lung transplantation represents the only curative therapeutic option. Extracorporeal membrane oxygenation (ECMO) can be used perioperatively as bridge-to-transplant as well as bridge-to-recovery. Although low molecular weight heparin (LMWH) has replaced unfractioned heparin (UFH) in a number of indications in critically ill patients, UFH remains the most commonly used anticoagulant for ECMO.<sup>12</sup> The aim of this study was to compare subcutaneously administered LMWH with intravenous UFH for anticoagulation during ECMO.

Material and methods: All patients that underwent lung transplantation with periprocedural ECMO support at the Medical University of Vienna between 2006

and 2017 were screened for inclusion and grouped in two cohorts depending on the anticoagulant. Primary outcome parameter was the occurrence of at least one severe bleeding event (bleeding that led to surgical intervention, intracranial hemorrhage or exsanguination). Secondary outcome parameter was the occurrence of at least one thromboembolic event (arterial thromboembolic event, deep vein thrombosis, pulmonary embolism or extracorporeal circuit thrombosis).

**Results**: 102 patients (80 LMWH, 22 UFH) were included. In total 452 ECMO-days (256 LMWH, 200 UFH) were observed and analysed. Significant differences between the groups occurred in regard to ECMO duration (LMWH median 4 (IQR 3) vs. UFH 7 (12) days; P<0.01), ICU length of stay (LMWH 24 (19) vs. UFH 36 (30) days; P<0.01), as well as the proportion of venoarterial ECMO (LMWH 80% vs. UFH 32%; P<0.01). Outcome parameters are shown in table 1.

	UFH (n=22)	LMWH (n=80)	P
Severe bleeding event	5 (22,7 %)	10 (12,5 %)	0,30
Thromboembolic event	11 (50,0 %)	16 (20,0 %)	0,01*
Events overall	13 (59,1 %)	25 (31,3 %)	0,03*

Table 1 - Outcome parameters. Fisher's exact test. (Abbreviations: LMWH - low molecular weight heparin; UFH - unfractioned heparin)

Conclusion: In this study anticoagulation with LMWH for ECMO therapy in lung transplant patients does not seem to be inferior compared to UFH. The observed lower rate of thromboembolic events and composite events in the LMWH group remains to be evaluated in prospective, randomized, controlled trials.

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#### 12AP03-1

Point-of-care assessment of platelet aggregation in infants and children with cyanotic and acyanotic heart disease undergoing open-heart surgery

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**Background and Goal of Study**:Conflicting results exist regarding Platelet(PL) count/function in infants with cyanotic(Cyan) and acyanotic(Acyan) heart disease(HD). <sup>1,2</sup>We investigated this point and transfusion of PL in a homgeneous group of infants with these pathologies.

Materials and Methods:This is a subanalysis of a prospective double-blinded randomised trial(NCT02567786) evaluating the effectiveness of a pump prime based on FFP vs Plasmalyte® in infants weighing 7-15 kg undergoing open-heart surgery. Blood is drawn for PL count,Multiplate®(ADP,ASPI,TRAP) and ROTEM® after the induction of anesthesia(T1),at the end of cardiopulmonary bypass(T2) and at PICU arrival(T3).Transfusion was based on clinical bleeding and guided with POC tests. Data is expressed in mean±SD and numbers(%).A repeated measure ANOVA was performed to analyse the effect of time and group on PL count and function.T-test and Fisher'exact were used.

Results and Discussion:30 children were included and 29 analysed. There was no significant difference between groups regarding POC tests and PL count(Table1) and regarding PL transfusion(Table2). There was a significant difference within groups for PL count, MCFEXTEM of ROTEM® and ADP \*:P<0.001 T1vsT2 and T1vsT3. This effect was much less observed for ASPI/TRAP(data not shown).

TABLE1	T1	T2	T3
PLcount			
	336±103*	151±49	176±70
Cyan			
	391±134*	179±98	205±81
Acyan			
ADPAUC			
	747±217*	288±202	378±206
Cyan			
	894±269*	477±342	430±249
Acyan			
MCFEXTEM			
	61±5*	48±8	50±8
0			
Cyan			
	64±7*	52±10	53±7
Acyan			
, 10 juli			

TABLE2		Cyan(N=14)	Acyan(N=15)	Р
Age(m)		23±16	25±16	0.65
Weight(kg)		10.4±2.5	10.6±2.7	0.83
N patients tra	ansfuse-	4(29%)	1(7%)	0.17
N patients tra			1(7%)	0.60

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Conclusion:PL number/function significantly deteriorate after cardiopulmonary bypass in infants with Cyan as well as Acyan HD without difference between groups.Multiplate®did not give additional information already available with PL count and ROTEM.

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#### 12AP03-2

## Analysis of the effect of dexmedetomidine on platelet function with TEG6s® PlateletMapping® assay in whole blood

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Background and Goal of Study: Dexmedetomidine (DEX) is a highly selective alpha2-adrenergic receptor (alpha2-AR) agonist. Recently, an *in vitro* study using platelet-rich plasma demonstrated that DEX affected adenosine diphosphate (ADP)-induced platelet aggregation via alpha2-AR (Eur J Pharmacol 2015). However, the effect of DEX on platelet function in whole blood remains unclear, because platelet aggregation is a complex reaction that is associated with other blood cell components. In the present study, the effect of DEX on platelet function in whole blood was evaluated using the TEG6s® PlateletMapping®ADP assay.

**Materials and Methods:** The study was approved by the institutional review board and registered in the UMIN clinical registry (UMIN000030233). Whole blood was obtained from healthy male volunteers (25-35 years old, n = 6) and the blood was dispensed into 3 collection tubes. The blood was incubated with DEX (0nM, 10 nM or 100 nM), and the TEG6s® PlateletMapping®ADP assay was performed. The primary outcome was MA\_ADP (clot strength when platelets are activated only through the ADP receptor). Given a type I error of 0.017 and a power of 0.9, a sample size of 6 subjects was estimated to be needed for detection of a 15% change in MA\_ADP (variables were compared in the 3 groups by the paired t-test. Applying Bonferont correction for multiple comparison, p < 0.017 was considered statistically significant. **Results and Discussion:** The values of MA\_ADP were comparable in the 3 groups (Figure A). MA\_HIGH and MA\_ACIP, which reflect global platelet function and fibrin contribution to clot strength, respectively, were also comparable (Figure B, C). Additionally, there was no significant difference in %Aggregation ADP (Figure D). Variables associated with coagulation factors were also evaluated in the present study, and no significant difference was found in R (clotting time), K (clot kinetic time), or Angle (velocity of clot formation) between the 3 groups.

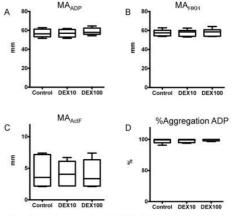


Figure. Platelet function evaluated by TEG6s® PlateletMapping®ADP assay Data are presented as medians [interquartile range]. DEX10: group with 10 nM of dexmedetomidine, DEX100: group with 100 nM of dexmedetomidine.

**Conclusion**: DEX did not affect platelet function measured by the TEG6s® PlateletMapping® assay in whole blood. The findings of our study indicate that DEX can be safely used without modification of platelet function.

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#### 12AP03-3

#### Morphological characteristics of platelet in patients with severe sepsis

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Background and Goal of Study: Patients with severe sepsis have a multiple organ dysfunction including system of hemocoagulation. Thrombocytopenia is present in 30-40% patients. Recently, a significant interest has been shown in morphological characteristics of platelets, including mean platelet volume because it can present functionality of the platelets better than platelet count. Measurement of MPV (mean platelet volume) is used in everyday practice. Increased MPV can exist in terms of increased number of platelets due to hyperproduction, or in case of their activation. The recent studies are pointing out at the correlation between increased MPV and thromboembolic complications. We aimed to estimate the variation in morphological characteristics of platelets in patients with sepsis.

Materials and Methods: 60 patients with sepsis were enrolled, divided into two groups according to the platelets count. The Group 1 consisted of 26 patients with thrombocytopenia (<100\*109/L) and Group 2 had 34 patients without thrombocytopenia. We took into consideration specific factors as: platelet count. MPV, platelet large cell ratio (P-LCR), platelet distribution width (PDW). Clinical blood analysis and determination of the morphological parameters of the platelets have been conducted at hematological analyzer Sysmex XS-1000i (Japan).

Results and Discussion: Mean platelet count in Group 1 was 70\*109/L and in Group 2 - 225\*109/L. In patients with thrombocytopenia the increased MPV has been found (11,3 fl vs 10,5 fl; P=0,008). P-LCR also has been increased in Group 1 (36,3% vs 30,1%; P=0,004). PDW in Group 1 was also confirmed enlarged compared to Group 2 (16,1% vs 13,6%; P= 0,007). The possible causes for increased MPV in patients with thrombocytopenia suffering severe sepsis are: hyperproduction of platelets due to increased production of thrombopoietin and activation of platelets with increased cell volume (transformation of the platelets) It can be suggested that activation of thrombopoesis due to consumption and destruction of platelets results in both MPV and PDW increase. Although, if transformation of the platelets occurs only MPV is expected to be increased and PDW to remain unchanged.

Conclusion: The consumption of the platelets during the septic process lead to thrombocytopenia. Increased MPV and P-LCR are noted in thrombocytopenia. This represents their hyperproduction, regeneration of platelet population and increased thrombogenic capacity

#### 12AP03-4

#### Fresh washed platelets restore clotting time after extrinsic activation by ROTEM® reactants in an in vitro model for extreme hemodilution

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Background and Goal of Study: Clotting Time alterations in rotational thrombelastometry (Rotem®) caused by dilutional coagulopathy are usually interpreted as shortage of procoagulant plasmatic coagulation factors, limiting the potential of thrombin generation. Therefore current treatment algorhythms suggest factor substitution by FFP or prothrombin complex (PCC) transfusion. Although being a central element in the activation of coagulation factors the role of platelets on this thrombelastometrical parameter is not well studied. In an in vitro model for hemodilution whith exactly defined protein contents and free from blood cells we studied the influence of platelets on this important Rotem parameter.

Materials and Methods: Stem solution (SS): Human albumin 5% (Grifols, Spain) in Viaflo Plasmalyte® 148 (Baxter, Spain), enriched with Ca++ dluconate (0.9 mmol/l) was titrated with TRIS buffer 2M to pH 7,3 -7,4 and heated to 37°C.

From this SS we create an enriched SS by adding:

-Fibrinogen concentrate (FC) to get a concentration of 4g/L

-Protrombin Complex Concentrate (PCC) to get a concentration of 1IU/ml -Factor thirteen (FXIII) was added to reach a concertation of 1IU/ml. Starting from this protein enriched SS we analyzed 2 study samples:

Enriched SS without platelets

2. Enriched SS with platelets in a fixed concentration of 200.000 platelets/ul by adding the proper amount of washed platelets from a healthy donant. The study samples were analyzed for viscoelastic properties with the EXTEM S and FIBTEM S subtest on a ROTEM® delta machine.

**Results and Discussion:** 

CT in study samples platelet free sample (mean value, n=8): 128.13'

CT in study samples with platelets (mean value. n=5): 73.60'

A shortening in CT is observed in the platelet group. This shortening is statistically

Conclusion: In coagulopathic bleeding patients with prolonged CT values the transfusion of platelets (if indicated by clot firmness parameters) might improve or even correct this thrombelastometric treatment goal. This approach differs from usually proposed FFP or PCC treatment.

#### 12AP03-5

#### Usefulness of Sonoclot for detection of residual effects of antiplatelet agents: a pilot study

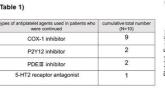
Azumaguchi R.1, Tokinaga Y.1, Kimizuka M.1, Kazuma S.1, Hamada K.1, Yamakage M<sup>1</sup>

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Background and Goal of Study: There has been an increasing number of tients in whom operations have been performed without stopping administration of antiplatelet agents due to the increase in incidences of cerebrovascular and cardiovascular diseases associated with aging. However, there is no effective means for evaluating the actual inhibition of platelet function at the start of surgery. Sonoclot, which was revised to the current model in 2008, is an old blood coagulation/platelet function analyzer using viscosity measurement. It is easy to use and fast. In particular, "platelet function (PF)" is a new index not found in other thromboelastometry. Platelet retraction ability is higher for a larger value of PF. Usefulness of Sonoclot for detection of residual effects of antiplatelet agents was contradictory1, but it should be reexamined.

Materials and Methods: We prospectively examined 10 patients who were not inistered antiplatelet agents, 10 patients in whom administration of antiplatelet agents were continued, and 10 patients in whom administration of antiplatelet agents ere discontinued among patients who underwent scheduled surgery. The values of PF of Sonoclot were compared by using 1-ml blood samples obtained at the beginning of anesthesia. Values are expressed as means ± standard error. Multiple comparisons of data were performed by one-way analysis of variance (ANOVA) followed by Tukey's test. P< 0.05 was considered to be statistically significant.

Results and Discussion: The types of antiplatelet agents included COX-1 inhibitor, P2Y12 inhibitor, PDEⅢ inhibitor, and 5-HT2 receptor antagonist (Table 1). There was no significant difference in PF among groups (Figure 1).



#### Conclusion:

PF of Sonoclot may not be able to detect residual effects of oral antiplatelet agents. References:

1. Gibbs NM. Point-of-care assessment of antiplatelet agents in the perioperative period: a review. Anaesth Intensive Care. 2009;37:354–369.

### 12AP03-6

#### Ascorbic acid improves thrombotic function of platelets during living donor liver transplantation by modulating the function of the E3 ubiquitin ligases Cbl-b and c-Cbl

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Background and Goal of Study: This study employed thromboelastography to investigate the effect of ascorbic acid (AA) on hemostatic function during living donor liver transplantation (LDLT). In addition, we examined whether AA affects clot rigidity by modulating the function of intracellular E3 ubiquitin ligases, Cbl-b and c-Cbl, during orthotopic liver transplantation

Materials and Methods: Twenty-one recipients undergoing LDLT were enrolled in this study. Thromboelastography was performed using blood samples drawn within 30 min after the induction and at 120-min after reperfusion. Each blood sample was divided into three groups: the control group (C group: 0.36 mL of blood sample), the normal saline group (N group: 0.33 mL of blood sample + 0.03 mL of 0.9% normal saline), and the AA group (A group: 0.33 mL of blood sample + 0.03 mL of 200 µmol L-AA dissolved in 0.9% normal saline). Western blot analysis was performed after platelet isolation at the corresponding times to investigate the functional changes of c-Chl and Chl-h

Results and Discussion: Thromboelastographic analysis revealed that AA decreased fibrinolysis and increased clot rigidity at baseline and 120 min after reperfusion. Western blotting revealed that Cbl-b expression was significantly increased at baseline and 120 min after reperfusion in the A group compared to the C or N groups. However, among the three groups, phosphorylation of c-Cbl was most significantly decreased in the A group at baseline and 120 min after reperfusion

Conclusion: Our results showed that AA can significantly decrease fibrinolysis and improve clot rigidity in recipients during LDLT, and the functional changes in Cbl-b and c-Cbl might represent the mechanism underlying these findings. Therefore, the use of AA might be considered to improve hyperfibrinolysis during LDLT. References:

1.Czubkowski P, Socha P, Pawlowska J. Current status of oxidative stress in pediatric liver transplantation Pediatr Transplant 2010:14:169-77

2. Elias-Miro M, Jimenez-Castro MB, Rodes J, et al. Current knowledge on oxidative stress in hepatic ischemia/reperfusion. Free Radic Res 2013;47:555-68. 3. Muriel P. Role of free radicals in liver diseases. Hepatol Int 2009;3:526-36

#### 12AP03-7

#### Effects of dexmedetomidine and propofol on in vitro platelet P-selectin expression in postsurgical patients in an intensive care unit

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Background: We previously reported that dexmedetomidine (DEX) enhances the function of human platelets (Fur J Pharmacol 2015;766:122-8) and that propofol (PRO) has bidirectional effects on platelet function (Anesthesiology 1999;91:361-9). DEX and PRO are often administered in postsurgical patients in an intensive care unit (ICU), but the effects of these drugs on postoperative platelet function are unclear. In this study, we examined the effects of DEX and PRO on expression of P-selectin, an adhesion molecule on the surface of activated platelets, in an in vitro study of samples from postsurgical ICU patients.

Methods: Venous blood was taken with a 10% volume of 3.8% trisodium citrate from 8 patients at the time of ICU admission after elective abdominal surgery under general anaesthesia. Patients with coagulopathy and those who took medication before and during surgery that might affect platelet function were excluded. Plateletrich plasma was stimulated by adenosine diphosphate (ADP) with DEX or PRO for 30 min and then coincubated with PerCP-labeled anti-CD61 antibody and PE-labeled anti-CD62P (P-selectin) antibody for 1 h. P-selectin expression was assessed by flow cytometry.

Results: DEX (10-100 ng/ml) dose-dependently enhanced P-selectin expression on ADP-stimulated platelet surfaces. PRO (40 µM) enhanced P-selectin expression, whereas PRO (70, 100 µM) had no effect (Fig. 1).

Discussion: In our previous study in healthy volunteers, DEX (100 ng/ml) enhanced P-selectin expression, and PRO (40  $\mu$ M) enhanced and PRO (>70  $\mu$ M) suppressed platelet aggregation, consistent with the results of this study. P-selectin stabilizes initial platelet aggregates in vitro and increases and stabilizes arterial thrombi. To confirm whether the effects of DEX and PRO on platelet function increase in the postoperative period, the perioperative time-course of P-selectin expression must be examined, and in vivo studies are needed to clarify effects on platelet functions and hemostasis in a clinical setting.

Conclusion: DEX enhanced in vitro P-selectin expression dose-dependently, while PRO enhanced P-selectin expression only at a low concentration in postsurgical ICU patients.

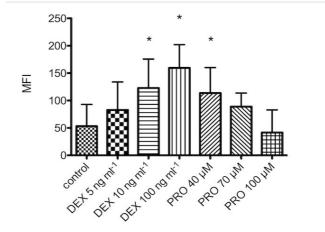


Fig.1. Effect of dexmedetomidine (DEX; 5-100  $\mu$  M) and propofol (PRO: 40-100 µM) on P-selectin expression on platelets collected from postsurgical patients in the ICU. Data are expressed as mean  $\pm$  S.D. (n=8) and were compared by one-way ANOVA, followed by a Dunnett post hoc test. P<0.05 was considered to indicate significance. \*P<0.05 vs. control. MFI; mean fluorescence intensity.

#### 12AP03-9

#### Degree of coagulopathy according to the use or not of autologous blood recovery in cardiac surgery

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Background and Goal of Study: The attempt to minimize the transfusion of allogenic blood and the complications that it entails has increased the use of autologous blood recovery as Cell Saver to preserve the hematocrit, in surgeries such as the cardiac. Its usefulness by reducing transfusion and preserving the erythrocyte capacity of oxygen transport compared to stored blood; But they induce dilutional coagulopathy, not recover platelets and coagulation factors, or due to the residual effect of heparin.Is the incidence of coagulopathy greater with the use of recuperator? Which group required more units of prothrombin complex?

Materials and Methods: Retrospective study, a total sample of 300 patients undergoing cardiac surgery at The Hospital of Salamanca. Variables included were: age, sex, body mass index, conventional coagulation parameters (prothrombin time (PT), activated partial thromboplastin time (aPTT), Fibrinogen, Amount of platelets in preoperative period, at the time and 24 hours after surgery). Level of statistical significance p <0.05. For the multivariate analysis, a binary logistic regression is performed. The program used was SPSS 20.0.

Results and Discussion: Regarding the platelet count we can affirm but without statistical significance that platelet levels are higher after surgery, who recovery has not been used; However, Fibrinogen levels will remain higher with their use, with recovery to normal values almost complete at 24 hours significantly. Focusing on conventional coagulation tests, the Prothrombin Time (PT) is significantly higher in those patients in which recuperator is used, both at hour and 24 hours:Regarding the total activated partial thromboplastin time (aPTT), the levels are significantly higher in patients who do not use a recuperator. Finally, it should be noted that 64% of those in which recovery was used received Prothrombin complex concentrates, while in the group in which recovery was not used, only 20% received it. We could think that the preservation of TP is due to prothrombin complex concentrates.

Conclusion: Therefore, we could say that the recuperator affects mainly the platelet count and the coagulation factors, which despite showing in our study that with recuperator, prothrombin time (PT) is preserved to a greater extent, this may be due to the fact that in this group it is in which they are transfused older CCP. Further studies of a larger sample size that confirm it are necessary

#### 12AP03-10

#### Diagnosis and prevention of haemocoagulation disorders in patients after total hysterectomy

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Background and Goal of Study: Each year in the world the diseases of reproductive system is diagnosed in more than 700,000. In 8.35% of patients with diseases of reproductive system pulmonary embolism was the cause of death, and at 43% - the background for other fatal complications.

Materials and Methods: The results of surgical treatment of 106 patients after hysterectomy during the period from 2014 to 2017 entered the study. Condition of hemostasis was monitored by 12 standard biochemical tests, as well as the new instrumental method - low-frequency piezoelectric thromboelastography preoperative, intraoperative and every day during 10 days after surgery. All patients received disaggregant therapy during 3 days before and 3 days after operation. Prevention of thrombosis in group 1 (n=46) conducted by acetylsalicylic acid (75 mg per day); group 2 (n=60) received Pentoxifylline (100 mg per day).

Results and Discussion: All included in the study patients prior to surgery in the hemostasis system direct a shift towards hypercoagulation and inhibition of fibrinolysis: the intensity of clot coagulation (ICC) increased by 23.78%, increase in MA (maximum density of the clot, fibrin-platelet constant of the blood) at 28.74% (p< 0.001)and reduction of IRCL - the intensity of the retraction and clot lysis to 13.66% (p< 0,05) in both groups compared to normal rates. At first day after surgery in patients (group 1) declines MA, ICC - the intensity of clot coagulation to 12.78 % (p< 0.05) and 12.64 %(p< 0.001) above norm, respectively, and IRCL increased by 4,42% (p<0,001). In the second group MA -11.8%, ICC -4.47%, IRCL - 8.27% were above the norm (p< 0,05). At the fifth day condition of hemostasis in both groups came almost to the same value -hypoagregation, a moderate hypocoagulation, normal activity of fibrinolysis

Conclusion: The use of pentoxifylline makes it possible to improve the parameters of the curative system of the level in the postoperative period in patients who underwent total hysterectomy.

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#### 12AP04-1

## Patients that refuse blood transfusions: clinical and ethical dilemmas on approaching haemorrhagic shock

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**Background**: Treatment of acute blood loss in patients that refuse blood transfusion (BT) represents not only an anaesthetic and clinical challenge but an ethical and sociological problem. Jehovah witnesses (JW) refuse BT based on religious beliefs. In our country, it is common for JW to carry an informed and signed consent in which they state their refusal on red cells (RC), white cells (WC), platelets (P) and fresh frozen plasma (FFP) transfusion.

Case Report: 75 ys woman, JW, history of moderate asthma and dyslipidaemia, proposed for a right hepatectomy to remove a Klatskin tumor with likely cystic invasion. Patient presented an explicit RC, WC, P and FFP transfusion denial in a written consent. As part of the perioperative approach to patients that refuse BT, she received a cycle of recombinant erythropoietin before surgery and presented at surgery time, with an Hb of 16,4 g/dL, P count of 251x103 /ml and no significant  $coagulation \ deficits. \ Right \ hepatectomy \ was \ performed \ under \ balanced \ anaesthesia$ with standard monitoring, invasive arterial cannulation, central venous access in left iugular vein and 2 peripheral accesses. No major surgical complication was detected but, due to intraoperative refractory hypotension, noradrenaline (NA) perfusion was started and adjusted according to patient' needs. Final blood loss of 900ml During her stay in the PACU, patient progressively became more hypotensive, with increasing demand of NA and steady rise of arterial lactate. After 2 hours, she was considered to be in haemorrhagic shock due to surgical complication and brought back to the operating theatre to perform exploring laparotomy. Blood sample analysis showed an Hb of 5.1 g/dl, and lactate of 5.2 mmol/L at this stage. Packing with haemorrhagic containing compresses was performed. No blood transfusion was administered. After re-intervention, patient vitals continue to drop and she died

**Discussion and Conclusion**: In this case, the team agreed to preserve respect for the patient's autonomy since she had been deemed competent to accept or refuse any proposed treatment, and had been extensively informed about the potential complications of refusal of blood transfusions. However, this refusal may constitute an ethical dilemma for physicians, particularly facing life-threatening situations whereas a blood transfusion might save the patient's life and alternative treatments are unproven or unavailable.

#### 12AP04-2

## The influence of preoperative anemia on one-year mortality after orthotopic liver transplantation

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<sup>1</sup>Department of Anaesthesia, Intensive Care Medicine and Pain Medicine, Medical University of Vienna - Vienna (Austria), <sup>2</sup>Section for Medical Statistics, Center for Medical Statistics, Informatics, and Intelligent Systems, Medical University of Vienna - Vienna (Austria), <sup>3</sup>Department of Surgery, Division of Transplantation, Medical University of Vienna - Vienna (Austria)

Background and Goal of Study: Anemia is a common condition in patients suffering from end-stage liver disease (1). In previous studies, preoperative anemia was associated with greater mortality in patients undergoing major surgery (2,3). The aim of this study was to investigate whether preoperative anemia influences one-year mortality in patients undergoing orthotopic liver transplantation (OLT). Materials and Methods: This single-center retrospective study was performed at the Medical University of Vienna after local ethics committee approval. Patients undergoing their first OLT between 2004 and 2016 were included. Exclusion criteria were combined liver-kidney-transplantation and combined liver-lung-transplantation. Anemia was defined according to the classification of the WHO. Hemoglobin values were determined within 24 hours prior to surgery. To assess one-year mortality, a univariate cox regression model for death as event accounting for the combined factor of anemia (mild, moderate, and severe) was calculated.

Results and Discussion:We included 607 patients with a mean age of 53±8 years. Preoperatively, 24% (n=146) of patients had no anemia, while 76% (n=461) of patients suffered from anemia. Of the anemic patients, 28% (n=172) had mild anemia, 42% (n=252) had moderate anemia, and 6% (n=37) suffered from severe anemia. Mean age of non-anemic patients was 55±8 years while that of anemic patients was 53±10 years (P=0.01). During OLT, non-anemic patients required less intraoperative transfusion of red blood cell units than did anemic patients (2±3 versus 4±5 units, respectively, P<0.001). One-year mortality after OLT did not differ between patients without preoperative anemia (21% mortality) and those suffering from preoperative anemia (21% mortality, hazard ratio 0.91, P=0.66).

**Conclusion**:This retrospective study suggests that preoperative anemia is associated with increased intraoperative transfusion of red blood cell units but does not affect one-year mortality in patients with end-stage liver disease undergoing their first OLT.

#### References:

- 1. Stein J, et al. World J Gastroenterol. 2016;22(35):7908-25.
- 2. Baron DM, et al. Br J Anaesth. 2014;113(3):416–23.
- 3. Musallam KM, et al. Lancet 2011;378(9800):1396–407

#### 12AP04-3

#### Surgical blood loss: Should we keep estimating volume?

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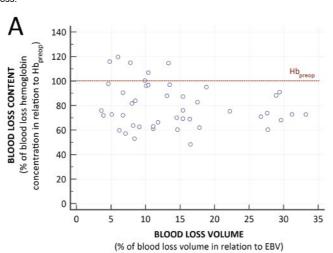
<sup>1</sup>Hospital Clinic de Barcelona - Barcelona (Spain)

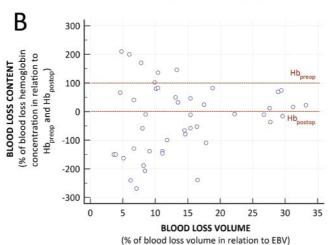
Background and Goal of Study: Usual estimation and quantification of surgical blood loss is based in volume units, but blood loss composition has never been investigated. The purpose of this study is to analyze the relation between the blood loss volume and the blood loss content, recovered during surgical procedures.

Materials and Methods: 45 consecutive patients undergoing robotic prostatectomy were studied. Patients in optimal conditions for measuring blood loss were only considered. Intraoperative blood loss volume was precisely quantified from the suctioned fluid from the surgical field. Blood loss content was assessed by measuring hemoglobin concentration directly from suction fluid. Both parameters, blood loss volume and content, were corrected by the amount of irrigation fluid used during surgery, and standardized into values relative to the patient's characteristics. The relationship between blood loss volume and content (in terms of hemoglobin concentration) was evaluated by a correlation analysis of a linear and nonlinear relation, and displayed in two scatter-plots. A regression analysis was performed to evaluate the assumed content of blood loss of previous blood loss formulas. Perioperative factors were also considered.

Results and Discussion: Correlation coefficient (r) between blood loss volume and content using a linear analysis was found to be almost negligible (0.108-0.117, p < 0.05), and so was using a nonlinear analysis (-0.142-0.139, p < 0.05). The relationship could not either be explained by previous formulas (r² 0.008-0.039, p < 0.05). The use of vasoactive drugs during surgery was related to an increased content of blood loss (P = 0.045) without significant changes in blood loss volume. Age, hypertension, obesity, intraoperative fluid therapy, heart rate, MAP and surgical time were not related to a significant difference in blood loss content. The relation could not be attributed to perioperative variables in a multiple correlation analysis.

**Conclusion**: Volume of blood loss does not correlate with its content. Results from this study suggest that volume is not a reliable way to estimate and quantify blood loss





#### 12AP04-4

## When do we use blood products for coagulation management after liver transplantation

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Background and Goal of Study: end stage liver disease is associated with severe coagulation impairment, and optimal coagulation management remains one of the greatest challenges in liver transplantation. Recently restricted transfusion strategy become common in many transplant centers, this allowed to avoid many unnecessary transfusions (1). But some patients after liver transplantation still need active replacement of coagulation factors due number of reasons (2). Aim of study: to specify conditions when fresh frozen plasma (FFP) or cryoprecipitate transfusion are used in patients after liver transplantation.

Materials and Methods:we studied retrospectively 87 adult patients with liver cirrhosis, aged 38.2±17.3 (24-60) yo, weight 65.8±7.9 (48-78) kg underwent liver transplantation. We studied activated partial prothrombine time (APPT), prothrombine time (PT), international normalized ratio (INR), level of serum fibrinogen A (FGA), platelets count (PLT), thromboelastography (K; R; α angle; MA; LY30), volume of FFP and cryoprecipitate transfused postoperatively.

Results and Discussion: 12 (13.8%) of patients with MELD score 24.8±2.7 had severe coagulopathy and 8 (66.6%) of them had active bleeding, all of these patients were transfused FFP and/or cryoprecipitate. The coagulation tests showed significant prolongation of APPT and PT, decreased of FGA level, increased of INR and thromboelastography showed significant hypocoagulability. APPT 102.5±57.2 sec, PT 19.6±10.8%, INR 5.7±4.2, FGA 0.7±1.0 g/l, R 9.2±1.8 min, K 12.1±4.6 min, α angle 31.5±13.0 degree, MA 30.9±8.0 mm, LY30 0.1±0.3%. Mean volume of transfused FFP postoperatively was 3222.5±3274.8 (690-8650) ml. Transfused cryoprecipitate volume was 80±193.7 (0-600) ml. In all patients FFP and cryoprecipitate transfusion needed during 72h after surgery.

**Conclusion**: 13.8% of cirrhotic patients after liver transplantation presented severe coagulopathy and 66.6% of them had active bleeding. In case of active bleeding and severe coagulopathy (APPT 102 sec, PT 19.6%, INR 5.7, R 9.2 min, K 12.1 min,  $\alpha$  angle 31.5 degree) FFP and/or cryoprecipitate might be transfused. **References**:

 Massicotte L et al. Transfusion rate for 500 consecutive liver transplantations: experience of one liver transplantation center. Transplantation. 2012;93:1276– 1281.

 Ozier Y et al. Institutional variability in transfusion practice for liver transplantation. Anesth Analg. 2003;97:671–679.

#### 12AP04-5

## The incidence of preoperative anemia in patients undergoing cardiac surgery

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Background and Goal of Study:In a multicenter cohort study, the incidence of preoperative anemia in cardiac surgery patients was found to be 26% on average, up to a maximum of 30%. In another study of elective vascular surgery patients, the preoperative anemia incidence was 47% and the risk of mortality and cardiac events in these patients was 2.4%. Our hypothesis was that the incidence of preoperative anemia may be high in patients undergoing cardiac surgery and this may be related to mortality and perioperative complications. We believe that the awareness of preoperative anemia can be increased according to the results of this study, that elective patients can undergo surgery with preoperative anemia treatment. Thus consequently blood and blood product transfusion requirement and related complications can be reduced.

#### Materials and Methods:

Following Ethics Committee approval, adult patients undergoing bypass surgery due to ischemic heart disease between 2014 and 2017 were evaluated retrospectively. Patient demographics, cardiac reserves, preoperative and postoperative Htc values, transfusion volume of blood and blood products, complications and mortality rates were recorded. Other laboratory tests, type of surgery, re-exploration frequency, intensive care and hospital stay were recorded. According to the World Health Organization, for women to have anemia, the Hb value should be <12.0 g/dL, and for men, <13.0 g/dL.

Results and Discussion:In total the data of 333 patients were evaluated. The incidence of anemia was 43%. 265 patients received RBC transfusions (79.6%) and 75% of blood transfusions were found in the anemic group compared to the RBC transfusions in the non anemic group and 89% in the anemia group (p=0.005, Table 1,2). Perioperative bleeding ranged from 100 mL to 3400 mL. The mean amount of bleeding was significantly higher in the anemic group. Nine patients were reexplored. The use of FFP in the anemic group was higher than in nonanemic patients (60.0%, 45.9%, respectively, p = 0.019).

Conclusions: Despite the published guidelines, the incidence of anemia in the preoperative period was high in our study similar to the literature. Although our study did not lead to an increase in complications statistically, the risks associated with RBC and FFP transfusion in the perioperative period exsts. In order to reduce this, anemia treatment should be included in the preoperative preparation of cardiac patients.

#### 12AP04-6

## Efficacy of cell saver on high bleeding risk orthopaedic patients. A retrospective comparative study

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Background and Goal of Study: High bleeding and transfusion risk is very common in certain orthopaedic procedures. Cell saver significantly forms part in a blood saving strategy. The aim of the study was to analyse the impact of cell saver and its effect on transfusion rate and to compare it with its avoidance on high risk bleeding orthopaedic procedures (HRBOP).

Materials and Methods: Retrospective study analysing recorded data of HRBOP patients in the period 2011-2014: Demographic data, procedure, preoperative and postoperative haemoglobin, perioperative bleeding, and cell saver use, autologous and heterologous transfusion rates.

Results and Discussion:In the 2011-2014 period 72 HRBOP patients were identified. We found 57 cases eligible for cell saver. Finally, cell saver and autologous blood transfusion (ABT) was adopted in 19 cases (33%). Age (average standard deviation) 73,6 7,4;Females 59,6%. Femur Peri-prosthetic fractures 22% Primary hip prosthesis 18% rescue hip prosthesis 60%. Preoperative haemoglobin was 12,3 2,6 gr/dl; 31% of the patients were anaemic before surgery; perioperative bleeding was 1683697 ml. Heterologous blood transfusion (HBT) was needed in 61,4% of the patients (57,9% (cell saver) vs. 63,2% (no cell saver). None of the anaemic patients in the cell saver group needed heterologous transfusion. Anaemic patients without cell saver implementation were transfused 66,7% in contrast to the cell saver group that were transfused 50% of times.

**Conclusion:** Bleeding and transfusion rates in HRBOP are high. A significant number of patients come anaemic to surgery. Cell saver implementation can reduce HTR

#### 12AP04-7

### The effects of multidisciplinary team approach on blood and blood products transfusion

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Background and Goal of Study: The Joint Commission and the American Medical Association-Convened Physician Consortium for Performance Improvement reported that the blood transfusions are among the top 5 overused treatments in modern medicine. Optimal management of blood transfusion is one of the most important factors that increase patient safety and special education is increasing all over the world. In our hospital, it is aimed to decrease the perioperative transfusion amount by multidisciplinary team approach. In this regard, a commission has been established in which anesthesiologist, intensivist, cardiovascular surgeon, blood bank unit and hospital administrators are involved. By organizing monthly regular meetings we try to develop new strategies. Our goal in this retrospective cohort study is to investigate the effects of periodic consensus meetings and trainings on perioperative blood transfusion by a team of different branches of medicine.

Materials and Methods: Following the Ethics Committee approval, between 2014 and 2016, patients over the age of 18 who underwent cardiac surgery and had blood transfusion were included in this study. The transfusions were calculated cumulatively, the change with respect to years was determined, as well as side effects and complications associated with transfusion. Patients' cardiac reserves, preoperative and postoperative laboratory values, anticoagulant drug use frequency, transfused blood volume, complications and mortality rates were recorded. The types of surgery, reexploration rate, length of intensive care and hospital stay were recorded.

Results and Discussion: Patients' age, BMI, EF value, COPD, DM, HT ratio, antimicrobial drug use did not differ between the years 2014, 2015 and 2016 (p> 0.05). The length of intensive care and hospital stay, amount of bleeding, mortality rate did not differ. CBP and CX time in 2016, were significantly higher than in 2014 and 2015 (p<0.05, Table 1). The amount of RBC, FFP, platelet, cryoprecipitate did not differ significantly. Besides after 2014, an increase in the use of platelets was observed. The change in Hb, Htc, platelet and INR did not differ significantly in the pre-postoperative period.

Conclusions: Training on the restrictive use of blood products did not have a positive influence on blood transfusion in our study. It has been demonstrated that there are challenges in sufficiently transferring the knowledge to the clinical environment

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## 12AP04-8

## Perioperative anaemia management in elective colorectal surgery

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**Goals:** Anaemia is one of the most frequent extraintestinal manifestations of colorectal cancer with a prevalence up to 25% of moderate or severe anaemia. This condition has been linked to increased postoperative mortality and morbidity and allogeneic blood transfusion (ABT) 1. Iron deficiency is the principal cause of anaemia. We evaluate the role of postoperative iron therapy (PIT) in the immediate postoperative period as part of a new multidisciplinary project of Enhanced Recovery After Surgery (ERAS).

Materials and Methods: We review two cohorts: Prospective ERAS group and a retrospective NO ERAS group:

•ERAS: 177 patients (108 men/ 69 women), mean age was 67.54 ±12.34 between January and November 2017 under ERAS program.

**No ERAS**: 66 (41 men/ 25 women), mean age was 65.8 ±13.88 patients between July and October 2015, prior protocol establishment.

Patients under the ERAS program received 300 mg of iron sucrose intravenously the day of surgery and the second day. We evaluate hemoglobin (Hb) on the first, third and fifth days after surgery and the percentage of patients requiring transfusion in the postoperative period. Results: - ERAS:laparoscopic approach 65% , PIT 82% vs NO ERAS:laparoscopic approach 59%, PIT 0%.

Hb levels and percentage of patients requiring ABT:

	NO ERAS	ERAS
Hb g/dl 1st day	11,52 ± 1,96	11,37 ± 1,75
Hb g/dl 3rd day	11,14 ± 1,74	11,47 ± 2,15
Hb g/dl 5th day % postoperative ABT	10,82 ± 1,70 21%	11,7 ± 2,16 5%

**Conclusions**: In ERAS group hemoglobin shows a tendency to increase progressively until the 5 Th day. PIT could be an effective treatment to decrease incidence of postoperative anaemia after colorectal surgery. We must wait up to three weeks to observe the maximum effect of iron sucrose, so it would be interesting to observe this trend in a similar period of time for future studies. Incidence of ABT was less frequent in ERAS group. This strategy of anaemia management could avoid risk factors associated to ABT.

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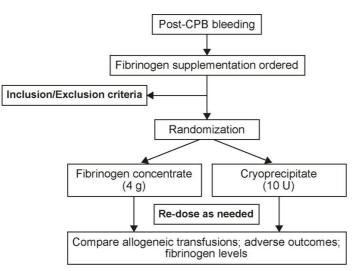
## 12AP04-9

The FIBRES study: a pragmatic, randomised, activecontrol, non-inferiority, phase 3 trial comparing a new fibrinogen concentrate vs. cryoprecipitate for the treatment of acquired hypofibrinogenaemia in bleeding cardiac surgical patients

Karkouti K. 1. on behalf of the FIBRES Study Group

Background and Goal of Study: Coagulopathic bleeding is a serious complication of cardiac surgery. A key contributor is acquired hypofibrinogenaemia (plasma fibrinogen <1.5–2.0 g/L), the standard treatment for which is cryoprecipitate. Purified fibrinogen concentrate is also used, but few comparative data exist and randomised trials are needed. The primary objective of the FIBrinogen REplenishment in Surgery (FIBRES) study is to demonstrate that a new fibrinogen concentrate (Octafibrin/Fibryga, Octapharma) is non-inferior to cryoprecipitate.

Materials and Methods: This is a pragmatic, multi-centre, active-control, randomised (1:1), single-blinded, non-inferiority, phase 3 trial in adult cardiac surgical patients with clinically significant bleeding due to acquired hypofibrinogenaemia. Patients undergoing cardiopulmonary bypass (CPB) for whom fibrinogen supplementation is ordered within 24 hours will be randomised to receive 4 g fibrinogen concentrate or 10 units cryoprecipitate (dose equivalent). All randomised patients will receive fibrinogen supplementation according to clinical need. Patient consent at randomisation is waived, with written informed consent obtained after. Primary outcome is total red cell, platelet and plasma transfusions within 24 hours of CPB. Secondary outcomes include blood products used within 7 days, major bleeding within 24 hours, fibrinogen levels and adverse events. Enrolment of 1,200 patients will provide >90% power to demonstrate non-inferiority, based on a 20% non-inferiority margin, ≥550 patients/group and ~10% drop-out rate. An interim analysis includes 600 patients. The pragmatic design and treatment algorithm align with standard practice, aiding adherence and generalizability.



Results and Discussion: This is the largest randomised study of fibrinogen concentrate versus cryoprecipitate in adult cardiac surgical patients. Expected completion is late 2018, with results available in early 2019.

**Conclusion:** Non-inferiority of the new fibrinogen concentrate would support its use in cardiac surgical patients experiencing significant bleeding because of acquired hypofibrinogenaemia, an under-studied yet high-risk population.

## 12AP04-10

## Study of the incidence of iron deficiency in abdominal aortic aneurysm surgery

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Background and Goal of Study: Iron deficiency is a common cause of preoperative anemia. The perioperative anemia management is a major concern teams of anesthesia and surgery because of its impact on morbidity and mortality. In major orthopedic surgery, the prevalence or iron deficiency is around 20%. In line with the recommendations of a Health Authority, undergoing major orthopedic surgery, a blood saving policy is applied. This strategy has contributed to the decrease of the blood transfusion rate. The use of erythropoietin is often forbidden in vascular surgery patients, but treatment with iron could be introduced particularly in abdominal aneurysm aortic surgery. The objective of our work was to determine the incidence of iron deficiency in abdominal aortic surgery and its association with perioperative anemia.

Materials and Methods: This observational, prospective and single-center study was conducted at the University Hospital of Caen from December 2016 to March 2017. This study was approved by the Comité de Protection des Personnes Nord-Ouest III. All consecutive patients programmed for abdominal aortic surgery was included. A preoperative hemoglobin level of less than 13g/dL defined anemia. A martial assessment was performed the day before the surgery (D-1). Iron deficiency was defined as ferritinemia less than 100mg/mL and/or a transferrin saturation factor less than 20%. A monitoring of the hemoglobin level was performed on D-1 and postoperatively D0, D1 and D3.

**Results and Discussion**: Twenty patients were included. Iron deficiency involved 12 (60%) patients preoperatively. The presence or absence of iron deficiency was our 2 study groups. Populations in each group were comparable in terms of age (74 vs 67, p = 0.13), duration of surgery (176 minutes vs 196 minutes, p = 0.63), vascular filling by crystalloids (1700mL vs. 2000mL, p = 0.52). The blood recovery by cellsaver was similar (632mL vs 525mL, p = 0.67). Iron deficiency was not associated with preoperative anemia (p = 0.49). Postoperative anemia on D1 was not associated with iron deficiency (p = 0.62). Postoperatively on D3, all patients had hemoglobin levels below 13g / dL.

In abdominal aortic surgery, the prevalence of iron deficiency, preoperatively, is high. However, it is not associated with perioperative anemia. This observation does allow better target the causes and treatments of anemia in this context

## 12AP04-11

The difference between tissue oxygenation markers and development of acute kidney injury in minimally transfused and non-transfused cardiac surgery patients

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**Goal of Study**:To compare AKI development and tissue oxygenation by evaluating ScvO2, lactate, venoarterial PCO2 difference( $\Delta$ PCO2) in minimally transfused and non-transfused cardiac surgery patients.

Materials and Methods: One hundred twenty-seven ASA I-II elective coronary artery and valvular heart surgery patients without major intraoperative complications were included in this prospective nonrandomized study. Blood transfusions were driven primarily by hemoglobin levels (7.0 g/dL during cardiopulmonary bypass(CPB) and 8.0g/dL at other times). Patients were divided into two groups: Minimally(1-2 U) Transfused(Group T) and Non-Transfused(Group NT). ScvO2, lactate, ΔPCO2 levels were evaluated after anesthesia induction and at the end of the operation and compared between the groups. Postoperative Grade I AKI was defined as increase in serum creatinine of more than or equal to 0.3 mg/dl. The lengths of mechanical ventilation and ICU period, development of Grade I AKI and 28 days mortality were recorded and compared between the groups. Chi-square, Fisher's Exact, Student's T, Paired samples T, Mann Whitney-U, Wilcoxon Signed ranks tests were used to compare categoric and scale variables between two groups for statistical analysis. Results and Discussion: The operation, CPB, cross clamp times, hemodynamic variables urine output were similar between two groups Increment rate of lactate and ΔPCO2 levels in Group T were significantly higher than those levels in Group NT. Twenty-two patients (17.5%) showed AKI and 4 patients (3.1%) died in hospital. Group T patients had more (28,0%) postoperative AKI without statistically significance. Hospital mortality in Group T was higher than those Group NT with significant difference(P;0.024). Patients with lactate ≥2 mmol/L at the end of operation showed more AKI than those patients with normal lactate (24.2% vs 9.1% respectively: P:0.030). Lactate. ΔPCO2. ScvO2 levels showed good correlation for the development of AKI in both groups.

Conclusions: We concluded that intraoperative anemia that is treated with 1-2 units of blood transfusion causes impairment of tissue oxygenation and increases risk of postoperative AKI in cardiac surgery. Impairment of renal tissue oxygenation may be one of the possible mechanisms for the development of postoperative AKI.

## 12AP05-1

## Tranexamic acid and transfusion requirements in primary and revision total knee arthroplasty

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Background and Goals of Study: Total knee arthroplasty is associated with extensive postoperative blood loss, comprising risks of transfusion therapy, and tranexamic acid (TXA) appears to reduce both. In our hospital, a protocol of its administration in elective primary total knee arthroplasty (PTKA) and revision total knee arthroplasty (RTKA) was implemented a year ago. It includes 1-2g TXA administered through the drain, clamped for 30-60 minutes, plus 1g IV 3-12 hours after surgery if bleeding exceeds 500mL. We aimed to audit protocol implementation to investigate if haemoglobin variation and transfusion requirements lowered with protocol employment.

Materials and Methods: Health records of patients undergoing elective PTKA and RTKA during an one-year period at a single institution were retrospectively reviewed. We revised 323 clinical records and excluded 46 patients who had (1) no postoperative haemoglobin control, (2) unknown TXA doses or (3) timing, doses or route administration not according to the protocol. Of the 277 patients included, 254 underwent PTHA and the remaining 23 were submitted to RTHA. We compared transfusion requirements and postoperative haemoglobin drop in the TXA group vs. the No TXA group in PTKA and RTKA patients (195 vs. 59 patients and 8 vs. 15 patients, respectively). SPSS version 22 was used for all statistical analysis, and a p-value < 0,05 significance level was used for all statistical hypothesis tests. Fisher's exact test, chi-square test and U Mann-Whitney test were used when appropriate. TXA administration was guided by the anaesthesiologist's clinical judgement and by the protocol's exclusion criteria

**Results and Discussion:** In PTKA patients, the mean postoperative haemoglobin drop was significantly lower in the TXA group compared with the No TXA group (2,7±1,2 g/dL vs. 3,8±1,5 g/dL, p<0,0001). The transfusion rate was also significantly lower for the TXA group compared with the No TXA group (5,6% vs. 30,5%; p<0,0001). In RTKA patients, both mean postoperative haemoglobin drop and transfusion requirements were less in the TXA group vs. the No TXA group, but that difference did not reach statistical significance (2,6±1,5 g/dL vs. 2,9±1,4 g/dL, p<0,591; 25% vs. 46,7%; p=0,4).

Conclusions: TXA administration in PTKA appears to reduce both postoperative haemoglobin drop and transfusion requirements so we recommend the use of TXA in PTKA. A larger sample would be required to analyse the role of TXA in RTKA more thoroughly.

## 12AP05-2

Clinical relevance of postoperative second dose of tranexamic acid in total knee arthroplasty surgery. Preliminary results of a clinical assay

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**Background and Goal of Study**: In recent years there has been a growing interest in patient blood management program (PBM) to reduce allogeneic transfusions and its deleterious effects. Tranexamic acid (TXA) has demonstrated the reduction of blood loss and transfusion in total knee arthroplasty (TKA). The aim of this study is to compare the efficacy in reducing blood loss and transfusion of adding a second dose of TXA three hours after surgery, and its impact on outcomes.

Materials and Methods: A prospective, double-blind, placebo-controlled clinical trial (EudraCT:2016-000071-24) was conducted on 99 adult patients scheduled for unilateral TKA with tourniquet, in Hospital del Mar between April 2016 to November 2017. Patients were randomized into two groups: Group 1 received an only intraoperative dose of TXA (15 mL/Kg) while Group 2 received an additional second dose of TXA (10 mL/Kg) 3 hours after surgery. Blood loss was measured in terms of haemoglobin (Hb) at 24h and discharge, visible drain blood loss (ml), calculated blood loss (ml) and transfusion. Complications were collected within up to 30 days post-surgery. Both groups were compared using Chi-squared for qualitative variables and T-student for continuous variables. Statistical significance was considered when p < 0.05.

Results and Discussion: Both groups were comparable according to gender, age, weight, surgery duration, ASA and type of anaesthesia. Results are shown in the table below:

	Group 1(1 TXM dose) n=51	Group 2 (2 TXA dose) n=48	р
24h Hb (g/dL)	11.60 ± 1.26	12.01±1.20	0.09
Visible blood loss (ml)	185.37±132.01	168.96±128.94	0.53
Hb discharge (g/dL)	10.32±1.20	10.92±1.06	0.01
Calculated blood loss (ml)	1674.88±604.80	1482.73±520.70	0.09
Transfusion (%)	1	0	0.33

**Conclusion**: The administration of a second dose of TXA after surgery showed a clear reduction in blood loss, but our our findings only showed a statistically significant higher Hb at discharge (this may be due to an insufficient sample size). Nevertheless, clinical relevance was low as there was no impact on transfusion or outcomes (1%deep venous thrombosis in both groups; 3% surgical infection in Group 1 vs 4% in Group 2, p= 0.87).

## 12AP05-3

## Interest of tranexamic acid in the prevention of bleeding during surgery TRAUMATIC SPINE

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**Background and Goal of Study**: traumatic spine surgery is associated with major blood loss for which it is often necessary to be transfused. Many techniques blood saving are developed in order to limit bleeding and consequently transfusion. We assessed whether tranexamic acid (ATX) would reduce the accumulated blood loss over 24 hours without the occurrence of side effects.

Materials and Methods:120 patients operated on for traumatic spinal arthrodesis of three to five vertebrae were included. They were divided into two equal groups of 60 patients each: Control (T) and Exacyl (E). The group E received Exacyl (ATX) intraoperatively and postoperatively until the fifth hour (10 mg / kg bolus followed by 1 mg / kg / h). We evaluated the intraoperative and postoperative blood loss until the 72th hour. we searched the occurrence of side effects and changes in laboratory parameters from dosing of ddimers and I trponine every 8 hours during the first day. A Doppler ultrasonography of the lower limbs was performed for all patient with a rate of d-dimer> 10.000ng / ml. statistical analysis by SPSS 22.

Results and Discussion: There is no difference between the anthropometric parameters of the 2 groups.

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	T	E	р
durationof the act(min)	112.4 ± 22.8	128.7 ± 29.9	0.14
duration of ane- sthesia(min)	154.7 ± 37.7	161.7 ± 41.2	0.17
number of opera- ted vertebrae	$3.92 \pm 0.84$	4.08±0.60	4.08±0.6
	782.6 ± 234.7	644.9 ± 288.7	0.044
bleeding in post-in- terventional moni- toring room(ml)	442.7 ± 185.6	312.8 ± 88.4	0.031
transfusion rate(R- BC)	$0.96 \pm 0.24$	$0.78 \pm 0.31$	0.27
D-dimer(ng / ml)	3968 ± 147	5847 ± 2545	0.022
Troponinel(µg / I)	0.058 ± 0.033	$0.074 \pm 0,027$	0.09

We have noted in any patient of the 2 groups the occurrence of clinic or doppler ultrasound thromboembolic complications.

**Conclusion:**ATX significantly reduce blood loss in the traumatic spinal surgery, with no impact on transfusion and no significant side effects.

## 12AP05-4

## Importance of fibrinolytic changes in liver surgery

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**Background and Goal of Study**: Nowadays liver resection surgery is still associated with development of sever bleeding. The cause might be hyperfibrinolysis as a result of t-PA and PAI-1 disbalance. We aimed to analyse the changes of fibrinolytic system activity in patients undergoing liver resection surgery.

Materials and Methods:In prospective research were included 15 scheduled patients, that had undergone a liver resection surgery. All patients corresponded to Child-Pugh class A. Fibrinolytic system was evaluated with two markers -t-PA and PAI-1 in four time periods: before the surgery (T1), before the start of Pringle manoeuvre (T2), at the end of the surgery (T3), 24 hours after surgery (T4). As a primary outcome changes of fibrinolytic markers in plasma were analysed, secondary their association with bleeding, extent of liver surgery and haemothrasfusions was assessed.

Results and Discussion:Totally, 9 patients were analysed (6 women, 3 men), with a mean age of 49.1  $\pm$  19.6 years. From further analysis 6 patients were excluded due to inoperable tumors after opening of abdominal cavity. The average duration of surgery was 339.4  $\pm$  230.5 minutes. The most significant PAI-1 raise was observed between T1 and T2, 6.25  $\pm$  2.2 to 17.3  $\pm$  14.6 ng/ml; p = 0.045, increasing up to 29  $\pm$  20,4 in T3, then a fall to 22.5  $\pm$  16 in T4 was seen. Values of PAI-1 increased dynamically for patients with larger extent of liver resection. Similarly, t-PA significantly increased from 4.8  $\pm$  3.08 at T1 to 8  $\pm$  5.1 at T2; p = 0.045, then decreased to 4.2  $\pm$  2.3; p = 0.036 at T3 and 3.04  $\pm$  3 at T4. Positive correlation was found between PAI-1 at T3 and baseline t-PA levels (r = 0.7; p = 0.03). Mean blood loss was 1377.7  $\pm$  1062.8 ml and 7 (85%) patients received blood products. Patients with higher PAI-1 levels in T3 received more fresh frozen plasma (r = 0,79; p=0.01) and red blood cells (r = 0.9; p=0.002).

Conclusion:During the liver resection surgery fibrinolytic activation occurs as seen by increment of t-PA especially at the start of surgery and notable release of PAI-1. Extent of liver tissue resection is associated with more pronounced fibrinolysis inhibition. Although, no association was found between fibrinolysis markers and bleeding volumes, higher fibrinolytic marker concentrations in plasma correlates with the volume of blood transfusions.

## 12AP05-5

## Tranexamic acid and transfusion requirements in primary and revision total hip arthroplasty

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Background and Goal of Study: Tranexamic acid (TXA) appears to reduce perioperative blood loss and transfusion requirements in major orthopaedic surgery. In our hospital, a TXA protocol for administration in elective primary total hip arthroplasty (PTHA) and revision total hip arthroplasty (RTHA) was implemented a year ago. It consists in 1g of TXA IV 15 min prior to incision, and the same dose repeated three to twelve hours after surgery if bleeding exceeds 500mL We aim to audit protocol implementation to investigate if haemoglobin variation and transfusion requirements lowered with protocol employment.

Materials and Methods: Retrospective cohort study of patients submitted to PTHA and RTHA during an one-year period. We revised 286 clinical records and excluded 30 patients who had (1) no postoperative haemoglobin control, (2) unknown TXA doses or (3) timing, doses or route administration not according to the protocol. Of the 256 patients included, 206 underwent PTHA and the remaining 50 were submitted to RTHA.

We compared transfusion requirements and postoperative haemoglobin drop in the TXA group vs the No TXA group in PTHA and RTHA patients (110 vs. 96 patients and 11 vs. 39 patients, respectively).

SPSS version 22 was used for all statistical analysis, and a p-value < 0,05 significance level was used for all statistical hypothesis tests. Fisher's exact test, chi-square test and U Mann-Whitney test were used when appropriate.

TXA administration was guided by the anaesthesiologist's clinical judgement and by the protocol's exclusion criteria.

Results and Discussion: In PTHA patients, the mean postoperative haemoglobin drop was significantly lower in the TXA group compared with the No TXA group (3,1±1,2 g/dL vs. 4,0±1,6 g/dL, p<0,0001). The transfusion rate was also significantly lower for the TXA group compared with the No TXA group (17,3% vs. 45,8%; p<0,0001). In RTHA patients, both mean postoperative haemoglobin drop and transfusion requirements were lower in TXA group vs. No TXA group. However, that difference did not reach statistical significance (2,9±0,9 g/dL vs. 3,2±1,8 g/dL, p<0,761; 45,5% vs. 59%; p=0,425).

Conclusions: TXA administration in PTHA appears to reduce both postoperative haemoglobin drop and transfusion requirements so, we recommend the use of TXA in PTHA. A larger sample should be considered to access the role of TXA in RTHA.

### 12AP05-6

## Tranexamic acid administration time to prevent bleeding in total knee arthroplasty: preliminary data

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Background and Goal of Study: Tranexamic acid has clearly demonstrated its effectiveness in reducing blood loss and transfusion requirements in major orthopedic surgery. However, the ideal timing of its administration is not well established in total knee prosthesis surgery with tourniquet. The aim of this study is to know if the moment of the tranexamic acid administration (at induction or before relieving the tourniquet) influences the perioperative bleeding on knee arthroplasty. Materials and Methods: Prospective, double-blind clinical trial (EudraCT 2016-000071-24) of the first 99 primary knee arrhroplasty patients operated with tourniquet. Patients were randomized in 2 groups: in the Induction group tranexamic acid was administered before starting the ischemia while in the Ischemia group it was administered 20-30 minutes before relieving the tourniquet.

The 2 groups were compared using Student's T for qualitative variables and a Shi square for quantitative variables. We considered statistically significant a p <0.05. **Results and Discussion**: The two groups were comparable in sex, age, ASA, preoperative haemoglobin (Hb) and duration of surgery. In the *Induction group* the visible bleeding in the drain was significantly lower than in the *Ischemia group* (145 ml vs 214 ml, p 0.005). We found no significant differences between Hb at 24h and at discharge, neither in calculated total bleeding (1568 ml vs 1595 ml respectively). There were few complications, with no differences between groups.

**Conclusion:** In these preliminary results, it seems that the administration of tranexamic acid before the induction significantly reduced visible bleeding in the drain without impact on complications.

## 12AP05-7

## Tranexamic acid reduces blood loss and transfusion requirements in adolescent idiopathic scoliosis

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Background and Goal of Study: Scoliosis is a three-dimensional deformity of the spine. Adolescent idiopathic scoliosis (AIS) is the most common type (1-3%). Surgical treatment involves exposure of a vast area of decorticated, raw and cancellous bone. Decreasing blood loss and transfusion requirements should improve patient's safety and their post-operative recovery. Tranexamic acid (TXA) is recommended to reduce blood loss especially in cardiac surgery. The aim of this study was to assess the effect of TXA on blood loss and transfusion requirements in posterior arthrodesis in AIS.

Materials and Methods: Retrospective cross-sectional study of all patients with AIS that had undergone posterior arthrodesis. All perioperative records from January 2009 to December 2014 were reviewed. Patients over 21y, with other diagnosis and combined anterior/posterior spinal fusion were excluded. Blood loss was assessed by measuring suction content and weighing swabs at the end of surgery. We had two groups: TXA group and non-TXA group (NTXA). In the TXA group patients received a loading dose of 10 mg/kg TXA, followed by an infusion of 1 mg/kg/h. Absolute and relative frequencies were calculated for categorical variables, and

mean and standard deviation for quantitative variables. Proportions were compared using chi-squared test (or Fisher's test, as adequate) while student's t-test and Mann-Whitney test were used to compare continuous variables. Statistical analyses were performed using Stata14. Significance level was set at 0.05.

Results and Discussion: 220 posterior arthrodesis for AIS were analysed. Of these, 21 were excluded. There was no significant difference in demographic data and Cobb angle in the 2 groups. The TXA group had a greater number of screws (p<0.001); there was no significant difference in the number of levels fused and duration of surgery. Intraoperative blood loss was 1649ml in NTXA group (95% CI: 1455-1843) and 1028ml in TXA group (95% CI: 881-1175); The number of patients transfused intraoperatively was significantly lower in the TXA group (n=12 vs n=69; p<0.001); in the postoperative period, there was no significant difference between the groups. No adverse events or TXA reactions were reported.

**Conclusion**: The TXA dose used in this study reduced perioperative blood loss and transfusion requirement in intraoperative in patients undergoing posterior arthrodesis for AIS.

## 12AP05-8

# Tranexamic acid use and preoperative haemoglobin level predict perioperative red blood cell transfusions in hip arthroplasty

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Background and Goal of Study: There is a high prevalence of blood product transfusions among patients undergoing total hip replacement surgery.(1) Preoperative estimation of transfusion may be useful to optimize perioperative blood management.(2) The simplest methods to do this are those that identify patients at risk of requiring transfusion support on the basis of the surgical and few clinical parameters.(2) The aim of this study was to assess if we could find in our clinical practice predictors of transfusion.

**Materials and Methods**: This is an observational retrospective study where 178 patients undergoing elective hip arthroplasty were considered. Demographic data (age and sex) as well as preoperative haemoglobin and use of tranexamic acid were included into a logistic regression for perioperative red blood cell transfusion. Data are presented as mean ± standard deviation.

**Results and Discussion**: The logistic regression model showed goodness of fit (Hosmer and Lemeshow test p = 0,953). Preoperative haemoglobin levels and the use of tranexamic acid were statistically significative (p<0,001, Exp(B) 0,412 and p=0,043, Exp(B) 0,222 respectively). ROC curve of the predicted probabilities yielded an AUC of 0,852 (p<0,001) (figure 1). **Conclusions**: From these results, it seems that in our population, some variables, like preoperative haemoglobin and the use of tranexamic acid, might be able to predict the perioperative requirement for transfusion of red blood cells. With this information, we could adjust our perioperative blood management strategy, according to the most likely outcome. **References**:

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## 12AP05-9

## Tranexamic acid after cardiopulmonary bypass and perioperative outcomes after cardiac surgery

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**Background and Goal of Study:**Tranexamic acid (TXA) has been widely used after induction of anesthesia to reduce bleeding in cardiac surgery with cardiopulmonary bypass (CPB). Whereas, TXA was reported to be associated with increased incidence of thrombotic complications. To reduce the risk of adverse outcomes associated with TXA, we began administrating TXA after CPB since July 1, 2011. This retrospective study was to observe whether the administration of TXA after CPB could reduce postoperative complications.

Materials and Methods: After the approval of ethics committee of West China Hospital (No. 256, 2017), clinical data of adult patients (>18 years) who underwent valve surgery and/or coronary artery bypass grafting between July 1, 2011 and December 31, 2016 were screened. Exclusion criteria included emergency surgery and death within 24 hours after surgery. Primary outcome was postoperative death from all cause and requirement for the blood products during the hospital stay. The second outcome was ischemic events and bleeding related events after the surgery.

Results and Discussion:Of all eligible patients, 2,062 received TXA after CPB (the TXA group); 4236 did not receive any TXA (the control group). The demographic characteristics were similar between groups, but the CPB time was longer in TXA group than control group (median, 115 vs. 113 minutes; P=0.007). Incidences of postoperative death, ischemic events and bleeding related events were similar between groups (mortality, 0.9% in TXA vs. 1.4% in control, p=0.058; ischemic events, 13.8% in TXA vs. 15.3% in control, p=0.105; bleeding related events: 1.0% in TXA vs. 1.5% in control, p=0.146). However, the requirements of any blood product in TXA (2.48±4.22 units per person) was fewer than those in control group

(2.74±5.21 units per person, p=0.001). In multivariate logistic analysis, TXA after CPB reduced the risk of death (OR, 0.54; 95%CI, 0.29 to 0.99; p=0.047), and exposure for any blood product (OR, 0.82; 95%CI, 0.72 to 0.93; p=0.001), but not ischemic events (OR, 0.92; 95%CI, 0.78 to 1.09; p=0.314) and bleeding related events (OR, 0.65; 95%CI, 0.39 to 1.08; p=0.095). Our results need to be verified in multi-center, randomized, double-blind, controlled studies.

**Conclusion(s):** TXA after CPB reduced the risk of death and requirement for any blood product, but did not influence the ischemic events and bleeding related events.

### 12AP05-10

## Heparinoid substance in liver transplantation after reperfusion

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**Background**:Liver transplantation is one of the most complex procedures of modern surgery. There are many intercurrences that can occur, one of which is the release by grafting of a heparin-like substance at the time of reperfusion. Diagnosis is often difficult and depends on team recognition and prompt reversor administration.

Case Report: A 62-year-old patient, diagnosed with non-alcoholic fatty cirrhosis, MELD 35, hemodynamically stable, encephalopathy (I), underwent liver transplantation. Anesthetic induction without complications. During the intraoperative period, it was necessary to use noradrenaline 0.1ug/kg/min to maintain the median blood pressure around 70mmHg. The analysis of the initial thromboelastometry showed normal coagulation pattern, however, we did not have the reagent to perform the heparin test. Reperfusion of the graft was performed. and a new thromboelastogram was collected 30 minutes after reperfusion, which presented a decrease in fibrinogen (MCF 3mm) that was corrected with 3 grams of fibrinogen concentrate. After about an hour of the last thromboelastogram, there was still diffuse bleeding at the edges of surgical incision. A thromboelastogram was performed, which showed an increase in coagulation time in the Intern. The possibility of being a heparinoid substance was suggested and due to the lack of the reagent specific for the thromboelastogram, activated coagulation time (ACT) was collected, resulting in 584 seconds. After this result, 20mg of protamine were empirically administered and bleeding was improved and ACT decreased for 150 seconds. At the end of the surgical procedure, the patient was clinically stable, being transferred to the intubated ICU and without signs of active bleeding.

**Discussion**:One of the most prominent disorders of cirrhotics is coagulopathy. With the advent and diffusion of thromboelastography, the treatment of these disorders has become increasingly specific and effective. However, we often do not have the specific reagents to use the technology as a whole. In the present case, in view of the suspected production of heparinoid by the graft, the ACT was used for the differential diagnosis and it was successfully managed to treat the existing disorder. **References**: Kettner SC, et al. Endogenous heparin-like substances significantly impair coagulation in patients undergoing orthotopic liver transplantation. Anesth Analg. 1998 Apr;86(4):691-5.

Learning points: anticoagulants, liver transplant

## 12AP05-11

## Comparison of the efficacy and pharmacokinetics of two tranexamic acid dosage regimes; High vs. low for craniosynostosis surgery. A multicenter double-blind randomized clinical trial

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Introduction: Tranexamic acid (TXA) in a dose of 50 mg/kg loading dose followed by 5 mg/kg/h infusion significantly reduced blood loss in pediatric open craniosynostosis surgery as well as the overall exposure of children to donor PRBC, compared with placebo¹. TXA plasma concentrations with this high dosing regimen were shown to exceed the accepted therapeutic level by over 10 fold. From pharmacokinetic modelling, we predict that reducing the loading dose to 10 mg/kg is adequate to maintain plasma concentrations above the presumed accepted therapeutic level of 20 mcg/mL². This may be safer in terms of side effect profile. The hypothesis of this study is to validate our published TXA pharmacokinetic model and determine if the lower dosage scheme is as effective as the higher dosage scheme in decreasing blood loss and transfusion requirements in pediatric craniosynostosis surgery.

**Methods:** With IRB (BCH IRB-P00008434) and Ethic (2013-001056-35) approval, we planned a multicenter, prospective, double-blind equivalence randomized controlled trial to compare high TXA dose (50mg/kg/15min and 5 mg/kg/h) va low TXA dose (10 mg/kg/15min and 5 mg/kg/h) regime. Standardized anesthetic, fluid, blood and blood product management protocols were followed. TXA analysis was performed using liquid chromatography with mass spectrometry detection (LC/MS) and utilizing 4 different non-linear sampling schemes randomly assigned. The two participating hospitals were: Boston Children's Hospital, Boston USA, and Istituto Gaslini, Genoa, Italy. ClinicalTrials.gov identifier: NCT02188576.

**Results:** 68 children, 3 months to 2 years scheduled for open craniosynostosis surgery were included. Demographics were comparable between groups (Table).

There was no significant difference in blood loss (32.1 vs 32.4 mL/kg) or blood product transfusion (PRBC 19.6 vs 22.5 mL/kg) between the high and low dose groups respectively. TXA plasma levels at steady state averaged 50 mcg/mL in the high dose group vs 25 mcg/mL the low dose group; both above the presumed therapeutic threshold. Blood loss and blood product transfusion were also less than our previous study by two fold. No adverse events such as seizures or thromboembolic events were observed in either group

**Conclusions:** A low vs a high dose regimen of TXA is as effective in reducing blood loss and transfusion in pediatric craniosynostosis reconstruction surgery References:

. Anesth 2011; 114:862-71

2. Clin Pharmacokinet 2013; 52:267-276.

## 12AP06-1

## Transfusion triggers: A comparison between Germany and Japan ~Learning from other countries, optimising blood transfusion practices and improving patient safety

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Background: The transfusion guidelines have been developed and updated around the world. Although there are differences among guidelines, in a nutshell, the recent trend towards a restrictive transfusion regimen can be seen to save donated blood and to prevent side effects. In real, things are more complicated since the degree of following guidelines varies according to each practitioner.

In this study, we compared red blood cell (RBC) transfusion triggers in guidelines and in actual clinical practice between two countries with emphasizing similarities and differences. This study represents a collaboration of two hospitals in Japan and Germany and aims to learn the differences among countries, maximise the efficacy of transfusion and improve the patient's safety globally.

Materials and methods: We investigated elective non-cardiac surgery related RBC transfusions in two hospitals of Germany and Japan during 12 months retrospectively. Pre- and post-transfusion hemoglobin concentration (Hb) and the amount of transfused RBC were evaluated. Paediatric cases (age<18 yr) and cases lack of Hb data were excluded. Mann-Whitney U test was used for the analysis.

Results and discussion: In German guideline, Hb trigger of less than 6 g/dl is recommended unconditionally, whereas Japanese recommends higher Hb of 7-8 g/ dl. For patients with risk factors such as cardiovascular disease, Hb trigger of 6-8 g/ dl is recommended in Germany and of 8-10 g/dl in Japan.

In actual practice, pre-transfusion Hb were lower in German hospital (n=99) than in Japanese hospital (n=95): 6.6 (5.9-7.2) [median (range)] g/dl vs 7.8 (7.3-8.2) g/ dl, p<0.001. In German and Japanese hospitals, post-transfusion Hb were 8.6 (7.7-9.4) g/dl and 9.6 (8.9-10.9) g/dl (p<0.001), the total amount of transfused RBC was 500 (250-500) ml and 560 (280-840) ml (p<0.001), respectively

The differences of guidelines and practices of RBC transfusion could be based on the local factors such as supply, reimbursement system and cost of transfusion. Each country's guideline was moderately implemented in both hospitals. Although transfused RBC amount and pre-transfusion Hb differ, no cases revealed side effects by transfusion or ischaemic disease caused by low Hb.

Conclusion: As German guideline has set lower Hb trigger for RBC transfusion than Japanese, pre-transfusion Hb were significantly lower in German hospital and, hence, the lesser amount of RBC was transfused compared to Japanese hospital.

## 12AP06-2

## Effects of intraoperative liquid and restrictive blood transfusion management to hospital discharge in high risk patients on major abdominal surgery

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Background and Goal of Study: The aim of this study is to evaluate intraoperative fluid resuscitation in patients who underwent high risk major abdominal surgery and to compare the mortality and morbidity of intraoperative restrictive blood transfusion versus liberal blood transfusion.

Materials and Methods: Among three hundred and fifty-two ASA (American Society of Anesthesiologists) scores were III-V patients who have had elective major abdominal surgery between July 2014-July 2015, 141 were included in the study. Patients were divided into two groups according to their blood transfusion management as "restrictive" (group R) and "liberal" (group L). Demographic data, preoperative, intraoperative, and postoperative complications, duration of hospitalization, intensive care unit stay, mortality and discharge rates were

Results and Discussion: Demographic and preoperative data were similar in both groups (group L, n=49; and group R, n=92).

However, the number of ASA IV patients in Group R was higher than Group L (p<0.005). Intraoperative data (preoperative and postoperative haemoglobin values, type of surgery, duration of operation, total amount of crystalloid and colloid, fresh frozen plasma and erythrocyte suspension counts) were similar in both groups and it was seen that Group L had more colloid transfusion than Group R. Postoperative complications, mortality/discharge ratio, duration of hospitalization and intensive care unit stay were similar in both groups. However, the rate of minor infections was 26.5% in Group L and 7.6% in Group R, which was statistically significantly

Conclusion: In high-risk patients, restrictive blood transfusion strategies should be used due to the positive effects of morbidity, mortality, and discharge compared to liberal blood transfusion strategies without applying fluid-restricting protocols.

## 12AP06-3

## Estimated blood loss: A new hemoglobin mass-based model

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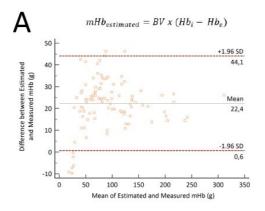
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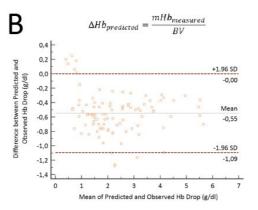
Background and Goal of Study: Estimation of blood loss (EBL) has relevant clinical and research applications. Volume-based EBL formulas have been found to be significantly inaccurate. A new hemoglobin mass-based model is proposed to estimate surgical blood loss and to predict hemoglobin drop 48h after surgery.

Materials and Methods: 100 consecutive patients undergoing urologic surgery were studied. Only patients in optimal conditions for the assessment of intraoperative blood loss were considered. Hemoglobin mass was measured from the suction canister. A model was designed to estimate blood loss in grams of hemoglobin mass and to predict hemoglobin drop 48h after surgery. Concordance between estimates and directly measured values was assessed using the Intraclass Correlation Coefficient (ICC) and Bland-Altman analysis. Main volume-based mulas were compared with the proposed model.

Results and Discussion: Excellent consistency of ICC was found between estimated and measured hemoglobin mass loss (0.980, p < 0.001), and between predicted and measured hemoglobin level drop (0.974, p < 0.001). A systematic bias was found, leading to an overestimate of hemoglobin mass lost (+22.4 g) and an underestimate of hemoglobin drop (-0.55 g/dl). Narrow limits of agreement were observed for estimated blood loss (± 21.7 g) and predicted hemoglobin drop (± 0.54 g/dl). Precision significantly improved as blood loss increased. The proposed model was more reliable than volume-based formulas. Results suggest that the new model is a reliable method both to estimate blood loss and to predict hemoglobin drop 48h after surgery

Conclusion: This is the first model aimed at estimating blood loss based on the quantification of lost hemoglobin mass, which also accurately predicts hemoglobin drop 48h after surgery. Further studies are needed to validate the new model in other scenarios.





EBL Formula	ICC Consistency	ICC Absolute concordance	Bias + Limits of agreement (α 0.05)	Precision as blood loss increased
New model	0.980 (p < 0.001)	0.907 (p < 0.001)	22.4 ± 21.7 g	Improved
Bourke et al. (1974)	0.665 (p < 0.001)	0.489 (p < 0.001)	370 ± 1230 ml	Decreased
Ward et al. (1980)	0.585 (p < 0.001)	0.440 (p < 0.001)	361 ± 1247 ml	Decreased
Gross et al. (1983)	0.577 (p < 0.001)	0.465 (p < 0.001)	355 ± 1238 ml	Decreased
OSTHEO study (2001)	0.578 (p < 0.001)	0.416 (p < 0.001)	573 ± 1227 ml	Decreased
Meunier et al. (2008)	0.879 (p < 0.001)	0.664 (p < 0.001)	-413 ± 893 ml	Decreased
Lopez-Picado et al. (2017)	0.282 (p < 0.001)	0.218 (p < 0.001)	-345 ± 1244 ml	Decreased

## 12AP06-5

## How I couldn't avoid intraoperative massive transfusion in a patient with Multiple Myeloma?

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Background: The incidence of Multiple Myeloma (MM) is about 15% of all hematologic malignancies. There are several difficulties during surgery including malignant hematological disorders and thrombosis As immunomodulation may occur with allogeneic transfusion the use of cellsaver is a source of major controversy.

Case Report: A 69 year old male patient had been diagnosed with MM 1 year ago and received chemo-radiotherapy as primary radical treatment The patient had a history of hypertension, inguinal hernia repair and vertebroplasty. He had normal global left ventricular function with an EF of 57%. He had also an ascending aortic aneurysm measuring 4.8 cm. In myocardial perfusion SPECT there was a mild inferior perfusion defect. The left anterior descending coronary artery had a 30% stenosis in the mid portion. His Htc level was 29.6%, Hg was 11.2 g/dL and Platelet count was 76000/mL. Thrombocytopenia occured due to bone marrow infiltration in preoperative period. He had a vertebral compression fracture because of the MM mass at the level of thoracic spine T2-T3. He had posterior laminectomy and instrumentation T1-T10. His all hemodynamic variables were stable during the surgical procedure. Isolyte S was administered at 6 mL/kg/h iv for the fluid maintenance. 1 g tranexamic acid was administered by slow iv injection and then iv infusion was started with a dose of 1 mg/kg/h. When the bleeding amount reached to 1800 cc 2 packed RBCs and 1000 cc gelatin were given. Then the Htc was 23.8%, Platelet was 60000/mL, fibrinogen was 122 mg/dL and INR was 1.65. The thromboelastogram analysis showed a high R (10.4 min) and K levels (3.7 min) with a normal angle degree and MĂ (58.5 min, Figure). At the end of surgery the duration was 8 hours, total bleeding reached to 6 L. We transfused 10U of RBCs, 8P of FFPs and 2 apheresis of platelet. Final Htc was 26.5%, PT:14.7 s. PTT:39.7 s. INR:1.24, Platelet:90000/mL, fibrinogen:164 mg/dL and CVP:5 in supine

Discussion: Preoperative thrombocytopenia was one of the main factors that increases bleeding. We administered tranexamic acid at the beginning of the surgery to reduce heavy bleeding. Therefore we restricted the loss of coagulation factors. We couldn't avoid massive transfusion however disseminated intravascular coagulopathy didn't occur. In the reported case we have demonstrated that optimizing coagulation through goal directed use of blood products may reduce bleeding and using unnecessary blood products.

## 12AP06-6

## Does transfusion of blood and blood products increases the length of stay in hospital?

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Background and Goal of Study: Despite the implementation of protection strategies against transfusion in cardiac surgery, the use of blood and blood products is still a major concern. Cell saver use is recommended as class 1 recommendation in all cardiac surgery patients without infection or malignancy. However it reported that cell saver did not have a significant effect on blood conservation during cardiopulmonary bypass surgery and also increased the use of fresh frozen plasma. We aimed to investigate whether the use of cell saver blood has a significant effect on the use of blood products and the duration of hospital and intensive care unit (ICU) stay.

Materials and Methods: Following the Ethics Committee approval, we analysed the data of patients undergoing coronary bypass and/or heart valve operation between 2006 and 2016. The duration of surgery, need for cell saver, the amount of bleeding and transfusion requirements within 24 hours postoperatively, were recorded. Patients' survival, length of hospital stay and complication rates were also evaluated. Patients were divided into 2 different groups according to the duration of ICU and hospital stay

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Results and Discussion: Cardiopulmonary Bypass time, CX time, the use of cryoprecipitate, FFP, platelet, RBC and the amount of bleeding were significantly higher in groups with >7 days in hospital stay and >2 days in intensive care unit (p<0.05, Table 1). There was no correlation between the use of cell salvage systems and age, BMI, Cx time, CPB time, the amount of bleeding, cryoprecipitate, FFP, platelet, RBC, Hb, Htc, INR, BUN and creatinine levels. There was a positive correlation between the duration of ICU and hospital stay and Cx time. CPB time. the amount of bleeding, cryoprecipitate, FFP, platelet and RBC transfusion (p<0.05). For the prediction of hospital stay more than 1 week and ICU stay more than 3 days, the amount of postoperative FFP, platelet, RBC, bleeding and the CPB time were found significantly efficient in univariate model (p<0.05). In multivariate reduced model, for the prediction of hospital stay more than 1 week and ICU stay more than 3 days, significant efficacy of postoperative FFP transfusion was observed (p<0.05,

Conclusions: Increased blood product use, Cx and CPB time were associated with prolonged stay in hospital and ICU. The use of blood products due to bleeding was found to be a predictor of more than 3 days stay in ICU and more than one week stav in hospita

## 12AP06-7

## Artificial normocoagulant colloid solutions (ANCS): A solution for plasma free management of severe perioperative bleeding?

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Background and Goal of Study: Volume therapy by cristalloid or colloid solutions is responsible for dilutional coagulopathy in severe perioperative bleeding. This often leads to plasma transfusion as volume therapy in simultaneously hypovolemic and coagulopathic patients to avoid further deterioration of clot formation. We would like to present a plasma free colloid solution based on human albumin which shows physical clot formation properties comparable to whole blood when combined with washed platelets Materials and Methods: Stem solution (SS): Human albumin 5% (Grifols, Spain) in

Viaflo Plasmalyte® 148 (Baxter, Spain), enriched with Ca++ gluconate (0.9 mmol/l) was titrated with TRIS buffer 2M to pH 7,3 -7,4 and heated to 37°C. Starting from this SS we create an enriched SS by adding:

-Fibrinogen concentrate (FC) to get a final concentration of 4g/L

-Protrombin Complex Concentrate (PCC) to get a final concentration of 1IU/ml

-FXIII was added to reach a final concetration of 1IU/ml In a final step this plasma free procoagulant colloid solution was further enriched with washed platelets from a healthy donor to a final concentration of 200.000/

This platelet and coagulation factor enriched solution was analyzed for viscoelastic properties with the EXTEM S and FIBTEM S subtests on a ROTEM® delta machine. Results and Discussion: Our plasma free colloid solution showed the following

50-72

Extem (mean values, n=5): normal values 44 mm 43-65

58 mm

MCF Fibtem (mean values, n=5)

values in Rotem key parameters

<u>CT</u> 73 sec 17 mm 7-23 mm <u>A 10</u> 19 mm **MCF** 9-25

Conclusion: The tested ANCS showed normal values for all ROTEM key parameters. These kind of solutions might be an alternative to plasma or single Rotem based factor replacement especially in clinically "chaotic" situations of massive bleeding

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### 12AP06-8

## Hip fracture: blood loss in a vulnerable population

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Background: Hip fractures are one of the most common fractures treated by orthopedic surgeons. With increasing life expectancy, its incidence is expected to rise in the next years. Elderly patients have usually multiple comorbidities, and are therefore at high risk of perioperative complications. Blood loss is a major issue in hip fractures and transfusion of blood products is frequently required. Although blood transfusion may be a life-saving intervention, it may increase morbidity and possibly mortality, with substantial costs involved.

**Methods**: We retrospectively analyzed 134 femoral neck fracture patients, admitted from January and December of 2016, who underwent urgent primary surgery in a tertiary hospital. Primary outcome was administration of blood products. Statistical analysis was performed using SPSS software.

Results: The average age of patients submitted to hip fracture surgery in this study was 83.46 years, 72.4% were female and 26.6% were male. Regarding previous autonomy degree in daily activity, 15.7% were considered dependent, 39.6% partially dependent and 43.3% independent. 17.3% of the patients lived in a nursing home and 11.2% had been hospitalized in the previous 3 months. As per comorbidities, 25.2% suffered from dementia, 25.9% had heart failure, 9.7% had chronic obstructive pulmonary disease, 17.2% had diabetes mellitus type 2 and the incidence of renal disease was 19.4%. 58.9% of the patients had preoperative Hb<12g/dL. Blood products were administered in 23.1% of our patients either during surgery or in the postoperative period. Blood transfusion need was associated with female gender, low preoperative hemoglobin (Hb), intraoperative blood loss, minimum heart rate during surgery, and duration of the procedure (p<0.05).

Conclusion: Among the variables associated with blood transfusion requirement, the only modifiable ones were preoperative Hb, intraoperative blood loss and duration of procedure. Previous studies have also identified low preoperative Hb as a risk factor for transfusion and suggest that only values under 12g/dL should require cross matching. Others point that intraoperative blood loss has been associated with delay of surgery, type of fracture and fixing method. Recently the role of intraoperative tranexamic acid in hip fractures is being discussed. More studies are needed to better understand risk factors for blood transfusion in order to minimize associated morbidity and mortality.

## 12AP06-9

## Management of hemorrhagic risk in children in neurosurgery

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Background and Goal of Study: The hemorrhagic risk in children in neurosurgery is considered to be high because the life expectancy can be rapidly brought into play, if its management is not immediate, unlike the adult, child and especially in the infant and the newborn can lead to a haemorrhagic shock because the mechanisms of adaptation of the TaO2 to the needs of the organism are more fragile than in the adult. The objective of the study is to evaluate this hemorrhagic risk and to understand its pathophysiological mechanism in order to prevent it before curing it Materials and Methods: It is a descriptive retrospective study of a series of 122 children hospitalized in neuro-resuscitation service during the period January 01 to December 31, 2016. Clinical, para-clinical, etiological and therapeutic data are collected from hospital records.

Results and Discussion:Of the 122 hospitalized children, 45 operated for tumor pathology, 32 operated for craniostenosis, 23 children operated for congenital malformations of the spine, and 22 admitted for cranial trauma of which 10 operated. Age [1 day to 15 years], 68% were <3. The main objective was to prevent the risk of bleeding in these children, especially since most of them were anemic preoperatively due to dehydration, tumor pathologies, but also due to bleeding in head trauma The transfusion threshold was: hemoglobin <10g / dl or <30% hematocrit in the newborn, Hb <8g / dl or <25% in infants less than one year of age, and Hb <7g / dl for the rest, with the exception of traumatized cranial or transfusion threshold was Hb <10g / dl.In per-operative, strict monitoring of clinical signs of hypovolemia + temperature, hourly diuresis (see table1 sfar2016) non-invasive monitoring of PAM (see Table 2), biology (rate of hematocrit in per-op). Of the 122 children, 85 showed signs of hypovolemia on bleeding, and required early resuscitation with rapid and effective filling, 58 required transfusion of iso-Rh isogroup phenotyped blood, and two showed haemorrhagic shock requiring transfusion and the introduction of cathecholamines, one of which died in per-operative

Conclusion: The hemorrhagic risk in children and in particular in neurosurgery is certainly not negligible, that is why it is necessary to watch for it in preoperative, to monitor and to take care of it early in peroperative, to avoid its complications which can be rapidly harmful in children

## Perioperative Medicine

### 13AP01-1

Feasibility and safety of a trimodal prehabilitation program in patients awaiting cardiac surgery to improve functional capacity

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Background and Goal of Study: Cardiac surgical patients usually present a multifactorial reduction in aerobic capacity and a sedentary lifestyle. Multiple comorbidities, perception of severe illness and fear of worsening symptomatology contribute to physical inactivity and deterioration of their functional status. During the preoperative period there is a unique opportunity to optimize our patients, trying to decrease the incidence and severity of the postoperative complications.

Trimodal prehabilitation has demonstrated a reduction on the incidence of postoperative complications in certain groups of patients undergoing major abdominal surgery. However, there is little experience regarding prehabilitation in cardiac surgery and most studies have only included low risk patients.

Our objective is to assess the effect of a multimodal prehabilitation program on functional capacity in cardiac surgery candidates. Secondly, we aimed to analyze the feasibility and safety of the program.

Materials and Methods: Patients 18-80 years old with a waiting time of >4 weeks for cardiac surgery (CABG, valve and/or ascending aortic surgery) were included. Severe LV systolic dysfunction, LOVT obstruction, severe pulmonary hypertension and severe valve stenosis were excluded. The program consisted on 1) in situ or home based controlled exercise training. 2) Nutritional support and education, 3) Cognitive support with mindfulness appointments. Assessments of the functional status, level of activity, nutritional and psychological aspects were made at baseline and when finishing the program.

Results and Discussion: 59 patients were enrolled, 57 of which completed the prehabilitation program. Male n=43 (75,4%), mean age 63,93 (SD 8,93) years, the preoperative estimated risk was ASA II n=2 (3%), ASA III n=46(78%), ASA IV n=11 (19%), Euroscore II 2,23 (SD 2.0). The average duration of the program was 7 weeks and compliance 90%. No complications were observed during the program. The program significantly increased functional capacity measured in an increase of the 6MWT distance and Sit-to-Stand test repetitions, as well as patient reported physical activity before surgery measured by the Yale Physical Activity Survey.

**Conclusion(s)**: The implementation of a multidisciplinary Trimodal Prehabilitation Program as a preoperative optimization strategy in patients awaiting cardiac surgery is feasible and safe. Results show positive effects of prehabilitation on functional capacity.

## 13AP01-2

## Preoperative Anaemia Prevention and Control by a Prehabilitation Programm in Radical Cystectomy

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Background and Goal of Study: One of the complications of patients undergoing radical cystectomy is mutifactorial origin anemia. The hemoglobin (Hb) preoperative levels, added to the surgery itself, which has a high bleeding risk, can result in patients requiring the transfusion of packed red blood cells (PRBCs) more frequently. Therefore, an important point in establishing a prehabilitation program is prevention and treatment of perioperative anemia and enhancing the Hb levels. This, added to specific physical exercises, will aim to improve the function of oxygen transport and try to decrease the requirement for the transfusion of PRBCs

**Materials and Methods**: A prospective cohort of patients included in the prehabilitation program (PREHAB, january 2015 – march 2017) was compared to an historical cohort receiving no prehabilitation (NO-PREHAB, january 2012 – december 2014), both of them following enhancing recovering protocols.

The program is based on physical therapy with aerobic and resistance exercises, respiratory exercises, nutritional and iron supplementation as well as cognitive therapy. All the patients were given iron supplements unless they had an iron overload. The discrete variables were described as frequency (percentage) and the continuous variables as a median (interquartile range), with Fisher's test (discrete) and Wilcoxon's (continuous). A p value <0.05 was considered statistically significant

Results and Discussion: The sample included 141 patients, 101 in the historical cohort (NoPR) and 40 in the prospective cohort (PR). In comparing groups with Hb baseline levels, no statistical differences were found. Significant differences were found between the two groups according to transfusion during hospital stay: PR 0 (0-2) vs NoPR 2 (1-4) (p<0.0001). Although no statistical differences were found according to transfusion prior to surgery (PR 0 vs NoPR 0), six of the patients of the non-prehabilitation group required transfusion of PRBCs prior to surgery for severe anemia, whereas only one patient required transfusion in the prehabilitation group [p90=1,6 vs 0; p99=6 vs 1].

**Conclusion**: This Prehabilitation program may result in a proper optimization of perioperative Hb; reducing the requirements of perioperative transfusion of PRBCs and therefore avoiding its side effects with less use of limited resources, resulting in a decrease in associated costs. More study needed to clarify the impact of Prehabilitation in Hb perioperative levels.

## 13AP01-3

# Short and mid-term impact of a prehabilitation program in high-risk patients undergoing elective major abdominal surgery

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**Background:** Benefits of preoperative personalized training programs (prehabilitation) in high risk-patients who underwent to major digestive surgery have been recently demonstrated. However, sustainability of the effects is still unknown. **Goal of Study:** To evaluate short and mid-term impact of prehabilitation in high-risk patients who underwent to elective major digestive surgery.

Materials and Methods: This study was designed as a randomized controlled trial (NCT02024776) comparing standard care versus a prehabilitation program including: i) a motivational interview; ii) a personalized program to promote physical activity and; iii) a supervised high-intensity endurance training program. The primary outcome was the incidence of postoperative complications (previously reported at Barberan-Garcia A, et al. Ann Surg 2017). Secondary outcomes included: i) endurance time during a constant work-rate exercise test (ET) pre and post-prehabilitation and 3 months after the surgery; ii) physical activity measured using the Yale physical activity survey (YPAS), self-perceived health status by the Short Form health survey (SF-36) and psychological status by the Hospital Anxiety and Depression scale (HAD) pre and post-prehabilitation, and 1 and 6 months after surgery.

Results and Discussion: One-hundred and eight patients (55 prehabilitation; 53 usual care), out of the 125 patients included in the RCT, completed the follow-up. The prehabilitation-induced enhancement of aerobic capacity [ET 399 (218) sec; p<0.001] showed sustained differences between groups at 3-month follow-up [ET 192 (218) sec; p=0.048]. Likewise, the higher prehabilitation-induced levels of physical activity [ΔΥPAS 31(19) score; p<0.001] sustained differences at 1 [ΔΥALE 11 (13) score; p<0.001] and 6-month follow-up [ΔΥPAS 7 (14) score; p=0.016]. Moreover, self-perceived physical component status was significantly enhanced in the prehabilitation group at 1 [SF-36 7 (8) mental score; p<0.001] and 6-month follow-up [SF-36 3 (7) mental score; p=0.042]. Interestingly, the prehabilitation group also showed enhanced psychological status at 1-month follow-up compared with the usual care group [HAD 2.9 (5.7) score; p=0.008].

**Conclusion:** Prehabilitation-induced effects on aerobic capacity, physical activity and self-perceived physical status have a significant impact at postoperative midterm in high risk-patients who underwent to major digestive surgery. Supported by ESA Grant support 2016 and ISCIII Pl13/00425

## 13AP01-4

Cost-effectiveness analysis of a prehabilitation program in high-risk patients undergoing elective major abdominal surgery

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**Background:** Preoperative personalized programs (prehabilitation) are effective in reducing postoperative complications in high-risk patients undergoing major abdominal surgery. However, its effects on healthcare costs are still unknown. **Goal of Study:** To determine the cost-effectiveness of prehabilitation program versus conventional care for high-risk patients undergoing elective major abdominal surgery.

Materials and Methods: This study involved data arising from a previously published randomized controlled trial which demonstrated the efficacy of prehabilitation versus standard care in reducing postoperative complications

in high-risk undergoing major abdominal surgery (Barberan-Garcia A, et al. Ann Surg 2017). The costs of the prehabilitation program and hospital resources related to surgery were also evaluated. Prehabilitation program costs included: i) a cardiopulmonary exercise testing; ii) the physiotherapist fees; and, iii) a pedometer device. Surgery costs included: i) direct costs (pharmacy and transfusions); and, ii) costs for hospital length of stay (days of initial hospitalization plus days during 30-day readmissions) by diagnosis-related group. Data were obtained for each patient. Information on costs was provided by the hospital finance department. Uncertainty was expressed using bootstrapped estimates (1,000 repetitions).

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Results and Discussion: One-hundred and twenty-five patients (63 control and 62 intervention), out of the 144 participating in the study, were finally included in the intention-to-treat analysis. Prehabilitation program cost was EUR 389 per patient. The average hospital costs per patient in the prehabilitation group were EUR 4,340 and in the control group were EUR 7,643 (p=0.134). The impact of the prehabilitation in comparison with standard care represented a mean cost saving of EUR 3,659 per patient (95% IC EUR -36 to 8,459 €).

Conclusion: Prehabilitation shows potential for money saving compared to standard care. A larger sample size may have resulted in a statistically significant result.

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## 13AP01-5

The association between preoperative anemia with long term functional outcomes and quality of life after total knee arthroplasty – A single centre retrospective study

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Background and Goal of Study: Preoperative anemia affects one third of patients undergoing total knee arthroplasty (TKA) and is associated with increased blood transfusion and prolonged hospitalisation. [1] Preoperative anemia leads to poorer functional recovery in total hip arthroplasty. However, the association between preoperative anemia and functional outcomes following TKA is unknown. We aim to determine whether preoperative anemia and perioperative blood transfusion affect functional outcomes and health-related quality of life (HRQoL) following TKA.

Materials and Methods: Retrospective cohort analysis of 1994 patients who underwent primary unilateral TKA from 2013-2014. Anemia was defined according to the World Health Organisation definition. Oxford Knee Score (OKS) and Knee Society Score (KSS) were used to assess functional outcomes at baseline and 6 months postoperatively. HRQoL was assessed with the 36-Item Short Form Survey (SF-36). Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP), Social Functioning (SF) and Role Emotional (RE) domains of SF-36, OKS and KSS demonstrated significant change greater than minimal clinically important difference between baseline and 6 months. General linear model analysis was performed to identify predictors of 6 month scores.

Results and Discussion: The incidence of preoperative anemia was 22.3%. 4.3% of patients received blood transfusions. Preoperative anemia or perioperative blood transfusion did not significantly affect SF-36, KSS and OKS scores at 6 months postoperatively. Poor baseline SF-36, KSS and OKS scores and high BMI≥37.5kg/ m² are consistently associated with lower scores at 6 months.

**Conclusion:** Preoperative anemia and perioperative blood transfusion did not significantly affect functional outcomes and HRQoL following TKA.

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Variables which attained statistical significance (as defined by of 16) are highlighted in pay. Variables such as condomination accolent (CNA), congestive cander, failure (CDF) and type of assembless were not bound to be extinically significant and freedow not down in Table 1. The results displayed in Table 1 have been adjusted for the variables which were not found to be extincted, significant.

Table 2: Factors affecting functional outcomes at 6 months after TKA

Variable	KSS-Functi	01	0KS		
	B-coefficient a (95% CI)	pvalue	B-coefficient a (95% CI)	pvalue	
Preoperative anemia					
Mid					
Moderate/Severe	-0.716 (-2.768, 1.337)	0.494	-0.047 (-0.758, 0.663)	0.896	
No anemia	-2.387 (-5.535, 0.761)	0.137	0.761 (-0.328, 1.850)	0.171	
	REF		REF		
Perioperative blood					
transfusion					
1 Unit	-3.668 (-8.196, 0.860)	0.112	1.067 (-0.497, 2.630)	0.181	
≥2 Units	-5.029 (-11.587, 1.529)	0.133	0.294 (-1.975, 2.563)	0.799	
No perioperative	REF		REF		
blood transfusion					
BMI (kg/m²)					
<17.5	8.112 (-7.890, 24.114)	0.320	0.844 (-4.691, 6.380)	0.765	
23.0-27.4	-2.258 (-4.647, 0.131)	0.064	0.478 (-0.348, 1.304)	0.257	
27.5-32.4	4.921 (-7.365, -2.477)	<0.001	0.749 (-0.097, 1.594)	0.083	
32.5-37.4	-7.158 (-10.269, -4.046)	<0.001	1.398 (0.323, 2.474)	0.011	
≥37.5	-14.827 (-19.380, -10.274)	<0.001	2.835 (1.261, 4.410)	<0.001	
17.5-22.9	REF		REF		
Baseline scores	0.367 (0.323, 0.411)	<0.001	0.164 (0.131, 0.197)	<0.001	
Age	80-10		500 000 000 000		
>61 and ≤67	-0.777 (-2.876, 1.322)	0.468	-1.103 (-1.828, -0.377)	0.003	
>67 and ≤73	-3.474 (-5.677, -1.272)	0.002	-0.816 (-1.577, -0.055)	0.036	
>73	-8.452 (-10.723, -6.182)	<0.001	0.922 (0.150, 1.694)	0.019	
<b>461</b>	REF		REF		
Gender	000000000000000000000000000000000000000				
Female	4.678 (-6.609, -2.746)	<0.001	0.314 (-0.359, 0.987)	0.361	
Male	REF		REF		
ASA status		12.2			
1	4.893 (-9.217, -0.568)	0.027	0.190 (-1.307, 1.687)	0.804	
1	-1.706 (4.692, 1.281)	0.263	0.273 (-0.760, 1.306)	0.604	
1	REF		REF		

Variables which attained statistical significance (as defined by p<0.05) are highlighted in grey. Variables such as cerebrovascular accident (CVA), congestive cardiac failure (CCF) and type of anaesthesia were not found to be statistically significant and therefore not shown in Table 2. The results displayed in Table 2 have been adjusted for the variables which were not found to be statistically significant.

## References:

1. BMJ Open 2017;7:e016403. doi: 10.1136/bmjopen-2017-016403

## 13AP01-6

# Can we predict mortality in hip fracture surgery? Application of the POSSUM and CHARLSON scales on a sample

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Background and Goal of Study: Hip fracture surgery is an intervention whose severity and risk are often undervalued. They have a high percentage of postoperative complications and short-term mortality. The application of perioperative scores may be important when identifying some of these patients who may be at special risk. Our goal with this study was to evaluate the risk using different scales.

**Materials and Methods**: An observational study was carried out analyzing all the hip fracture surgeries performed in our hospital over a month. 32 consecutive patients were selected.

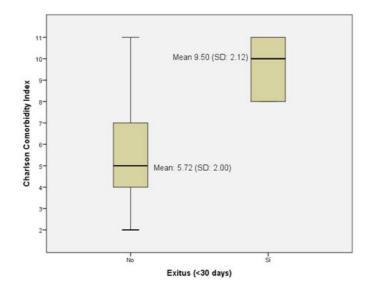
Different scales of perioperative risk were calculated through data from the clinical and intraoperative history. Major complications and death in the first 30 days were recorded from the clinical evolution

Data analysis was performed with the IBM SPSS Statistics. We carry out a comparison of the means through the T-Student.

Results and Discussion: We analyzed a total of 32 patients (78.1% were women). The mean age was 85.34 years (SD: 7.19). The sample presented a Charlson comorbidity index score of 5.97 (SD: 2.15) and a POSSUM of 35.66 (SD: 6.82). Mortality at 30 days was 6.5%.

We observed a relationship between worse scores in the Charlson comorbidity index and the POSSUM scale with 30-day mortality.

We found statistical significance (p=0.015) with the Charlson score and the exitus (figure 1)



In addition, when looking at the prediction of survival at 10 years according to this index, we could see that the predicted survival percentage in the group of the deceased was 0% (SD: 0.00), while it reached 22.45% (SD: 26.62) among those who did not die (p=0.041).

The score of the POSSÚM scale was significantly higher in the group of patients who died, with a mean of 48.50 (SD: 0.71) in these and of 35.07 (SD: 6.06) in the other group (p<0.001). If we analyze the prediction of mortality according to the POSSUM score, this was 37.54% (SD: 2.77) in the deceased and 11.52% (SD: 8.06) among those who lived (p<0.001).

**Conclusion**: The results obtained and the simplicity and harmlessness of the perioperative risk scales, leads us to conclude that these should be applied to our daily clinic practice.

### 13AP01-7

# Association between preoperative anaemia, blood transfusion rates and outcomes after major hepatobiliary surgery

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Background and Goal of Study: There is increasing evidence that anaemia is associated with worse outcomes, increased rates of blood transfusions and increased financial burden. Traditionally, cut-off values derived from the WHO classification of anaemia, have been used but whether these are appropriate in the preoperative setting remain to be investigated.

Materials and Methods: This is a retrospective review of data from 377 consecutive patients undergoing major hepatobiliary surgery at a single centre over a 30 month period. Caldicott approval was granted for the study. A number of factors were examined including preoperative haemoglobin, transfusion rates, age, sex, duration of surgery and length of stay in critical care and hospital.

Results and Discussion: We had complete data recorded for the 377 patients. The perioperative transfusion rate was 22.3%. Blood transfusion was associated with increased duration of surgery suggesting surgery of a more complex nature. Both critical care (1.9 vs 10.2 days p<0.001) and hospital stay (14.2 vs 35.1 days p<0.001) were increased in those requiring transfusion. The in-hospital mortality rate was 1.9% and all had received a blood transfusion. Preoperative Hb levels were significantly reduced in those requiring transfusion (119 g/l vs 135 g/l p<0.001). ROC curve analysis revealed the optimum preop Hb to predict those at risk of transfusion was 125 g/l (AUROC=0.75 sens 78 spec 77 p<0.001). Using this cut-off value, Hb<125g/l was associated with a four fold increase in transfusion rates and prolonged critical care and hospital stay.

Conclusion: This retrospective study of patients undergoing major HPB surgery has revealed that preoperative anaemia is a potentially reversible risk factor for blood transfusion and prolonged hospital stay. The potential cost savings by implementing a preoperative anaemia service as well as the reduction in the need for blood transfusion are significant. We believe that this is the first time optimal Hb levels have been assessed to make the most cost effective treatment pathway.

	Hb <125	Hb=>125	p value
n=	121	256	
Transfusion	46.2%	10.9%	<0.001
CCU stay days mean (SD)	5.8 (10.9)	3.0 (5.7)	0.001
Hospital stay mean (SD)	24.5 (27.9)	16.9 (16.6)	0.002

## 13AP01-8

## Association of endothelial injury and systemic inflammation with perioperative myocardial infarction

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Background and Goal of Study: Major surgery predisposes to endothelial glycocalyx (EG) injury. EG injury associates with cardiac morbidity [1] but its potential association with perioperative myocardial infarction (PMI) is unknown. Accordingly, we investigated the relation of EG injury, systemic inflammation and perioperative myocardial injury/infarction, hypothesising the acute EG injury and inflammation are associated with cardiac troponin T (TnT) release and PMI.

Materials and Methods: 15 PMI patients and 60 propensity-matched controls were investigated in this prospective study. The diagnosis of PMI was based on repeated TnT measurements, electrocardiographs, and recordings of ischemic signs and symptoms. We measured EG markers, soluble thrombomodulin (sTM), syndecan-1, vascular adhesion protein 1 (VAP-1), and an inflammatory marker IL-6 preoperatively, 6h, and 24h postoperatively. We calculated Spearman's correlation between TnT, EG markers and IL-6. To investigate if the highest plasma concentrations of EG markers and IL-6 were predictive for PMI, we calculated areas under receiver operating characteristics curves (AUCs) with 95% confidence intervals. We identified the best cut-off points using the Youden index and calculated sensitivity, specificity and positive likelihood ratios using these cut-off points. A two-sided p-value <0.05 was considered significant.

Results and Discussion: Preoperative IL-6 had a positive correlation with preoperative, 6h, and 24h postoperative TnT (p=0.05) in PMI patients. Furthermore, preoperative IL-6 correlated positively with sTM (p=0.01) but only with 24h syndecan-1 levels (p=0.01) in PMI patients. sTM and TnT levels correlated positively at all the time points (p<0.01) in non-PMI patients. IL-6 predicted PMI with an AUC (95% CI) of 0.69 (0.54-0.85), p=0.02. The best cut-off value was 238 pg/mL with sensitivity, specificity, and LR+ (95% CI) of 0.53, 0.85, and 3.56 (1.65-7.65), respectively.

**Conclusion:** Systemic inflammation, reflected by IL-6, associates with endothelial injury and PMI. sTM correlated positively with TnT release. Circulating IL-6 demonstrated some potential to predict PMI, whereas EG markers did not. The findings should be considered as first hypothesis-generating preliminary evidence regarding the potential association of EG injury with PMI and need to be confirmed or refuted in future larger studies.

## References:

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## 13AP01-9

## ASA classification: consistency of an universal tool

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Background and Goal of Study: The classification of the physical status of the American Society of Anesthesiology (ASA) has 6 categories, being the most used score in the preoperative evaluation by anesthesiologists. Although it is related with anesthetic morbidity and mortality, inconsistent evaluations of the same patients have been observed among different anesthesiologists. The aim of this study is to evaluate the variability in the evaluation of ASA physical status classification among portuguese anesthesiologists.

Materials and Methods: Prospective study, in which an electronic questionnaire was distributed to Portuguese anesthesiologists by the Portuguese Society of Anesthesiology, and through the Facebook for 7 days. Anesthesiologists were questioned regarding their demographic characteristics, category and professional experience, place of work, and how they would've categorized 15 clinical cases in ASA classification. These cases were based on other studies, and were translated by 2 anesthesiologists and 1 medical student. The agreement among participants was evaluated through intraclass correlation coefficient (ICC). A value of p <0.05 was assumed to be statistically significant.

Results and Discussion: We got 100 answers, 3 were excluded due to incomplete answers. Median age of participants was 38 years. 76 were female and 21 males. 59 were anesthesiology fellows and 38 residents. 93.8% work in the public sector. All participants confirmed that they regularly use the ASA classification. Compared with the authors' classification, participants' agreement ranged from 3 to 15 responses, with a mean of 9.8 (SD +/- 2.3). In none of the cases was observed a total agreement with the previous classification (max. 94.8%), and in all except 2 cases, the majority of the participants had a concordant response. The ICC among the participants was 0.726 (0.585; 0.869; p <0.001) showing a satisfactory degree of agreement; among fellows, the value was 0.728, and residents, 0.709.

**Conclusion**: The results of this sample revealed that the agreement among Portuguese anesthetists is very satisfactory and is similar with the values observed in the literature.

## 13AP01-10

Application of the Surgical Apgar Score for the prediction of major complications in hip fracture surgery

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**Background and Goal of Study**:The Surgical Apgar Score (SAS) has been considered as a good independent predictor of major postoperative complications and mortality in the first 30 days in different types of surgeries. This scale has already been validated in different orthopedic surgical procedures and there are several studies that highlight its usefulness in hip fracture surgery. Patients with a SAS  $\leq$ 4 are 14.4 times more likely to suffer major complications in the first 30 days compared to those with a SAS  $\geq$ 5. Our goal with this study was to evaluate the risk in our population using the Surgical Apgar Score.

Materials and Methods: An observational study was carried out analyzing all the hip fracture surgeries performed in our hospital over a month. 32 consecutive patients were selected. SAS was calculated prospectively from intraoperative data. The appearance of major complications and death in the first 30 days was recorded from the clinical evolution. Among these complications were: anemia requiring transfusion, acute myocardial infarction, decompensation of heart failure, cardiorespiratory arrest, need for reoperation or re-entry in resuscitation, need for vasoactive support drugs or mechanical ventilation, acute renal failure, stroke, pulmonary embolism or DVT, sepsis, pneumonia, fever or urinary tract infection, as well as delirium without a history of previous cognitive disorders. Data analysis was performed with the IBM SPSS Statistics. We carry out a comparison of the means through the T-Student.

Results and Discussion: We analyzed a total of 32 patients (78.1% were women). The mean age was 85.34 years (SD: 7.19). The mean os SAS in the sample was 6.91 (SD: 1.38). The incidence of major complications in the first 30 days was 68.8%. We analyzed the relationship of SAS with the appearance of major complications in the first 30 days as a whole, as well as each of them individually. In the case of delirium, lower SAS could be found in those who suffered it (mean of 6.00; SD: 1.00), than in those who did not (7.16; SD: 1.38). (p=0.047). We could not find statistical significance that would support that worse scores in SAS were related to a higher incidence of other complications.

**Conclusion:** Surgical Apgar Score could become a very useful tool when it comes to immediately identify patients with a higher risk stratification and thus be able to receive post-intensive intensive care and closer attention both during as after the hospital stay.

## 13AP01-11

Compliance with the 2014 ESC/ESA guidelines on noncardiac surgery preoperative cardiovascular assessment by 5 tertiary Greek hospitals: A retrospective observational study

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**Background and Goal of Study**:In 2014 the European Society of Cardiology and the European Society of Anaesthesiology published guidelines on preoperative assessment and management of non-cardiac surgery patients. The objective of the study was to evaluate the rate of compliance with the task force recommendations by 5 major tertiary Greek hospitals.

Materials and Methods: A retrospective observational cohort study was designed. 5 tertiary Greek hospitals participated in the study between February 2016 and April 2016. The adult ASA 1-4 patients who underwent non-cardiac surgery were included. Patients treated in Intensive Care Unit were excluded. The preanesthetic charts were reviewed and the information about the age, surgical risk, ASA classification, the cardiological history and medication, the physical examination findings, and the tests ordered was recorded. A total of 5009 records were reviewed. The main outcomes were the rates of compliance with the published recommendations of the following parameters: preoperative testing (electrocardiogram [ECG], heart ultrasound, heart imaging stress testing, invasive coronary angiography), continuation or not of medication (b-blockers, statins, angiotensin-converting enzyme inhibitors [ACEIs] and angiotensin-receptor blockers [ARBs]) and overall compliance with the recommendations.

Results and Discussion:63,8% (3197) of the preoperative ECGs, 83,8% (522) of the heart ultrasonographies and 93,2% (55) of the non-invasive stress tests shouldn't had been performed. On the other hand, only 30,3% (101) and 6% (4) of the patients that should or could have been evaluated with a heart ultrasound and a non-invasive stress test respectively, did the recommended tests. B-blockers and statins were correctly continued to all the patients who were taking them. 1055 patients were receiving ACEIs or ARBs for hypertension and should have

discontinued their medication, but none did. 53,4% (31) of the patients with known systolic heart failure were not being treated with ACEIs or ARBs as they should and were operated despite the recommendation to begin treatment for at least 1 week before surgery. The overall percentage of the patients managed exactly as recommended was only 27,3%.

**Conclusion**:The 2014 guidelines for preoperative management of the non-cardiac surgery patients are not sufficiently being followed by the Greek hospitals.

## 13AP01-12

## Description of the utility of POSSUM in the perioperative prognosis in abdominal surgery

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Background and Goal of Study: POSSUM (Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity) scale is a patient classification system used to predict mortality and risk-adjusted morbidity in a variety of surgical procedures. We studied the usefulness of this scale in the perioperative prognosis in abdominal surgery.

**Materials and Methods**: We get a sample of 47 consecutive patients undergoing major abdominal surgery and performed an observational study. Both scheduled (76.6%) and urgent (23.4%) procedures were included in the sample.

The calculation of the scale was carried out upon the arrival of the patients to the Resuscitation area after the surgery.

Data analysis was performed with the IBM SPSS Statistics. We carry out a comparison of the means through the T-student. The correlation was calculated with the Pearson or Spearmen correlation.

Results and Discussion: The mean age of the patients who underwent surgery was 71.8 years (SD: 12.83). The mean score of POSSUM in the sample was 35.87 (SD: 12.13). The mean of hospital stay was 9.65 days (SD: 6.72); in the Reanimation area was 1.74 days (SD: 3.34). 10.87% of all the sample need invasive ventilation. A correlation was found between the increase in the score on the POSSUM scale and the prolongation of the hospital stay (p=0.006) and the stay in the Resuscitation area (p=0.026).

In addition, there is a clear correlation between the POSSUM score and the need for invasive ventilation, with a mean score of POSSUM of 34.13 (SD: 11.35) in those who did not receive invasive ventilation in the postoperative period, while it was 49.80 (SD: 9,52) in those who did require it (p=0.002).

On the other hand, there is a tendency to correlate the POSSUM score with mortality, although this does not become statistically significant (p=0.076). The mean score of POSSUM in those who died was 42.67 (SD: 10.21), while it was 32.60 (SD: 12.50). in those who did not.

Conclusion: It is observed that the POSSUM scale presents an important value as a predictive factor. Considering that, it is a scale which is calculated with data available to us in the common practice, we consider that it can be a useful tool when evaluating a patient. The routine calculation of this scale can allow us to adjust the management of patients, given its correlation with potential complications.

## 13AP02-1

# Enhanced Recovery After Surgery Protocol(ERAS) for elective colorectal surgery in the University Hospital of Guadalajara, Spain: a prospective cohort study

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Background and Goal of Study: The use of ERAS pathways has proven to reduce care time after colorectal surgery. The aim of this study is to evaluate the effectiveness of an ERAS program based on hospital length of stay (LOS), readmission rates and postoperative Clavien-Dindo complications

Materials and Methods:a total of 256 patients were included. We compared the first 121 consecutive patients that participated in the ERAS group (from May 2016 to January 2017) with 135 consecutive patients that were operated prior to the implementation of the ERAS (from January to December 2015). The inclusion criteria were: elective colorectal surgery, over 18 years old, appropriate cognitive state and ASA I-II-III. The exclusion criteria were: urgent surgery and existence of higher concomitant surgical processes. All variable data were descriptively analyzed via SPSS version 20.0. The results are presented as number of patients (%) or mean±standard deviation. Chi-square and Fisher exact test were applied for the study of categorical variables and the Student t test was used for normally distributed quantitative variables. Results were considered statistically significant when p value<0.05.

Results and Discussion: The two groups were homogeneous. No statistically significant differences were found in terms of age, sex, ASA, diagnosis, TNM stage in colorectal cancer, preoperative haemoglobin, length of surgery... The average compliance with the ERAS protocol was 74.3%. ERAS decreased LOS (9.8±3.7 vs 11±3.8, p 0.018), but not the 30-days readmission rates (12 (9.9%) vs 15 (11.11%), p 0.756) or the number of postoperative complications according to Clavien-Dindo

classification (38 (31.4%) vs 49 (36.3%), p 0.49) or the rate of reinterventions (9 (7.4%) vs 11 (8.1%), p 0.833). ERAS improved secondary variables in a statistically significant way: more laparoscopic surgery (45 (37.2%) vs 27 (20%), p 0.006); greater use of regional analgesia in the intraoperative period; more rapid adherence to ambulation, a faster onset of oral liquid diet and analgesia by mouth and lower requirements of opioids in the postoperative period.

**Conclusion**: ERAS program shortened LOS without increasing 30-days readmission rates. We need to increase patients' compliance to the protocol to improve our results in future studies.

## 13AP02-2

## A prehabilitation program included in an ERAS protocol for radical cystectomy

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**Background and Goal of Study**: Bladder cancer and its surgical treatment by radical cystectomy have a high morbidity and mortality. The goal of this study is to know if our prehabilitation program decreases the postoperative complications and hospital stay by optimizing the physical and mental conditions before the surgery.

Materials and Methods: A prospective cohort of patients included in the prehabilitation program (PREHAB, january 2015 – march 2017) was compared to an historical cohort receiving no prehabilitation (NO-PREHAB, January 2012 – December 2014), both of them following enhancing recovering protocols.

The program is based on physical therapy with aerobic and resistance exercises, respiratory exercises, nutritional supplementation according to the patient's condition and malnutrition risk (MUST toolkit) as well as cognitive therapy.

The discrete variables were described as frequency (percentage) and the continuous variables as a median (interquartile range), with Fisher's test (discrete) and Wilcoxon's (continuous). A p value <0.05 was considered statistically significant. Multivariate analysis was made for age, Charlson Comorbidity Index, prehabilitation, surgical approach, haemoglobin and bleeding during the surgery versus total complications and major complications (Clavien-Dindo >2, CD>2) at 30 days after surgery.

**Results and Discussion**: The sample included 141 patients, 101 in the historical cohort (NO-PREHAB) and 40 in the prospective cohort (PREHAB).

- Significant differences were found between the two groups according to:
   The surgical approach, with more laparoscopy approach in the PREHAB group
- (66.66% vs 14,89% NO-PREHAB; p<0.0001).
   The hospital stay: PREHAB 8 (9.2-11.5) vs NO-PREHAB 14 (9-25.25) (p=0.0006)
- Total complications: PREHAB 12 (40%) vs NO-PREHAB 75 (79,79%) (p<0.0001)
   Major complications CD>2: PREHAB 3 (10%) vs NO-PREHAB 44 (46,8%) (p<0.0001)

The multivariate analysis did not show correlation between major complications and laparoscopy [-0.144(-0.313,0.032); p=0.188]

**Conclusion**: This Prehabilitation Program improved the outcomes of patients undergoing radical cystectomy by reducing hospital stay and postoperative complications, specially major complications. More studies are needed to determine the influence of prehabilitation and laparoscopy on the outcomes of radical cystectomy.

## 13AP02-3

## Does the ERAS program reduce the metabolic stress in colorectal surgery? A comparative study

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Background and Goal of Study: Surgery represents a disruption of the homeostatic processes of the body. There are now many programs focused on clinical strategies that attenuate metabolic stress. In our hospital we are following the Enhanced Recovery After Surgery (ERAS) program in colorrectal surgery. The procedures that reduce metabolic stress included in the ERAS program are: Optimization of the preoperative period, Avoidance of perioperative fasting (by feeding patients with oral carbohydrates), Optimal postoperative nutritional care with early oral feeding in order to achieve anabolism, Fluid therapy strict control, Multimodal analgesia and control of nausea and vomiting. The aim of this study is to demonstrate a reduction of the metabolic response in colorectal surgery using the ERAS program in comparison with the cases recollected before the implementation of the program; using the glycemic control and the C-Reactive Protein(RCP) as predictors of metabolic stress

Materials and Methods: We compared the RCP values and the subtraction between postoperative and basal glycemia on the first, third and fifth postoperative days after colorrectal surgery between two groups: The prospective group (n=133, medium age 67.54±12.34, CR-POSSUM 16±0.71) were subjected to colorrectal surgery in 2017 (POST-ERAS). The retrospective group (n=37, medium age 65.8±13.88, CR-POSSUM 9.53±3.37), subjected to the same surgery before ERAS program. In order to compare the studied parameters we used the mean and standard deviation.

### Results and Discussion:

GLYCEMIA mg/dl	POST-ERAS	PRE-ERAS	REDUCTION
1st d -basal	13.2 ± 35	20.9 ± 44	-7.7
3rd d -basal	-5.2 ± 77	-2.8 ± 31	-2.4
5th d -basal	-10.3 ± 17	-3.7 ± 29	-6.6
CRP			
1st d	63.3 ± 41	87.3 ± 40	-24
3rd d	69.7 ± 53	93.4 ± 64	-23.7
5th d	$45.4 \pm 49$	72.1 ± 104	-26.7

In both situations we found a reduction on the level of the predictors we were studying.

**Conclusion:** A reduction of the metabolic stress response, as shown by the reduction of the studied parameters, was observed. These results may highlight the significant role of ERAS program in maintaining homeostasis.

## 13AP02-4

## Analysis of the development of acute kidney injury (AKI) after enhanced recovery surgery (ERAS) protocol

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Background and Goal of Study: Clinical trials have demonstrated a reduction in non-surgical complications following restrictive fluid therapy, and so ERAS programs recommend use of gold directed fluid therapy (GDFT) and restrictive fluid therapy. Its opponents suggest a possible predisposition to AKI development. The objective is to analyze AKI development in patients submitted to ERAS protocol in colorectal surgery in our center, and compare them an historic cohort who followed standard care before ERAS implantation.

Materials and Methods: We compared two groups:

- ERAS group (prospective): 167 patients between January and November 2017 submitted to ERAS protocol with restrictive fluid therapy: 3ml/kg/h in laparoscopy surgery and 5 ml/kg/h in open surgery. No maintenance fluid if tolerance is achieved. -Non-ERAS group (retrospective): 66 patients between July and October 2015 following standard care with liberal intraoperative fluid and maintenance fluid in postoperative. AKI is defined by the AKIN (Acute Kidney Injury Network) as an increase of ≥ 0.3 mg/dl in creatinine levels. We analysed the incidence of AKI on each period comparing baseline creatinine with 24h post-op creatinine. Then we analysed some risk factors for AKI development in both groups such as type of surgery, masculine sex, high blood pressure, DM, smoking status and the incidence of anemia.

Results and Discussion: In the retrospective group baseline creatinine was 0,95±0,23 and 16,4% patients developed AKI. In the ERAS group baseline creatinine was 0,84±0,25 and 7,4% patients developed AKI. In the retrospective group 63,6% were men, 54,5% had HBP, 9,1% DM, 18,2% were smokers, and 27,3% were anemic on surgery day. In the ERAS group 76,9% were men, 69,2% had HBP, 15,3% DM, 38,5% were smokers, and 30,2% developed AKI despite anemic pre-surgery treatment.

**Conclusion**: It seems that restrictive fluid therapy in an ERAS program is not related to an increase in post-op creatinine, and to AKI development.

## 13AP02-5

## Implantation results of an enhanced recovery after surgery (ERAS) colorectal programme in a tertiary hospital

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Background and Goal of Study: ERAS programs have been effective in reducing length of stay (LOS) and complications rate. We review how implementation of colorectal ERAS program in a tertiary hospital affects complications, LOS and mortality.

Materials and Methods: Two cohorts of patients operated on colorectal surgery (CRS) were studied: -A retrospective non-ERAS group: 66 patients (41 men/25 women) between June and December 2015. Average age was 65.8 ys (SD=13.88). -A prospective ERAS group: 165 patients (101 men/64 women) between January and November 2017. Average age was 67.54 ys (SD=12.34). We evaluate complications classified by Clavien-Dindo, LOS (aiming for discharge on day 5), readmission, and mortality.

### Results and Discussion:

scopic	logic	Rectal Sur- gery (%)	Clavien- Dindo I (%)	Cla- vien-Din- do II (%)	Cla- vien-Din- do III (%)	Cla- vien-Din- do IV (%)	Cla- vien-Din- do V (%)	mission
								(%)
S 59.09	81.8	27.3	66.7	55.5	21.2	10.6	1.5	13.6
	77.7	21.4	44	15.7	6.1	3.1	0.6	1.8
	scopic Surgery (%)	scopic logic Surgery Surgery (%) (%)	scopic logic Surgery (%) (%) (%) (%)	Scopic   logic   Sur- Claviering   Surgery   Surgery   G	Scopic   logic   Surgery   Surgery   Gw   Wilson   Wils	Scopic   Surgery   Surge	Scopic   logic Surgery   Surgery	Scopic   Surgery Surgery (%)   Surgery (%)

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Discharge on day 5 postoperatory was 13.6% and 49.4% in non-ERAS and ERAS group respectively.

LOS was 11.6±10.5 days and 9±6.7 days in non-ERAS and ERAS group respectively.

Conclusion: In ERAS group there is a trend of a reduction in complications (grade

I,II,III,IV,V) and LOS with more patients being discharge at day 5.

A lower percentage of patients were readmitted in ERAS group.

### 13AP02-6

## Do we decrease the frequency of paralytic ileus after colorectal surgery using an ERAS protocol?

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Goals: Enhanced recovery after surgery programs (ERAS) have managed to reduce the surgical aggression response, lowering morbidity, mortality and length of hospitalary stay. Postoperative paralytic ileus (PPI) is one of the complications associated which delays recovery and may prolong the stay. PPI is multifactorial and has several etiopathogenic mechanisms; ERAS protocol establishes a series of measures to reduce its frequency1. Our goal is to check if there is lower PPI frequency after ERAS' protocol measures application, compared to the standard cares, prior to its establishment. Our second goal is to analize if the decrease in the ileus frequency, as well as other complications, may shorten hospital stay.

Materials and Methods: We compared a retrospective NO ERAS group and a prospective ERAS group:

• ERAS: 165 patients between january and november 2017 under ERAS protocol, which consists of:

- Carbohydrate drinks the night before and 2h before surgery Preoperative use of analgesic coadjuvants
- Preferred laparoscopic approach
- Preferred laparoscopic approach
   IV lidocaine and magnesium sulphate.
- Restrictive fluid therapy regime 3-5ml/kg/h
- Limited use of drains and nasogastric tube.
- Multimodal analgesia: Thoracic epidural, regional blockades and NSAIDs .
- Restricted opiate use.

   Early oral tolerance.
- Early mobilization.
- Non-ÉRAS: 65 patients between july and october 2015, under standard leasurements.

**Results:** ERAS group's mean age was 67,54  $\pm$ 12.34 vs 65.8  $\pm$ 13.88 in non-ERAS group. Male sex 61% in ERAS group vs 62%. Laparoscopic approach 65% vs 58%, mean surgery duration 195,6 minutes  $\pm$ 76.12 vs 179 mins  $\pm$ 82 and postoperative opiates use 17% vs 43%. We found lower ileus frequency 16.88% vs 29.23%, mean hospitalary length of stay of 8.98 days  $\pm$ 7.04 vs 11.9  $\pm$ 10.9, mean lenght of stay reduction of 2.9 days in ERAS group compared to non-ERAS group.

Our goal was to discharge patient on the 5th post operatory day and we found in ERAS cohort 27.8% of the patients could be discharged on 5th post operatory day vs 9.1%.

Conclusions: ERAS protocol application seems to reduce PPI frequency and may

Conclusions: ERAS protocol application seems to reduce PPI frequency and may allow an early hospital discharge and a reduction in health spending.

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## 13AP02-7

## Multimodal opioid-sparing analgesia protocol in an eras program: our outcomes

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**Background and Goal of Study**: An ERAS program (Enhance Recovery After Surgery) is based on the decreasement of surgical damage what leads to a reduction of morbidity, mortality, complications, length of hospital stay and costs. It establishes a multimodal analgesia protocol for the perioperative pain control. The aim of our study is to analyze the enhancement of the colorectal surgical patient in an ERAS program.

Materials and Methods: We compare two groups: group A (N: 165) were submitted in ERAS program in 2017 and group B (N: 66): an historic group where colorectal surgery (CRS) was held without ERAS program in 2015. Group A followed a multimodal opioid-sparing analgesia protocol including: preoperative gabapentin 300 mg, intraoperative magnesium IV (30 mg/kg) and lidocaine IV (bolus 1,5mg/kg + continuous infusion 1mg/kg) and transversus abdominis plane (TAP) block. Group B analgesia was intraoperative opioids and NSAID without premedication. In laparotomies an epidural catheter was placed in both groups (except contraindication or impossibility). Medium age is 66.25±12.93 years in group A and 64.8±15.54 years in group B. Physiological and surgical CR-POSSUM are: 12.11±6.93, 8.74±1.82 in group A and 9.03±2.67, 7.44±0.86 in group B. Chronic opioids consumption is 6.2% in group A and 1.52% in group B. Length of surgery is 193.89±74.85 minutes in group A and 179.23±82.46 in group B.

Results and Discussion: Laparoscopic surgery is 65% in group A and 59% in group B. In group A the analgesia protocol compliance was above 90%. VAS score 12 hours after surgery and on the first, second and third postoperative days is: 1.60+-1.66, 2.56±2.31, 2.13±2.02, 1.68±1.74 in group A and 2.5±1.67, 2.5±1.36, 1.83±1.56, 0.94±1.39 in group B. Morphine consumption (mg) 12 hours after surgery and on the first, second and third postoperative days is: 1.94±3.92, 2.05±4.92, 1.40±4.1, 0.92±3.53 in group A and 16.13±15.09, 13.44±10.76, 11.13±14.06, 5.18±7.57 in group B. Nauseas and vomiting occur in 18% of the patients in group A and 36.4% in group B. lleus occurs in 14.69% of the patients in group A and 2.8% in group B. Length of hospital stay is 6.95±4.78 days in group A and 19.35±8.23 days in group B.

**Conclusion**: Multimodal analgesia is an useful protocol in perioperative pain management. It seems that opioid- sparing analgesia in an ERAS program decreases opioids consumption, side effects and the length of hospital stay.

## 13AP02-8

# Enhanced recovery after surgery (ERAS) colorectal programme in a tertiary hospital: better compliance, better results?

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Background and Goal of Study: ERAS protocol in colorectal surgery (CRS) reduces length of hospital stay (LOS) and complication rate. Despite of the evidence, their full implementation into daily practice meets certain difficulties. We review how adherence to the protocol (compliance) determines results in the implementation of the ERAS protocol in a tertiary hospital.

Materials and Methods: We examine a prospective cohort of patients operated on colorectal surgery (CRS) under ERAS program (based on international guidelines) between January and November 2017: 165 patients (101 men/64 women), (57 open surgery, 108 laparoscopic surgery). Average age was 67.54 ys (SD=12.34). We evaluate if setting progressively higher levels of compliance (%) has any repercussion in complications (defined by the Clavien-Dindo classification) and LOS (aiming for discharge on day 5). We analyse complications and LOS with compliance stablished in <70%. >70%.>80%.>90%.

Results and Discussion:

Com- pliance	Laparo- scopic Sur- gery (%)	Onco- logic Sur- gery (%)	Rectal Sur- gery (%)	Cla- vien-Din- do I (%)	Cla- vien-Din- do II (%)	Cla- vien-Din- do III (%)	Cla- vien-Din- do IV (%)	Cla- vien-Din- do V (%)	Read- mis- sion
<70%									(%)
(n= 11 )	9,1	54,5	54,5	63,6	45,5	18,2	18,2	0,0	0,0
>70%	69,4	79,9	29,2	42,9	13,6	5,1	1,9	0,6	1,9
(n=154 ) >80%									
(n= 127)	75,6	77,9	29,1	38,6	13,4	4,7	2,4	0,7	2,4
>90%	84,4	84,4	26,6	37,3	10,9	1,5	3,1	0,0	1,6
(n= 63)									
Dischar	ae on	day !	5 (%)	was 0.0	32 5	37.0 46	9 for co	mpliance	<70%

Discharge on day 5 (%) was 0,0; 32,5; 37,0; 46,9 for compliance <70%; >70%;>80%;>90% respectively.

LOS (days) was 16,8 $\pm$ 16,2; 8 $\pm$ 4,7; 7,3 $\pm$ 3,9; 6,2 $\pm$ 3,1; for compliance <70%; >70%;>80%;>90% respectively.

**Conclusion**: When compliance increases, there is a trend of a reduction in complications (grade I,II,III) and LOS with more patients being discharge at day 5. Grade IV complications slightly increase but were clearly higher with less than 70% of compliance.

### 13AP02-9

# Sustainability of an enhanced recovery after surgery program (ERAS) in liver surgery and its relation to postoperative outcomes

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Background and Goal of Study: Evidence based multimodal perioperative protocols have been implemented all around Europe in the last decades leading to a reduction of postoperative complications and improving length of stay. In our institution, an enhanced recovery after surgery (ERAS) protocol was implemented successfully in patients scheduled for liver resection between 2012 and 2014. Nevertheless, sustainability of change needs to be assessed after the implementation period. The aim of this study was to compare adherence to ERAS items, length of stay and complications rate in different periods: before, during and after implementation.

Materials and Methods: An ambispective observational study was design. Data from pre-implementation period (2006-2012) were retrospectively collected, data from Implementation period (2012-2014) were prospectively and post-implementation (2014-2016) data were collected retrospectively from a prospective clinical database. Variables analysed were: fourteen items from ERAS protocol, length of stay and postoperative complications type 2 in Dindo-Clavien classification. Differences between periods were checked using one-way ANOVA for continuous variables and Chi-square for categorical variables.

Results and Discussion: 238 patients scheduled for liver resection were analysed. Mean length of stay was 7.87 ± 3.24, 5.44 ± 2.66 and 6.16 ±3.19 (p<0.05) days for pre-, during and post-implementation periods respectively. Incidence of patients with type II Dindo-Clavien complications were 40%, 12.77% and 29.03% (p<0.05) respectively. Postoperative adherence to four ERAS items dropped significantly during post-implementation period but not as far as pre-implantation level. Particularly, carbohydrate loading 2 hours prior to surgery (0.78% vs 97.84% vs 75.41%), preventing hypothermia (21.05% vs 94.29% vs 62.3%), complete food resumption 72h after surgery (16.67% vs 92.59% vs 70.37%) and 48h postoperative deambulation (22.22% vs 85.29% vs 60%). Decrease of adherence to ERAS elements was related proportionally with increased postoperative complications and longer hospital stay.

**Conclusion**: Audit of protocol adherence is essential to maintain sustainability and clinical success as well as to detect points of improvement.

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## 13AP02-10

## A protocol for fast-track in radical cystectomy. Comparative study of morbidity and mortality after the implementation

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**Background and Goal of Study**: To compare results of the fast track protocol in radical cystectomy in our hospital, in terms of morbidity and mortality, with the patients involved radical cystectomy following the classic protocol

Materials and Methods:a prospective study of patients undergoing radical cystectomy in the HUMS, between January 2016 and October 2016:51 classical protocol, 48 fast track protocol. Variables concerning previous characteristics of patients, hospital stay and complications were collected and divided, precystectomy, pery-cystectomy and post-cystectomy, later performing the statistical analysis using SPSS.

Results and Discussion

	CLASSIC PROTOCOL	FAST-TRACK PROTOCOL	TOTAL
NO NUMBER	7	31	38
NO			
% PO COMPLICATIONS	18,4%	81,6%	100,0%

NO	13,7%	64,6%	38,4%
% BY PROTO- COL			
YES NUMBER	44	17	61
YES			
% PO COMPLI- CATIONS	72,1%	27,9%	100,0%
YES			
% BY PROTO- COL	86,3%	35,4%	61,6%
TOTAL NUMBER	51	48	99
%PO COMPLIC	51,5%	48,5%	100,0%
% BY PROTOCO	100,0%	100,0%	100,0%

**Conclusion:**The implementation of this type of protocols shows significant decrease in number of complications and hospital stay, improving the quality of life of patients, and reducing the costs.

It should take out of the results obtained, the existence of a trend towards significance, so that in the classical although there is greater number of complications, mostly minor, while in the fast-track protocol have fewer complications, but the percentage of major complications is higher than in the classic. This could be the object of study in further works with increased sample size

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## 13AP02-11

# Does the implementation of an Enhanced Recovery After Surgery program improve postoperative outcomes for patients undergoing radical cystectomy?

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Background and Goal of Study: Radical cystectomy (RC) for bladder cancer is associated with a high risk of postoperative complications. Enhanced Recovery After Surgery (ERAS) is a multimodal concept combining pre, intra and postoperative evidence-based care elements to reduce surgical stress. Our objective is to evaluate the results of the implementation of an ERAS protocol for RC, compared to a historical cohort of our hospital

Materials and Methods: A retrospective study of 399 consecutive patients who underwent open, laparoscopic or robotic RC from January 2012 to December 2017 (47 ERAS vs 352 historical). We assessed preoperative clinical and demographics characteristics, intraoperative events and postoperative complications, as well as length of hospital stay. To compare means and percentages we used Mann Whitney U test and Chi-square test, respectively. Statistical analysis was performed by SPSS software.

**Results and Discussion**: Patients following ERAS program had a statistically significant shorter hospital stay (9 and 12 days respectively, p 0.002). The ERAS group had a significant decrease in intraoperative bleeding (350ml vs 500ml, p 0.001) and transfusion rate (10.6% vs 38.9%, p 0.001). The need for total parenteral nutrition was lower in the ERAS group (21.3% vs 33.8%, p 0.12). No statistically significant differences in overall complication rate were found (57.4% vs 59.7%, p 0.886) nor in Clavien-Dindo > 2 complications. **Conclusion**: Implementation of an ERAS program in RC reduces the length of stay and decreases the need of blood transfusion and postoperative parenteral nutrition without increasing morbidity and mortality.

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### 13AP03-1

References

## The Effect of Insufflation Pressure in Major Robotic-Assisted Gynaecologic Surgery on Perioperative Pain and Respiratory Parameters

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**Objective**: To investigate whether decreased insufflation pressure during robotic-assisted gynaecologic surgery has an influence on intraoperative respiratory parameters and can be associated with decreased recovery time and patient reported pain score.

Methods: Retrospective cohort study of women undergoing benign gynaecologic robotic procedures at single University Hospital from March 2014 to August 2015. 301 consecutive patients were recruited in this study. The first 101 subjects were on operated at standard insufflation pressure of 15 mmHg, the following 100 patients at 12 mmHg and the final 100 patients at 10 mmHg. 15 mmHg insufflation pressure was obtained using conventional insufflation. 10 mmHg and 12 mmHg pressures were obtained using AirSeal system. Most respiratory parameters were collected at three points, T0 (after intubation and before insufflation initiation), T1 (5 min after induction of insufflation), T2 (at median insufflation time). We also collected data on duration of operative procedures, estimated blood loss, recovery time, and patient reported pain levels in post-operative anaesthesia unit (PACU). Continuous data were analyzed using one-way analysis of variance (ANOVA) test with Bonferroni correction. Categorical data were analyzed using chi-square test.

Results:There were no statistically significant differences in baseline characteristics between three comparison groups. Compared to 15 mmHg insufflation group at T2, patients in 10 mmHg insufflation group had lower PIP (mean, 31.1 vs 27.9 cmH2O, respectively, p <0.0001), Pplat (mean, 29.4 vs 26.6 mmHg, respectively, p = 0.0003), and TV (mean, 579.2 vs 526.9 ml, respectively, p <0.0001). In addition, compared to 15 mmHg insufflation group, patients in 12 mmHg insufflation group had lower EtCO2 (mean, 35.9 vs 34.1 mmHg, respectively, p = 0.001) at the end of insufflation. No significant differences were observed for PEEP and lung compliance between three comparison groups. Compared to 12 mmHg, 10 mmHg group had faster recovery period defined as entry to the PACU until discharge (467 vs 351 min, respectively, p<0.05), lower first reported pain score (5.4 vs. 4.4, respectively, p<0.02), and maximum reported pain score (7.0 vs. 5.4, respectively, p<0.001). Conclusion: Performing robotic gynaecologic surgery at lower insufflation pressure improves intraoperative respiratory parameters, leads to lower patient-reported pain

## 13AP03-2

scores and faster postoperative recovery time.

# Assessment of plasma lactate in patients monitored by transthoracic echocardiography undergoing major non-cardiac surgery. A randomized clinical trial

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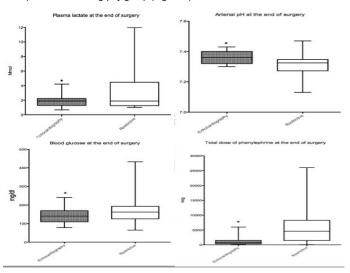
**Background and Goal of Study**:The intraoperative echocardiography have been using by the anesthesiologists as hemodynamic monitor in non-cardiac surgeries. The primary objective of this study is comparing plasma lactate levels in patients underwent a major non-cardiac surgery monitored by the transthoracic echocardiography (TTE).

Materials and Methods: After the release of the Ethics Committee and the Clinical Trials/FDA (NCT03103373), a prospective and randomized clinical trial between March 2017 to August 2017 was conducted in 64 patients divided in two groups: the restrictive fluid therapy group and the echocardiography group. Were included patients of both genders, aged between 18 and 80 years old, underwent major abdominal surgery. Patients from both groups were underwent general balanced anesthesia associated an epidural anesthesia. The TTE was used in the echocardiogram group according to the FATE protocol. Hemodynamic data, arterial lactate, arterial Ph and blood glucose were collected 10 minutes post-tracheal intubation before the surgery begining and in the end of surgery.

Results and Discussion: Were analyzed 27 patients in the echocardiography group and 26 patients in the restrictive fluid therapy group. There was no statistical difference between the groups regarding demographic data. When the groups were compared each other, there were no differences between the groups at the time 10 minutes post-tracheal intubation before the surgery beginning, however, when they were evaluated at the end of surgery, patients in the restrictive fluid therapy group

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presented high levels of lactate (p = 0.01), lower arterial Ph values (p = 0.003). higher values of blood glucose (p = 0.04) and greater use of phenylephrine (p = 0.006) than echocardiogrphy group (Figure 1).



Conclusion: We conclude from this prospective and randomized clinical trial that patients monitored by transthoracic echocardiography underwent major noncardiac surgery showed lower plasma lactate values at the end of surgery when were compared with patients in the restrictive fluid therapy group.

## 13AP03-3

## Demographic predictors of free flap damage: should we care about the body mass index?

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Background: Microvascular free flap surgery is the main technique to head and neck cancer reconstruction, improving survival and functional outcomes. Anaesthesiologists have a central role as perioperative physicians to these patients. However, free flap losses still occur at rates between 1-5%.12 Some risk factors are known to contribute to this outcome. We aimed to identify predictors of flap damage. Materials and Methods: We conducted a retrospective case-control study of patients submitted to head and neck free flap surgery from 01.2015-04.2017 at Instituto Português de Oncologia de Lisboa Francisco Gentil. The primary endpoint was flap damage - a composite of flap loss wound infection and 30-day reintervention. Statistical analysis used SPSS 23, IBM. a=0,05 was assumed to be statistical significant.

Results and Discussion:Our study enrolled 87 patients. A detailed data collection was made. Flap damage was present in 18,6% (n=16) and flap loss in 2,3% patients (n=2). These results are comparable to other series3. When comparing patients with and without flap damage, Body Mass Index (BMI) was significantly different. Patients with flap damage had a median BMI of 20,56 [IQ 25-75: 18,37-22,38] which compared to 22,03 [IQ: 25-75: 20,13-25,15] in patients without flap damage. A ROC curve was analysed and BMI had a significant discriminatory power for predicting flap damage (AUC 0,67 CI:0,54-0,81). With a cut-off BMI value of 21, lower BMI patients were at significantly increased risk for flap damage (OR 3,96; CI: 1,24-12,69). The burden of poor nutritional status is associated to postoperative infection rate, immune function and tissue healing,2 all of which contribute to flap damage. BMI should be considered during patient selection. Attempts should be made to optimize patients from a nutritional point of view during the perioperative period. Rehabilitation before cancer surgery as well as embracing the patient since the surgical decision until the postoperative period may be the future to better outcomes. Conclusion: A lower BMI was associated to flap damage. Nutritional status should be promptly assessed and optimized during the perioperative period. Our study could be a background for further work, ultimately to improve patient care References:

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### 13AP03-4

## Perioperative management and outcome of patients with undiagnosed coagulation disorders

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Background and Goal of Study: One of the main objectives of the preanesthesic evaluation is assessing the bleeding risk preoperatively. However, appropriate methods for ascertaining this risk remain subject to debate. A detailed history of bleeding and routine coagulation testing are used as a predictor for perioperative bleeding. The aim of our study is to describe the perioperative findings, management and outcome of patients with suspected coagulation disorders.

Materials and Methods: Fifty-one patients were enrolled in this study. Medical history, physical examination and standard laboratory testing (APTT, PT/INR, platelet count) was performed to all patients. In addition special coagulation tests were requested and specific treatment was administrated if needed. There is a minimum follow-up on all patients of at least 3 months.

Results and Discussion: Fifty-one ASA I - III patients evaluated in the preoperative program of Infanta Elena Hospital from September 2015 to September 2017, showed medical history v/or laboratory findings abnormalities: 10 patients (20%) referred bleeding history and 51 (100%) manifested abnormal coagulation tests. Fifty patients (98%) underwent specific tests and 29 (57%) patients were diagnosed with coagulation disorder: factor VII deficiency (6 patients), factor VIII deficiency (2 patients), Von Willebrand disease (4 patients), factor XI deficiency (2 patients) thrombocytopenia (3 patients), lupus anticoagulant (9 patients), coagulation altered for different reasons (3 patients). Twenty patients (39%) received treatment: Vitamin K preoperatively (8 patients), Tranexamic acid (4 patients), Desmopressin (3 patients) oral corticosteroids (2 patients) recombinant factor VII (1 patient), fresh frozen plasma (1 patient), platelet pools (1 patient). All patients with positive lupic anticoagulant had standard antithrombotic prophylaxis with low molecular weight heparin. Forty-eight patients (96%) underwent surgical intervention and only 5 (10%) presented adverse events during the follow up.

Conclusion: Detection of coagulation disorders is crucial during the preoperative evaluation. Adequate treatment of important alterations ensures good outcome of potential life threatening or seriously disabling complications.

AcknowledgementS: Assistance provided by Information Technology and Haematology Departments of Infanta Elena Hospital was greatly appreciated

## 13AP03-5

## Perioperative considerations in a patient with haemophilia A: a case report

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Background: Haemophilia A is an X-linked recessive hereditary disorder that compromises individual's coagulation.1 In those, haemostasis depends on vascular and extrinsic mechanisms. As a result, excessive bleeding, especially from larger vessels, becomes a serious and unlikely outcome. Moreover, delayed bleeding after an early period of apparent haemostasis is not uncommon.<sup>1,2</sup>

Anaesthetic management of Haemophilia A represents a challenging task along all the perioperative period.

Case Report: 35-year-old haemophilic male patient, was admitted for elective pilonidal cyst surgery. Past history revealed acute subdural haemorrhage with a history of joint swelling 5 years ago, for which he was operated and received Factor VIII (FVIII). At first, spinal anaesthesia was considered, but assessment of patient's risk, along with his refusal, led our choice to a mild sedation, with Midazolam and Propofol Blood tests to assess coagulation status FVIII and FVIII inhibitors were required to evaluate the risk of bleeding. Epsilon-aminocaproic acid was initiated at eve. Intranasal desmopressin was administered 30 minutes before admission to the operating room and repeatedly post-surgery. Concerns with pads at the extremities and pressure points, hypothermia and maintenance of hemodynamic conditions near normal were attended. Paracetamol and Tramadol were used for intra and post-operative analgesia. The surgery went uneventful. The patient stood for 2 hours at recovery room and was discharged on 2<sup>nd</sup> postop day and followed up 1 week later for FVIII level.

Discussion: Approaching haemophilic patients requires accurate history taking, careful physical examination, and coordination between medical teams to plan bleeding prophylaxis. Also, the anaesthetic perioperative strategy must attend controlled blood losses with patient's welfare.

- References Blackwell Publishing in Haemophilia. Guidelines for the Management of Haemophilia. 2012. Canada.
- 2. Jitendra U, Narayanan M, Smith J. Anaesthetic considerations in patients with inherited disorders of coagulation. Continuing Education in Anaesthesia, Critical Care & Pain. 2015; 15(1): 26-1.

Learning points: Haemophilia is challenging for the anaesthetic team. Planning is important, even for minor procedures, to avoid complications and achieve positive outcomes. There are no specific guidelines about which anaesthetic technique is more suitable. Risk-benefit assessment is done on an individual basis

## 13AP03-6

## Perioperative anaesthethic management of patients undergoing isolated lower limb perfusion

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Background and Goal of Study: The hyperthermic isolated limb perfusion (HILP) main indication is melanoma metastases of the limb. The isolated limb is exposed to high dosage of citotoxic agents. The intraoperative management of these patients is a challenge to the anaesthesiologist and it is not clearly established in the literature yet. The objective of this study is to describe our anesthetic practice.

Materials and Methods: Descriptive retrospective study, data collected from clinical records of all patients submitted to lower limb HILP between January 2015 and November 2017. Variables analyzed: demographic characteristics, anesthetic technique, advanced hemodynamic monitoring, chemotherapy, perioperative fluid imbalance, intraoperative vasopressor needs; mean surgery duration, type of postoperative vigilance, mean internment duration. Descriptive analysis: Microsoft

Results and Discussion: We evaluated 40 patients. Mean age: 70 years old, 78% females, 53% ASA II and 47% ASA III. Balanced general anaesthesia (BGA) was chosen in 80% of the patients and Combined anaesthesia (BGA + Quadratus lumborum type 1 block) in 20%. Anaesthesia maintenance with sevoflurane or desflurane (50/50%), and fentanyl according to patient needs (mean dose: 325 ug). Chemotherapy: Melphalan and TNF-α association in 88% of the patients, and Melphalan alone in 12%. Hemodynamic monitoring: invasive arterial pressure in all patients, VIGILEO in 58% and Central venous pressure in 38%. Crystalloids mean: 3240ml. Colloids used in 7 patients (mean 500ml). Urinary output: 772ml. Intraoperative mean blood loss: 1134ml. Blood transfusion required in all but one patient, mean erythrocyte units transfunded: 3. Intraoperative vasopressors needs: in 38% of the patients (Ephedrine 28%, Phenylephrine 8%, Dopamine 2%). Surgery mean duration: 383 minutes. Post operative vigilance: 10% intermediate care unit and 90% intensive care unit. Internment mean duration: 16 days.

Conclusion: HILP is a complex surgery, which demands team work between anaesthetists, surgeon, nurses and perfusionist in order to prevent complications associated to this procedure. Fluid exchange and cytokine release are associated with important hemodynamic variations, which makes hemodynamic monitoring a primary concern in the anesthetic management of these patients.

1 . BMC Anesthesiology 2013, 13:15

## 13AP03-7

## Pulse Pressure Variation Monitoring using a New **Smartphone Application: A Clinical Decision Making Study** In Patients Undergoing Major Abdominal Surgery

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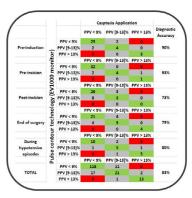
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Background and Goal of Study: PPV can be used to assess fluid responsiveness. However, as this variable is not routinely displayed on patient monitors, their determination usually requires a dedicated costly advanced monitoring system. Recently, a new smartphone application, Capstesia™, which automatically calculates PPV from a digital picture of the invasive arterial pressure waveform from any monitor screen, has been developed. Last year, our group demonstrated that PPV calculated using the Capstesia(PPVcap) was a valid substitute for PPV calculated manually.(1) As a next logical step, we aimed to investigate the value of PPVcap with regard to clinical decision making in patients undergoing abdominal surgery using PPV from a pulse contour analysis (PPVpc) as the reference (EV1000 monitor). Therefore, we classified PPVcap and PPVpc into three different categories reflecting PPV thresholds used for the decision to administer fluids in clinical practice(2): no fluid (PPV<9%); gray zone wherein value of PPV does not always accurately reflects the decision-making process (PPV9-13%),and fluid bolus (PPV>13%).

Materials and Methods: 40 patients undergoing major abdominal surgery with a radial catheter connected to the EV1000 monitor(Edwards Lifesciences, Irvine, USA) have been studied. Measurements were done at 5 time points: post-induction, pre-incision, post-incision, end of surgery and during every hypotensive episodes (MAP<65 mmHg). For each time point, we took 3pictures of the screen displaying the arterial waveform with the Capstesia™ to create 3PPVcap raw values Simultaneously, we recorded the corresponding 3PPV values from the EV1000

Results and Discussion: Diagnostic accuracy of PPVcap with regard to PPVpc





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Of note, at no time point PPVcap and PPVpc would have resulted in a diametrically opposed clinical decision regarding fluid administration

Conclusion: The use of the capstesia to provide PPV leads to similar decision making regarding fluid administration compared to a pulse contour technology.

1. Desebbe et al. A&A 2016 (2) Cannesson et al. Anesthesiology 2011

## 13AP03-8

## Restrictive or individualized goal-directed fluid replacement strategy in ovarian cancer cytoreductive surgery (RIGoROCS) - A prospective randomized controlled trial: An interim analysis

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Background and Goal of Study: Massive fluid shifts occur during ovarian cancer (OC) cytoreductive surgery (CRS) (both primary debulking surgery or PDS & interval debulking or IDS), which is associated with increased morbidity. Goaldirected therapy (GDT) for intra-operative fluid (IOF) has been widely studied in other abdominal surgeries, but not in OC.

Goal of study: To test the hypothesis that intra-operative SVV-guided fluid optimization during OC CRS reduces the postoperative length of hospital stay (LOS), morbidity and cost of treatment.

Materials and Methods: Prospective randomized controlled trial. Study population: OC patients undergoing debulking surgery since June 2016. Sample size: Control (Restrictive)=44, GDT=44. Pre-randomization stratification was done for PDS and IDS. Primary outcome measure was LOS & secondary outcome measures were postoperative morbidity and cost.

Results and Discussion: As per protocol interim analysis was conducted in June 2017, {N= 42 (PDS 26, IDS 16) C=22, G=20}. Median IOF administration was 5780 ml in control vs. 5880 ml in GDT). Median LOS in GDT group was 7 days vs. 8.5 days in control group. Median POMS on 3rd postoperative day was 3 in both groups. Mean cost of treatment in GDT group 3.48 lakhs vs. 4.55 lakhs in control group. 30-day morbidity (Clavien-Dindo grade 3-5 complication) was present in 3/22 (13.6%) in control group and 1/20 (5%) in the treatment group.

Conclusion: GDT might give better guidance to replace IOF loss and maintain tissue perfusion in OC CRS. Completion of the study recruitment by March 2018 and final data analysis is expected by the time of presentation.

Acknowledgements: Edwards Lifesciences

## 13AP03-9

## The effect of tranexamic acid administration on perioperative bleeding in patients undergoing spine

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Background and Goal of Study: Tranexamic acid (TXA) has been used to reduce perioperative bleeding in various surgery because of its antifibrinolytic effect 1,2. Recently the patients undergoing orthopedic surgery in our hospital received a loading dose of TXA (1000 mg) before surgery followed by 100 mg/hour until the end of surgery. The purpose of this study is to evaluate the efficacy of TXA administration on the perioperative blood loss in patients undergoing spine surgery. Materials and Methods: A retrospective review was conducted for the records in patients who underwent surgery without TXA administration (control group, from 1 January 2015 to 31 December 2015) and patients who underwent surgery with TXA administration (TXA group, from 1 July 2016 to 30 June 2017). The following data were collected: amount of intraoperative blood loss, intraoperative infusion

volume, intraoperative blood transfusion volume, perioperative blood transfusion volume, the changes of hemoglobin concentrations ( $\Delta Hb=Hb$  before surgery – 4 POD Hb), and estimated blood loss. Data (median (range)) were analyzed using Mann-Whitney U test, and results were considered statistically significant at p<0.05. **Results and Discussion**: A total of 185 patients were included during the study period; 98 patients for the control group and 87 patients for the TXA group. The demographic data were similar between the two groups.  $\Delta Hb$  and estimated blood loss were significantly reduced in the TXA group, although there were no significant differences in the volume of intraoperative blood loss, transfusion, infusion and perioperative transfusion (Table).

	Intraoperative blood loss (ml)	Intraoperative transfusion (ml)	Intraoperative infusion (ml)	Perioperative transfusion (ml)	ΔHb (g/dl)	Estimated blood loss (ml)
Control group	173	0	1800	0	2.1	643
	(75-562)	(0-250)	(1250-2678)	(0-560)	(1.1-3.1)	(333-934)
TV A	243	0	1650	0	1.5	450
TXA group	(99-450)	(0-50)	(1250-2200)	(0-560)	(0.7-2.4)*	(238-748)*

\*P<0.05 vs control group

**Conclusion**: Administration of TXA (a loading dose of 1000 mg and continuous infusion 100 mg/hour) reduced the perioperative blood loss. These results indicated that TXA administration is useful for reducing the perioperative blood loss in patients undergoing spine surgery.

### References

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## 13AP03-10

# The effect of tranexamic acid administration on perioperative bleeding in patients undergoing knee or hip arthroplasty

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Background and Goal of Study: Tranexamic acid (TXA) has been used to reduce perioperative bleeding in various surgery because of its antifibrinolytic effect. Recently, the patients undergoing orthopedic surgery in our hospital received a loading dose of TXA (1000 mg) before surgery followed by 100 mg/ hour until the end of surgery. The purpose of this study is to evaluate the efficacy of TXA administration on the perioperative blood loss in patients undergoing knee arthroplasty or hip arthroplasty.

Materials and Methods: A retrospective review was conducted for the records in patients who underwent surgery without TXA administration (control group, from 1 January 2015 to 31 December 2015) and patients who underwent surgery with TXA administration (TXA group, from 1 July 2016 to 30 June 2017). The following data were collected; amount of intraoperative blood loss, intraoperative infusion volume, intraoperative blood transfusion volume, postoperative blood transfusion volume, the changes of hemoglobin concentrations (ΔHb = Hb before surgery –2POD Hb;), and estimated blood loss. Data (mean ± SD) were analyzed using t test and Mann Whitney U test, and results were considered statistically significant at p<0.05.

**Results**: A total of 135 patients were included during the study period; 63 patients for the control group and 72 patients for the TXA group. The demographic data were similar between the two groups. The intraoperative infusion, the postoperative transfusion, ΔHb, and estimated blood loss were significantly reduced in the TXA group, although there were no significant differences in the volumes of intraoperative transfusion and blood loss (Table).

## \*P<0.05 vs control group

	Intraoperative blood loss (ml)	Intraoperative transfusion (ml)		Postoperative transfusion (ml)	AHb (g/dl)	Estimated blood loss (ml)
Control group	438 ± 414	213 ± 292	$1880 \pm 852$	122 ± 179	$2.8 \pm 1.3$	1873 ± 1081
TXA group	$434 \pm 574$	$156 \pm 293$	1400 ± 801*	62 ± 117*	$2.1\pm1.1*$	1400 ± 990*

**Conclusion**: Administration of TXA (a loading dose of 1000 mg and continuous infusion 100 mg/hour) reduced the postoperative transfusion and the perioperative blood loss. These results indicated that TXA administration is useful for reducing the perioperative blood loss in patients undergoing knee or hip arthroplasty.

### 13AP03-11

The critical incidents during major abdominal surgery in elderly and older patients: role preoperative level of wakefulness

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**Background and Goal of Study**: To determine frequency of critical incidents depending on initial level of wakefulness and patient age.

Materials and Methods: Retrospective study of 368 patients ufter elective abdominal surgery for colon tumours were performed. The physical condition of patients corresponded to 3 class of ASA. Patients were divided into two groups: 1-elderly (n=224), 2- older patients (n=144). Each group was divided into 3 subgroups, depending on level of wakefulness, estimated by the direct current potential level: low, average and high levels of wakefulness. The measurement was conducted in a continuous recording for 10 minutes from the active electrode located in the middle of the forehead, and the reference electrode - in the tenor region. Relations of age and level of wakefulness with a frequency of critical incidents were studied. Critical incidents included cardiovascular-related: hypotension, hypertension, bradycardia, arrhythmia and tachycardia; respiratory incidents: hypoxemia, hypercapnia, the need for prolonged postoperative mechanical ventilation; metabolic incidents: hypothermia, slow recovery of neuromuscular conduction, slow postoperative awakening.

Results and Discussion: The most frequent critical incidents in our study were cardiovascular-related incidents (38%), mainly hypotension (18,2%) and hypertension (9%). Among of the respiratory incidents (32%) the most frequently hypoxia (21%) and hypercapnia (8%) were observed. In the group of elderly patients the most incidents occurred in the subgroup with low level of wakefulness (68% of all), with cardiovascular-related - 49%; respiratory - 34%. The lowest rate of critical incidents was at average level of wakefulness (22%), with cardiovascular-related - 14%, respiratory - 8%. While in the group of oldest patients statistically significant differences between the groups were not observed.

**Conclusion**: Critical incident rate does not only depends on age but also on the preoperative level of wakefulness. And the highest rate of critical incidents was observed at the low level of wakefulness, and the lowest - at average level of wakefulness.

### Pafarancas

1. Zabolotskikh IB. et al. European Journal of Anaesthesiology 2015; 32(53): 260.

## 13AP04-1

## The role of direct current potential in energy metabolism assessment

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Background and Goal of Study: Correction of metabolic disorders is an obligatory component of treatment majority of the pathological processes, allowing to avoid deterioration of a condition of the patient and accordingly to reduce time of stay in the hospital. The goal - to develop a mode of non-invasive, informative and accessible in practical application the express-test of energy metabolism pattern.

accessible in practical application the express-test of energy metabolism pattern. **Materials and Methods**: The study was performed on 201 patients underwent abdominal surgery (duration 6-9 hours). Were assessed: central hemodynamics, gas exchange, temperature and nutrition state for the nutrition support. The nutritional support has based on monitored nutritional status. Depending on energy metabolism pattern defined by biochemical tests, patients were divided on 4 groups: group 1 - enzymic energy metabolism pattern, group 2 - hypoxic energy metabolism pattern, group 3 – substrate energy metabolism pattern, group 4 included the patients with hypermetabolic energy metabolism pattern. The concurrent registration of direct-current potential (DCP) and number of superslow oscillations (SSO) was made in a forehead-palm lead.

Results and Discussion: The enzymic energy metabolism pattern correspond with zero to 3 SSO and DCP value more than -10 mV; the hypoxic energy metabolism pattern correspond with more than 10 SSO and DCP value more than -15 mV; the substrate energy metabolism pattern correspond with more than 10 SSO and "average" DCP value of -15 to -35 mV; the hypermetabolic energy metabolism pattern correspond with more than 18 SSO and DCP value less than -35 mV; optimal (normal) energy metabolism pattern correspond with 4 to 9 SSO and DCP value of -15 to -35 mV

**Conclusion**: The DCP monitoring allows to determine the kind of energy metabolism pattern on the basis of number of superslow oscillations of direct current potential during ten minutes and background values of direct-current potential.

## 13AP03-12

## Usual suspect: Myocardial injury and infarction after noncardiac surgery

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**Background:** It is observed that postoperative 30day mortality is increased due to symptomatic and silent myocardial injuries, and this risk continues in the longterm, as well. The aim of this study is to investigate the preoperative risk factors and postoperative outcome in terms of myocardial ischemia(MI)in patients over the age of 45,who had undergone urological surgery.

Materials and Methods: The files of≥45year 809 patients who underwent surgery were reviewed. Preoperative co-morbidities of patients, perioperative MI were recorded. Postoperative Hs-troponinT (HsTrT) information was obtained. The patient was called to investigate 1year mortality and cardiac event.

Results and Discussion: A total of 809 urological surgical patients were performed within 1year period. Male were 81.7%, mean age 63±9,7. Outpatient anesthesia was applied 86.4%. There was no significant relationship between the type of anesthesia and MI and high HsTrT(p=0.534,p=307). HsTrT was performed in 69(8.5%) patients and was found to be high in 33.3%. Although 225 patients had preoperative coronary disease, HsTrT was studied in only 34 patients among them.MI was observed in 41(5.1%) patients at postoperative 1year. The MI ratio was 8.7% in patients aged≥ 65 years(p=0.009). When 41 MI patients were identified.9 were checked in terms of HsTrT and 7of them had high HsTrT. Among 41 patients.26(%63.4) patients had preoperative coronary disease(p<0.001). The 1year mortality rate was 1.23% (n=10). Postoperative troponin was found to be high in 22% of patients who had MI(p=0.04). Determination of undetected myocardial injury in the postoperative period is a actuel issue. In this study, although there is no evidence of increased troponin in all patients, obvious cardiac events are suspected to be perioperative myocardial ischemia. Despite many patients have risk factors, and even 225 patients have preoperative coronary artery disease, it is very worrisome that troponin is not studied in the postoperative period. Of 41 patients with MI.9 of which had troponin was seen, and this is showed us we missed a large part of iceberg. 1-year mortality due to MI was 1.23%(n=10). Also it was noted that only 1 of the patients had troponin value, 9 of the patients was not examine troponin. Conclusion: This study showed that, we are incapable of detecting perioperative silent and obvious myocardial damage. In light of this, preoperative patient evaluation and postoperative cardiac follow-up should be more careful and rigorous.

## 13AP04-2

## Develop a validated anaesthesia quality assessment to evaluate patients postoperatively

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**Background and Goal of Study**: Patient satisfaction becomes a crucial factor to determine the quality of care particularly in anaesthesia procedure.

Materials and Methods: After Siriraj IRB approval (Si 790/2016), the study was registered via ClinicalTrials.gov (NCT 0307996). The Siriraj Anaesthesia Quality Assessment Questionnaire was developed and validated under the conceptual/ theoretical framework of Maslow's hierarchy of needs, Hospital Consumer Assessment of Healthcare Providers and System, Patient Satisfaction Questionnaire, Service Quality Questionnaire and Quality of Recover after Anaesthesia. A total of 476 qualified responses with obtained consent were included in the study to verify the appropriateness of the tool.

**Results and Discussion**: There were 397 qualified patients (83.4%), aged 47.6  $\pm$  16.6 years, representing all anaesthesia services and procedures, accomplished the questionnaires. Significantly, a stepwise binary logistic regression revealed the predicted variables were Process of care (4.39  $\pm$  0.51) and Physical support (4.35  $\pm$  0.66) (Table 1). These compared to a sequence of Accessibility and convenience (4.33  $\pm$  0.56), Communication and information (4.00  $\pm$  0.70), Technical quality (4.46  $\pm$  0.45) Psychological support (4.57  $\pm$  0.65) and Loyalty (4.52  $\pm$  0.68) in anaesthesia quality assessment.

 Table 1 Significantly, a stepwise binary logistic regression revealed the predicted variables were process of care (PC) and physical support (PHY).

		Frequency	Percent
	0	17	4.3
Valid	1	379	95.5
	Total	469	98.7
Missing	System	16	0.2
Total		397	100.0

		Sig.	OR	95% CI for CRS	
			_	Lower	Upper
Step 2 <sup>b</sup>	PC_mean	.006	3.139	1.393	7.074
	PHY_mean	.017	2.457	1.176	5.136

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0 = unfavorable scores; 1 = favorable scores \* p < .05 statistical significance

Conclusion: The appropriateness of a developed, well-validated 40-item Si-2-AQ was applied to 397 patients' perspectives on anaesthesia care service. Process of care and Physical support appeared to be the significantly valued features, whereas Communication and information, Accessibility and convenience, Technical quality and Psychological support were the weak points in anaesthesia quality assessment.

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### 13AP04-3

## Development of an IT application to support process automation in the preoperative assessment oriented to surgical patient prehabilization

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Background and Goal of the Study: Recent focus on perioperative medicine has been given to assessing personal risks, such as frailty and optimizing plans through tailored prehabilitation programs and enhance recovery surgery. Developments based on information technologies (IT) could lead the wayer approach preoperative care. We aimed to create a new software application based on structured and non-structured information to achieve, as primary goals: a) Enable easy and structured risk stratification and determination of frailty in relevant patients, b) Develop perioperative care bundles and prehabilitation programs, c) Enhance adherence to guidelines, d) Avoid unnecessary surgical delays due to human errors in perioperative management of drugs or medical conditions and e) Improve quality of our anaesthesia visit.

Materials and Methods: A multidisciplinary team of anaesthesiologists, nurses and engineers reviewed current literature to comply with perioperative requirements and identify main clinical categories and subsequent risk items. A traffic light alert system and algorithms to personal perioperative recommendations were designed. The team embedded several risk scores, updated guidelines and an automatic clinical system to collect vital sings and clinical data.

Results and Discussion: The result was an IT support system which enhanced preoperative visit. It improved communication between the patient and the involved clinicians, assuring less interpersonal variation and better compliance of local protocols and prehabilitation programs, mainly achieved by a better identification of risky patients. Automatic algorithms reduced human errors and time visit, improving quality of the process. The support system proved capable of achieving our primary goals, and of being positively accepted by our team.

Conclusion: Nowadays, artificial intelligence is present in the day to day of people so implementing it in the medical field is a necessity. The designed preoperative application processes structured and non-structured information to accomplish an intelligent preanesthetic assessment. Also, there is a need for more multidisciplinary teams including biomedical engineers, who work together with physicians to give a new approach to medical issues by IT solutions. In summary, the application provided a personalized evaluation, was cornerstone for the prehabilitation program and resulted in an enhancement on quality in our preanestesia visit.

## 13AP04-4

## Double trouble: Lown-Ganong-Levine and long QT syndromes

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**Background**: Lown-Ganong-Levine (LGL) is a rare pre-excitation syndrome associated with a normal QRS and supraventricular tachycardias. Long QT syndrome (LQT) is characterized by prolongation of ventricular repolarization, making Torsades de Pointes more likely. Both syndromes bear a risk of perioperative arrhythmias, with the former potentially increasing the risk of the latter. Besides antiarrhythmics and common anaesthetic drugs might prolong QT. Given the lack of evidence on its management, we report a case of LGL and LQT.

Case Report: A 48yo female, presenting for Warthin tumour surgery, had recurrent palpitations, erroneously attributed to anxiety. ECG revealed sinus rhythm, PR 0.1s, QRS 0.1s with normal morphology, QTc 0.46s - LGL and LQT diagnosis was proposed. She was taking no medication, had no relevant family history, cardiac and metabolic workup was unremarkable. The patient was premedicated with midazolam. She underwent parotidectomy under propofol and remifentanil target-controlled infusions. No arrhythmias were documented intraoperatively. Dexamethasone was chosen for nausea prophylaxis and a cervical superficial plexus block was performed to avoid pain, opioids rescue along with antiemetic drugs known to prolong QT. Postoperative analgesia was supplemented with paracetamol

**Discussion**: Considering the scarcity of LGL cases¹ and conflicting data on LQT, we tried to identify the most innocuous agents. First, although not all drugs prolonging QT are arrhythmogenic, propofol was preferred over inhalational agents avoiding further prolongation; besides propofol is safe in WPW. Second, sympathetic stimulation was avoided because, despite its controversial role in acquired QTL, it promotes impulse generation, which accessory pathways can propagate better than AV node.

As overlapping diagnosis complicates the treatment of arrhythmias, some principles must be followed<sup>2</sup>: beta blockers maintained; magnesium sulphate and defibrillator available; 5-lead ECG, consider invasive arterial pressure; maintenance of normocarbia, thermia and volemia; electrolyte and acid-base disturbances promptly corrected; adequate anxiolysis, anaesthetic depth and analgesia.

References:

1. Anesthesiology. 2005 Jan;102(1):204-10.

2. Br J Anaesth. 2012 May;108(5):730-44.

**Learning points**: Appropriate selection of anaesthetic drugs and avoidance of arrhythmogenic triggers ensure an uneventful perioperative course. Total intravenous anaesthesia is safe in patients with LGL and LQT

## 13AP04-6

Evaluation of the perioperative anaesthetic management for patients undergoing cytoreductive surgery (CRS) with hyperthermic intraoperative peritoneal chemotherapy (HIPEC) at St Mary's Hospital, Imperial College Healthcare NHS Trust

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Introduction: Peritoneal surface malignancies caused by either primary peritoneal cancers, peritoneal carcinomatosis or pseudomyxoma peritone cause advanced cancers associated with a very poor prognosis and quality of life. Since the 1980s, CRS with HIPEC has made significant progress in treating advanced peritoneal malignancies. The surgery involves peritonectomies of macroscopic tumours followed by flushing the peritoneal cavity with warmed chemotherapy agents. Results show significant survival benefits.

These patients are a challenging anaesthetic with profound surgical stress occurring perioperatively. Therefore, preoperative optimization, careful perioperative management and post-operative care in a level two or three environment is crucial in reducing morbidity and mortality. Evaluating the new service provided at St Mary's is crucial to improving patient outcome long term.

**Method:** Fifteen surgeries have been performed between July 2016 and October 2017. We evaluated various factors with emphasis on pain management, which is vital for patient comfort and optimal pulmonary function post operatively. Our current method includes a thoracic epidural as well as an intraoperative lidocaine and ketamine infusion.

The post-operative pain data was collected from our online patient database and epidural audit forms, which include pain scores classified as mild, moderate or severe

Results: Of the fifteen surgeries performed, 60% were male and the ages ranged from 28 to 72 years. Patients were either ASA two or three. The causes of the peritoneal malignancies include colorectal and ovarian cancer. All patients had an epidural, lidocaine infusion and all but one received a ketamine infusion. 53% of patients reported mild or no pain day one and two post operatively. Our data also showed seven patients received an iron transfusion preoperatively and none had a blood transfusion during surgery. Only three patients required level 3 care and on average our patients are being discharged by day 12.

Conclusion: The anaesthetic management of these patients is crucial to reduce morbidity and mortality. We aim to reduce this number further and therefore have started to provide all patients with a PCA in addition to their epidural. As well an adjunct to pain management IV lidocaine infusion has been suggested to reduce the risk of tumour recurrence. Follow up these complex patients is essential to reduce the morbidity associated with the operation.

## 13AP04-7

## HbA1c lowering before surgery in poorly controlled diabetes mellitus; a pilot study

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Background and Goal of Study: The incidence of diabetes mellitus type 2 (DM2) is increasing worldwide into epidemic proportions, which is reflected in the patient population undergoing surgery. Preoperative HbA1c values are related to the risk of postoperative complications and mortality in cardiac, as well as non-cardiac surgery. Measuring HbA1c before surgery reflects the glucose control in the preceding 3 months. Although lowering HbA1c, in poorly controlled diabetic patients, is being advised, an effect of lower HbA1c on lowering postoperative complications has not been studied. In this pilot study we will investigate whether it is feasible to lower HbA1c before surgery in patients diagnosed with poorly controlled DM (HbA1c>53mmol) at the anaesthesiology preoperative screening clinic six weeks before surgery.

Material and Methods: At the anaesthesiology preoperative screening clinic of the Amsterdam Medical Centre, we performed a single centre open label pilot trial. Poorly controlled (HbA1c>53mmol) diabetes mellitus type II patients, aged between 18-80, with at least 6 weeks between preoperative screening and surgery were

eligible to participate in this study, because that is the minimal time needed to have an impact on Hba1c values. In this first analyses, we explored the proportion of patients in whom HbA1c is poorly controlled and in which patients it is feasible to lower Hba1c before surgery. As secondary outcome we studied the correlation between HbA1c at pre-assessment and fasting glucose before surgery.

Results and Discussion: During 18 weeks we screened 4397 patients, aged between 18-80 years. 375 (8.5%) of these patients had DM2, and poorly controlled HbA1c was found in 110/204 (54,1%). Finally, 7/110 (6.4%) patients were eligible for an HbA1c lowering intervention. The main reasons for exclusion was the time between screening and surgery (< 6 weeks). The correlation coefficient for Hba1c at pre-assessment and fasting glucose before surgery was 0.45 (p<0.001).

Conclusions: When lowering HbA1c before surgery is the treatment goal, the minimal needed period of 6 weeks disqualified >90% of the poorly controlled DM2 patients for an intervention. Alternative measures for glycaemic control, such as fasting glucose, could be useful for monitoring improvement of glycaemic control when one aims to study a preoperative intervention within 6 weeks before surgery.

## 13AP04-8

Humidified high flow nasal for morbidly obese patients undergoing bariatric surgery: our experience in the prevention of postoperative respiratory complications

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Background and Goal of Study: Humidified high flow nasal cannula (HFNC) oxygen therapy, delivers an air/oxygen blend with a concentration range between 21% to 100% generating up to 60 L/min flow rates. Gas flow is humidified, heated (35° to 40°) and delivered to the patients through a one-way circuit, connected to a large diameter nasal cannula. Aim of the study was to evaluate the effectiveness of Optiflow™ in patients with OSA, who underwent laparoscopic bariatric surgery, in the postoperative period.

Materials and Methods:45 mild and moderate OSA syndrome patients, with BMI≤ 45 and ASA≤ III. submitted to laparoscopic sleeve gastrectomy, were enrolled. The same intraoperative and postoperative anaesthesiologic protocol was administered to all patients: opioid-free anaesthesia (OFA), using clonidine as intra-operative analgesic adjuvant, and non-steroidal anti-inflammatory drugs (NSAID) for postoperative pain control. Optiflow™ was positioned in the immediate postoperative period and up to 48 hours postoperatively. Oximetry was monitored and recorded in continuous. Blood gas samples were taken at a distance of 1, 6, 12 and 48 hours before the intervention. Authors monitored the incidence of haemoglobin saturation below 90% during sleep (T90), the O2 Desaturation Events Index (ODI), and the number of O2 desaturation events per hour of sleep, and hemogasanalytic parameters. In addition, post-operative analgesia was evaluated using 11 points NRS score (0=no pain, 10=maximum pain) and relative comfort for each patient (0=no comfort, 4=optimal comfort). All the patients have given their informed consent for participation in the research study. The study was approved by the Local Ethics Committee.

**Results and Discussion**: The median duration of intervention was  $70 \pm 15$ min, recorded T90 values  $\leq 30\%$  and ODI  $\leq 5$ . Global emogasanalytic parameters (expressed in mean values and standard deviation): PaO2 97.6  $\pm$  10.9 mmHg, PaCO2 =  $37.2 \pm 5.5$  mmHg, SaO2 =  $92.5 \pm 3.8\%$ , pH 7.45  $\pm$  0.04. The NRS mean values, evaluated at the end of the intervention and at 6-12-24 h, was  $1 \pm 3$ . Overall valued comfort using the device was 4 for all 45 patients.

**Conclusion**: On the basis our preliminary results, Optiflow™ was effective in the prevention of hypoxia and in postoperative respiratory complications and outcomes.

## 13AP04-9

## Multimodal monitoring does not decrease incidence of renal or cardiac impairment after major abdominal surgery

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Background and Goal of Study: The combined use of new monitoring methods during anaesthesia (monitoring blood flow and regional tissue oxygenation) with adherence to appropriate management protocol might radically improve perioperative outcome of high-risk surgical patients, but few studies have confirmed that. Our study presents very homogenous groups of patients undergoing major abdominal surgery, with similar perioperative management and anaesthesia technique. We have assessed the differences in incidence of postoperative acute kidney injury and myocardial infarction if the multimodal monitoring is being used intraoperatively.

Materials and Methods: Prospective, randomised trial with 2 parallel groups was conducted at the UMC Ljubljana in years 2015 - 2017. ASA 2-3 high risk patients were included. In control group, only conventional monitoring was used. In the multimodal group, intraoperative fluid status was optimised according to blood flow monitoring and tissue oxygenation according to cerebral oxygenation monitoring. Postoperatively, clinical examination and laboratory values (including creatinine and troponin I) were conducted every 24 hours first three days. Acute kidney injury was suspected if ≥0.3 mg/dL increase in creatinine level or 1.5 times

baseline. Myocardial infarction was suspected if troponin I was positive according to laboratory reference range.

## Results and Discussion:

Lee's Revised Cardiac Risk Index	Control group (number of patients)	Multimodal group (number of patients)	P value (Fisher exact test)
II	26	27	
III	12	10	
IV	4	5	
total	42	42	
rise in creatinine level	3	4	0.500
Oliguria (urine output less than 500ml) in first 3 days	1	3	0.247
rise in troponin I level	0	3	0.241

There were no clinical signs of myocardial infarction in patients with raised troponin. Median intraoperative fluid load was higher in multimodal group (1650 vs 900 ml, p=0.000, Mann-Whitney U test)

**Conclusion**: Combined use of hemodynamic monitoring and cerebral oximetry does not significantly decrease the incidence of renal or cardiac impairment after abdominal surgery.

## 13AP04-10

## Anaesthetic management of a patient with Osteogenesis Imperfecta Type III

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Background: Osteogenesis imperfecta (OI), is a hereditary disorder of connective tissue. This disease is mostly inherited as autosomal dominant. There are four distinct types of OI. OI type III is the most severe form associated with platelet dysfunction, cardiac anomalies, hypermetabolic syndromes, respiratory compromise and/or basilar invagination. We report a case of OI type III who underwent elective stapedectomy.

Case Report: A 33-year-old woman, ASA III, with osteogenesis imperfecta type III was proposed to elective left stapedectomy. She presented fragile bones, hypermobile joints and fragile skin. She presented a history of multiples fractures. Previous surgical and anaesthetic procedures were uneventfully. She had good functional capacity. Physical examination revealed a height of 113 cm, weigh 37 kg, blue sclera and hearing impairment. No other deformities were found. Airway evaluation showed adequate mouth opening, normal dentition, a Mallampatti Class II and no limitation in neck mobility. Preoperative investigation excluded cardio-respiratory abnormalities and platelet dysfunction. A total intravenous general anaesthesia with propofol and remifentanil perfusion was performed. Muscle relaxant used was rocuronium. Orotracheal intubation was achieved with Macintosh laryngoscope and a size 6 cuffed preformed orotraqueal tube, at first attempt. Standard ASA, invasive arterial pressure, bispectral index (BIS) and TOF ratio were used. A 20G iv access was placed in left arm. The patient was positioned in dorsal decubitus and pressure points were padded cautiously. Patient presented hemodynamic stability, with a low blood pressure profile, during whole procedure. Surgical procedure lasted 2 hours and patient was extubated the operating room, uneventfully. She was discharged on 3th postoperative day.

**Discussion**: OI type III represents an anaesthetic challenge owing to difficult intubation, short neck, risk of odontoaxial dislocation, bone and teeth fractures, positioning problems, lung disease, bleeding disorders, cardiovascular abnormalities like mitral valve prolapse and susceptibility to malignant hyperthermia!

References: Oakley I, Reece LP. Anaesthetic implications for the patient with osteogenesis imperfecta. AANA J. 2010 Feb;78(1):47-53

**Learning points**: Proper preoperative anaesthetic evaluation and preparation are important. Optimization before surgery should lead to better outcomes.

## 13AP04-11

## Anaesthetic Management of Takotsubo syndrome: a case of success

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**Background**: Takotsubo syndrome (TS) is an acute and usually reversible heart failure syndrome characterized by a unique pattern of transient regional wall motion abnormalities of the left ventricle in the absence of obstructive coronary disease, which are frequently preceded by a stressful trigger.<sup>1,2</sup> Surgery and anaesthesia are conditions reported to trigger TS, so the anaesthetic approach of patients with this syndrome requires special care throughout the perioperative care.

Case Report: A 64-year-old women was scheduled for left simple mastectomy with sentinel lymph node biopsy. Preoperative evaluation showed a history of hypertension, anxiety and TS diagnosed in 2010 and recurring in 2015. She was

medicated with carvedilol, perindopril and aspirin who were maintained during the perioperative period. Midazolam 7,5mg was administered 1 hour before surgery. After standard ASA and bispectral index monitoring, general anaesthesia was induced with fentanyl and propofol and a laryngeal mask airway was inserted at first attempt. Anaesthesia was maintained with desflurane, air and  $\rm O_2$ . Radial artery cannulation was performed. The total operation time was 90min, the patient remained hemodynamically stable without need of vasoactive drugs and there were no ST-segment deviations. Analgesia was achieved with paracetamol, cetorolac and morphine. She stayed in the Post-Anaesthesia Care Unit for closely surveillance and then transferred to the nursery room. During this time an ECG was performed and showed no ST-segment alterations.

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**Discussion:**TS has a 5-year recurrence rate of 5-22% and the best approach to prevent perioperative TS remain unknown.¹ The main goal is to avoid psychological stress by use of psychological and pharmacologic approaches, including preoperative deep anxiolysis, adequate level of anaesthesia and optimal postoperative analgesia.²Anaesthetic agents that produce the least myocardial depression should be chosen in order to avoid hemodynamic instability. We chose desflurane for maintenance because despite a fall in systemic vascular resistance and mean arterial pressure, the heart rate rises and cardiac output is maintained.

### References:

- **1.** Eur J Heart Fail 2016;18:8-27
- 2. Can J Anesth 2016;63:1059

**Learning points**: The optimal anaesthetic management of patients with history of TS is unknown but through a preventive approach, close monitoring and minimum stressful stimulation the recurrence of this syndrome can be avoided.

## 13AP05-1

## Predicting perioperative acute kidney injury in liver surgery

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**Background and Goal of Study**: Acute kidney injury (AKI)¹ is a serious complication after abdominal surgery resulting in higher morbidity and mortality. Liver surgery may cause important fluid shifts and blood loss. The incidence of AKI in liver surgery in previous studies is approximately 8%². Peri-operative identification of these high-risk patients may improve utilization of healthcare resources and optimize patient care. The aim of the study is to examine the peri-operative risk factors for development of AKI in patient undergoing liver surgery.

Materials and Methods: After ethical committee approval, 970 patients who had undergone liver surgery between 2010 and 2016 in our institution were screened. A set of preoperative and postoperative laboratory results, type of surgery, type of resection, duration of the surgery and patient characteristics were collected. The diagnosis of postoperative AKI was done according to KDIGO criteria (ref). A logistic regression model was determined to predict the occurrence of AKI. After performing a best subset selection, the predictors of the optimal models were chosen based on Akaike (AIC) and Bayesian (BIC) information criteria. To assess the accuracy (percentage of correct classification) of the chosen models, a decision rule (p(X)>0.5) was used for classification. AUC of ROC analysis was determined.

Results and Discussion: A total of 640 patients were included. The

incidence of postoperative AKI was 4.6% (28/640). All but 2 patients developed a stage 1 AKI. Two logistic models were withheld; a 4 predictor model based on AIC, a 3 predictor model based on BIC (see table). Both models had an accuracy of 98.4%. AUC of the ROC analysis was 0.965 (95% CI: 0.946 – 0.988) for the AIC model and 0.968 (95% CI: 0.949 – 0.985) for the model based on BIC.

**Conclusion**: This logistic regression model based on the preoperative creatinine, creatinine change during surgery and the preoperative hemoglobine has good discriminatory properties to predict postoperative AKI in this cohort of patients undergoing liver surgery. **References**:

1. Summary of Recommendation Statements. Kidney Int Suppl (2011). 2012;2(1):8-12.

2. Long TE, et al. Anesth Analg. 2016;122(6):1912-1920.

## 13AP05-

## Feeding minimises liver injury after cold ischemia

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**Background and Goal of Study**: In clinical transplantation lack of adequate nutritional support of the donor, increases the incidence of hepatocellular injury and primary non-function¹. The aim of this study was to determine the role of feeding on hepatic injury after cold ischemia in *ex vivo* perfused rat livers.

Materials and Methods: After University Animal Care Committee approval, female Wistar rats were randomly divided into two groups: one had free access to food; the other was fasted for 18 hours. After they were anaesthetised, the portal vein was cannulated, the liver removed and perfused at a flow rate of 5 ml/min (± 12 cm H<sub>2</sub>O) at 37°C in a closed *ex vivo* system with HBSS supplemented with insulin,

HEPES and O<sub>2</sub>. The experiment consisted of three phases: perfusion for 15 min, cold ischemia (4°C) for 24 hours, and reperfusion during 60 min. Ten rats were included in each group. Glucose and lactate (mg/dl), potassium (mEq/l), ALT, AST, LDH (IU/I) were analysed in perfusate samples at different time-points. The ratio between oxidised and reduced glutathione (GSSG/GSH) was determined in tissue biopsies Mean + SD Student's test

Results and Discussion: Feeding minimizes enzymes release and oxidised glutathione from liver at the time of reperfusion. Lactate concentration in perfusate was higher in fed animals. Results at the end of the experiment are displayed in

Variable	Fasting	Fed	P-Value
Glucose (mg/dl)	83.2 ± 19.8	171.9 ± 49.4	<0.001
K+ (mEq/l)	$8.0 \pm 0.6$	$6.0 \pm 0.7$	<0.05
Lactate (mg/dl)	2.9 ± 1.0	43.4 ± 22.1	<0.001
AST (IU/I)	983 ± 331	84 ± 67	<0.001
ALT (IU/I)	641 ± 217	66 ± 116	<0.001
LDH (IU/I)	6,600 ± 3,060	147 ± 235	<0.001
GSSG/GSH (%)	12.8 ± 3.4	8.5 ± 3.5	<0.05

Conclusion: Feeding presents a beneficial effect at reperfusion in ex vivo perfused rat liver after cold ischemia

### References

1. Sankary et al. Transplantation 1992;54:170-2.

## 13AP05-4

## Early predictors of allograft dysfunction after liver transplantation

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Background and Goal of Study: Early allograft dysfunction (EAD) represents one of the most common and serious complications after liver transplantation (LT) Rapid diagnosis of EAD is mandatory in order for intensive care measures to be initiated

Materials and Methods: One hundred and sixty-four patients who underwent deceased donor LT were prospectively included in the present study. Donor characteristics (age, donor risk index - DRI), patient demographics, intraoperative blood loss and transfusion were noted at the time of LT. Lactate levels were recorded at the end of preanhepatic phase, beginning of neohepatic phase, end of surgery and daily for the first 3 postoperative days. Standard and derived rotational thromboelastometry (ROTEM) - ExTEM, InTEM, ApTEM and FibTEM - parameters were recorded 24 hours after the intervention. EAD was diagnosed according to Nanashima criteria and postanaesthesia care unit length of stay was recorded.

Results and Discussion: Forty-seven patients (28.6%) developed EAD. A DRI above 2 was significantly associated with an increased incidence of EAD. Intraoperative blood loss (p=0.01), packed red blood cells (p=0.04) and fresh frozen plasma (p=0.01) transfusion represented intraoperative risk factors. Lactate levels were significantly higher in patients with EAD at all time points. ROTEM demonstrated an increased clot formation time and decreased maximum clot firmness in both intrinsically (p<0.01) and extrinsically (p<0.01) activated assay, a decreased thrombin potential index (p<0.01), area under the curve (p<0.01) and clot elasticity (p<0.01) in patients who eventually developed EAD.

Conclusion: Our results show that standard and derived ROTEM parameters may represent early signs of graft failure and may aid in the diagnosis of EAD. High DRI and massive transfusion represents potentially reversible risk factors.

## 13AP05-5

## Does the extent of liver resection influence postoperative INR changes: a retrospective analysis

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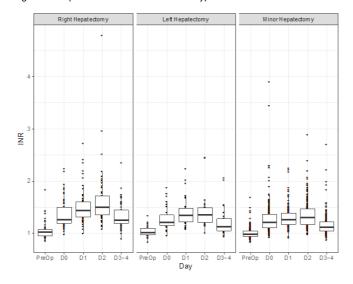
Background and Goal of Study: Epidural analgesia decreases morbidity in major abdominal surgery. In liver surgery there are concerns about the safety of epidural analgesia due to postoperative coagulopathy<sup>1</sup>. The extent of liver resection may cause a more pronounced coagulopathy2. The aim of the study is to evaluate the effect of the extent of liver resection on INR changes during the first post-operative Materials and Methods: After ethical committee approval, all liver surgery patients. operated between 2010 and 2016 were screened for retrospective analysis of INR. Patients were divided into three groups depending on the type of liver resection (right hepatectomy (RH), left hepatectomy (LH) and minor hepatectomy (MH). stoperative INR measurements were collected for the first 4 post-operative days and analyzed. Due to non-normality, non-parametric alternatives to ANOVA for repeated measures (Friedman test), mixed ANOVA and pairwise comparisons were used for statistical analyses.

Results and Discussion: A total of 970 patients were screened. 248 patients were eligible for analysis; of which 54 underwent RH, 33 LH and 161 MH. The overall values of INR were significantly higher in the RH group in comparison to LH (p = 0.014) and MR (p< 0.001). Furthermore, there was a significant interaction between the type of liver resection and the time course of the INR values (p < 0.002). RH differed significantly from LH (p = 0.006) and MH (p < 0.001) (see figure).

Conclusion: In liver surgery, INR values alter over time in all types of liver resections. These changes are more pronounced in patients undergoing right hepatectomy. Minor hepatectomy appears to have the least pronounced INR changes

- References: 1. Elterman KG, et al. J Anesth. 2015;29(3):367-372.
- 2. Jacquenod P, et al. Anesth Analg 2017. In press.

Figure: Time pattern of INR values in diffent type of resections



## 13AP05-6

## Comparison of electrical cardiometry and transoesophageal Doppler for haemodynamic monitoring during living donor liver transplantation

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Background and Goal of Study: Left cardiac output can be calculated noninvasively with Electrical Cardiometry (EC) utilizing thoracic electrical bioimpedance or minimal invasively with Transesophageal Doppler (TED) measuring descending aorta blood flow. Aim is to compare EC to TED regarding cardiac output (CO), ability to guided fluid administration and monitor haemodynamics during transplantation.

Methods: A prospective randomized study with Ethics Committee approval, Pan African Clinical Trial Registry (PACTR201701001990415), 47 adults (3 excluded): EC gp. (n=22) and TED gp (n=22) Following anaesthesia. TED probe (CardioQ. Deltex, UK) was passed orally into mid-esophagus. Cardiometry skin sensors were applied simultaneously. (ICON, Osypka, Germany). In EC gp Anaesthetist were blinded to TED and vice versa. 6 m l/kg/h Ringer's acetate, and only 3 ml/kg Albumin 5% boluses when stroke volume variation (SVV) (%) in EC > 10% or corrected flow time (FTc) (msec) in TED < 350 msec. Rotational thromboelastometry guided blood products

Results: Comparable age, weight, graft body weight ratio, operative time, blood products consumption, MELD score 14.5 [13.0-15.0] vs. 14.0 [12.0-15.0], p=0.54). An overall good degree of reliability between EC and TED CO (440 pairs) (Intraclass correlation =0.928, 95% CI (0.913-0.941), p<0.001. with an overall mean bias difference (95% confidence) (n=396) of 0.697 (0.6616-0.7323), p<0.001 (Bland and

Median (IQR) EC CO was constantly higher than TED CO (I/min). After induction 7.55 [6.70-8.50] vs. 6.80 [6.10-7.50], p<0.001, anhepatic: 7.60 [7.20-8.50] vs. 6.75 [6.35-7.50], p<0.001, reperfusion: 7.90 [7.10-8.60] vs.7.25 [6.50-7.85] p<0.001, end surgery 8.40 [8.00-8.80] vs.7.70 [7.25-8.20] p<0.001, respectively. Both CO increased after reperfusion (Repeated measure ANOVA, p<0.001).

FTc, SVV and central venous pressure (CVP) were comparable. In EC vs. TED. 5500 [5200-6000] vs. 5525 [5200-6000] ml, p=0.81 of Crystalloids and 800 [600-10001 vs. 850 [800-1000] ml. p=0.2 of Albumin 5% were infused, respectively

FTc negatively correlated with SVV (440 pairs) Kendall tau correlation (t) = -0.321,

p<0.001, and both not in correlation with CVP. Diathermy interfered with both and TED probes required repositioning.

Conclusion: The agreement between CO measured by EC and TED is acceptable Both were able to monitor trend changes and guide fluid administration. The consistently lower TED CO compared to EC CO invites further investigations.

## 13AP05-7

## Acute kidney injury after liver transplantation: perioperative predictors and impact on postoperative course

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Background: Acute kidney injury (AKI) is a common and serious complication after liver transplantation (LT). Identifying those patients at high risk of post-LT AKI could facilitate early preventive and therapeutic interventions.

Goal of study: To identify perioperative predictors of early post-LT AKI and its impact on postoperative course.

Materials and Methods: A prospective study was conducted in adult patients undergoing LT. Patients with preoperative renal impairment were excluded. AKI was defined according to KDIGO criteria. Serum creatinine was measured at baseline and up to 3 post-LT days. Univariate and multivariate logistic regression analyses were performed to determine clinical predictors of post-LT AKI. Length of ICU stay, hospital stay, 30-day and one-year mortality were studied as postoperative outcomes with Man Whitney or Fisher exact tests.

Results and Discussion: Out of 203 patients included in the study, 133 (65.5%) presented AKI at 72h post-LT. In the univariate analyses seven variables were significantly associated with post-LT AKI: recipient weight, indocyanine green plasma disappearance rate after graft reperfusion, intraoperative colloid administration and hemodynamic data at end of surgery (cardiac index, stroke volume variation [SVV], pulse pressure variation and renal perfusion pressure [mean arterial pressure inferior vena cava pressure])(p<0.05). Multivariate analysis showed that only higher recipient weight, higher SVV at end of surgery and higher colloid administration were independent predictors of post-LT AKI (p<0.05). Post-LT AKI was associated with longer ICU and hospital stay, and higher 30-day mortality (Table: Data as median[IQR] or no.[%]).

1			
	Post-LT AKI (n=133)	Without AKI (n=70)	P value
ICU stay (days)	3 (2-4)	2 (2-3)	0.003
Hospital stay (days)	18 (14-26)	14 (11-20)	<0.001
30-day mortality	9 (6.67 %)	0	0.03

Conclusions: Patients undergoing LT had a high incidence of early AKI. This complication was associated with a remarkably worse postoperative course. These results suggest that higher recipient weight, higher intraoperative colloid administration and higher SVV had a negative impact on post-LT renal function. Thus, targeting modifiable risk factors such as fluid therapy and hemodynamic derangements may reduce the incidence of AKI.

## 13AP05-8

## Autophagy might explain why release of cytolysis markers by ex-vivo perfused rat liver is less exacerbated by 24h than 18h fasting

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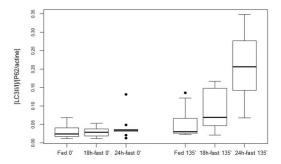
Background and Goal of Study: Previous studies have shown that livers of fasting animals exposed to ischemia-reperfusion injury are more sensitive to cytolysis (1). When prolonging the time of fasting (from 18h to 24h) cytolysis unexpectedly was less deleterious (personal data). In this experiment, we investigated autophagy, a process known to take place during fasting (2).

Materials and Methods: After University Animal Care Committee approval, female Wistar rats were or not fasted for 18h or 24h. They were anaesthetized, the portal vein cannulated, liver immediately removed, and perfused with HBSS solution in an ex-vivo closed system during 135 minutes at 37°C at a mean pressure of 12cm of H<sub>a</sub>O. Rats were randomly divided into 3 groups: 18h fasting (N=14), 24h fasting (N=10) and feeding (N=14) groups. Liver biopsies were obtained at the beginning and the end of the perfusion. Autophagy was evaluated using LC3II/LC3I and p62/ actin ratio markers (Western blot). Kruskal-Wallis test.

Results and Discussion: At T0, the ratio {LC3II/LC3I}/ {p62/actin} was homogeneous between groups. At T135, the ratio was higher in the 24h fasting group in comparison with the 2 others (p<0.001). The increase of the ratio was more important for the 24h fasting than the 18h fasting (p=0.011). No increase

was observed in the ratio for the fed group. In our model, livers after disconnected from body, were not longer exposed to circulating energetic substrates like glucose or alanine. At an energetic point of view, hepatocytes become fully dependent on intracellular energy stores, mainly glycogen, which become critical after 18h fasting (1). Therefore, autophagy might compensate the drop of glycogen in liver of fasting animals. This autophagy-driven compensation might represent a protective mechanism against cytolysis.

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Conclusion: Higher autophagy activity in 24h fasting livers in comparison to 18 h fasting minimizes ex-vivo perfused rat liver injury.

Stadler et al. Anesthesiology 2005, 103:978-6. (2) Esteban-Martinez & Boya. Methods 2015, 75:79-86.

## 13AP05-9

## Release of cytolysis markers by ex-vivo perfused rat liver is unexpectedly less exacerbated by 24h than 18h fasting

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Background and Goal of Study: Short fasting has positive impacts on health and on protection in animal models of liver ischemia/reperfusion injuries (1). In our exvivo model of perfused rat liver (2), a 18h-fasting failed to protect and worsened release of cytolysis markers in perfusates (3). To further amplify the detrimental effect of fasting, transition from 18h to 24h starvation of animals prior to ex-vivo liver perfusion was evaluated.

Materials and Methods: Experiments on animals were conducted under University Animal Care Committee approval. Female Wistar rats were or not fasted for 18h or 24h. They were anaesthetized, the portal vein cannulated, liver immediately removed and placed in an ex-vivo confined chamber and perfused with HBSS supplemented with HEPES and O2 during 135 min at 37°C and at a mean pressure of 12 cm H<sub>2</sub>O. Rats were randomly divided into 3 groups: 18h fasting, 24h fasting and fed groups. Lactate, K. liver enzymes were assayed in perfusate samples at different time points. Mean± SEM. Zerbe's test.

Results and Discussion: At the end of experiment, lactate and glucose were highest while enzymes release in perfusates was lowest in livers from fed vs fasted animals regardless of fasting time. However, enzymes were lower in livers of 24h compared to 18h fasted rats but does not reach the level of protection observed in fed rat livers. Results are displayed in Table 1. The mechanism that may explain these results remains unexplained. Table 1.

				P-value
Parameter	Fed (N=14)	Fasted 18h (N=14)	Fasted 24h (N=10)	
				18h vs 24h
Potassium	$6.3 \pm 0.37$	$8.2 \pm 0.47$	$6.8 \pm 0.63$	0.15
AST	24 ± 2.7	640 ± 161*	191 ± 109*	0.016
ALT	6.2 ± 0.63	503 ± 137*	142 ± 91*	0.075
LDH	106 ± 33	5890 ± 1749*	1414 ± 1010	0.003
Glucose	117 ± 13	5.5 ± 0.48*	10.4 ± 2.9*	0.023
Lactate	$6.7 \pm 0.76$	0.31 ± 0.05*	1.5 ± 0.0*	<0.001

\*P<0.001 compared to fed group

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- 3. Papegay et al. Nutrition 2017, 35:21-7.

### 13AP05-10

## The autophagy inhibitor 3 methyl-adenine exacerbates cytolysis of ex-vivo perfused liver from fasting rat

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**Background and Goal of Study**: Autophagy, a process recycling cytoplasm components and organelles, supplies cells with energetic substrates to face energy deficiency (survival role) (1). The present study evaluates the effect of the autophagic inhibitor 3 methyladenine (3MA) on fasting-stimulated cytolysis in *exvivo* perfused rat liver.

Materials and Methods: After University Animal Care Committee approval, female Wistar rats were or not fasted for 18h or 24h. They were anaesthetized, portal vein cannulated, liver immediately removed and perfused in an ex-vivo closed system during 135 minutes at 37°C at a mean pressure of 12cm of H<sub>2</sub>O. Rats were randomly divided into 4 groups: feeding (N=14), 18h (N=14) and 24h fasting (N=10) groups, and a 24h fasting group with 5 mM 3MA (N=10) added to perfusate. Lactate, K, liver enzymes were assayed in perfusate samples every 15 min. Autophagy markers i.e. LC3II/LC3I and p62/actin ratio were determined in liver biopsies at 0 and 135 min using Western blot. Kruskal-Wallis and Zerbe tests.

Results and Discussion: At 135 min, enzyme releases were significantly higher in 24h fasting 3 MA- treated livers when compared to the others groups (Table 1). The ratio {LC3II/LC3I}/ {p62/actin} was significantly lower in the 24h fasting 3 MA-group in comparison to the 24h fasting rats.

Parameter	Fed	Fasted 18h	Fasted 24h	Fasted 24h+3MA	P-value 18h vs 24h	P-value 24h vs 24h+3MA
Potassium	6.3 ± 0.37	8.2 ± 0.47	6.8 ± 0.63	9.33 ± 0.23*†	0.15	0.0049
AST	24 ± 2.7	640 ± 161*	191 ± 109*	1233.6 ± 184.04*†	0.016	0.0001
ALT	6.2 ± 0.63	503 ± 137*	142 ± 91*	832.7 ± 157.92*†	0.075	0.0001
LDH	106 ± 33	5890 ± 1749*	1414 ± 1010	9009.1 ± 1307.6*	0.0031	0.0004
{LC3II/I}/ {p62/ actin}	0.05 ±0.01	0.09 ±0.01	0.31 ±0.1*	0.11 ± 0.01*	0.0027	0.014

\*P<0.001 compared to fed group; †P<0.05 compared to fasted 18H rats **Conclusion**: Autophagy appears as a protective mechanism and might partially compensate reduction of energy mobilization capacity in livers of fasting animals. **References**:

## 13AP05-12

Patient State Index versus Bispectral Index in cirrhotic patients and non-cirrhotics undergoing hepatic resection: A controlled randomized study

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Background and Goal of Study: Patient State Index (PSI) and Bispectral Index (BIS) monitor anaesthesia depth with different algorithms. Primary goal is to test their agreement in two groups: Healthy volunteers undergoing right hepatotomy for live donor liver transplantation and liver cirrhotic patients undergoing major liver resection. Secondarily their sevoflurane (Sevo) consumption and tolerance to electrocautery interferences.

**Methods**: Local Ethics Committee approval and Pan Africa Clinical Trial Registry (PACTR201601001446303). PSI (Masimo, Irvine, USA) (Target depth: 25-50) or BIS (Aspect, Newton, USA) (Target depth: 40-60). Both forehead sensors were applied simultaneously. Anaesthetist when monitoring PSI were blinded to BIS and vice versa. 4 subgroups: Cirrhotic (PSI) (n=15), Cirrhotic (BIS) (n=15), Non-cirrhotic (PSI) (n=15) and Non-cirrhotic (BIS) (n=15). PSI, BIS, end-tidal (ET) Sevo concentration (%) monitored perioperative.

Results:65 adults (5 excluded). Comparable age cirrhotics, PSI (56.0 [53.0-57.0]) vs. BIS (56.0 [50.0-60.0]), p=0.935 and in non-cirrhotics, (30.0 [26.0-42.0]) vs. BIS (28.0 [24.0-39.0]), p=0.461 with same operation times in cirrhotics, p=0.106, and in non-cirrhotics, p=0.25. An excellent degree of reliability between PSI and BIS at all measuring points: Overall (804 pairs), Intra-class correlation (ICC) =0.92, 95% CI (0.91-0.93), P<0.001. In cirrhotic groups alone (ICC =0.93, 95% CI (0.91-0.94), p<0.001); and in non-cirrhotics (ICC=0.92, 95% CI (0.90-0.93, p<0.001. Bland and Altman analysis showed an overall mean bias difference of 2.19 and 95% confidence (1.40-2.98), p<0.0001. (n=804 pairs). A moderate degree of correlation between PSI and BIS negatively correlated with ET Sevo in all patients (Kendall's tau b = -0.463, p=0.000) and (Kendall's tau b = -0.520, p=0.000) respectively. PSI guided Sevo consumption (ml) was not different from BIS in cirrhotics (65.67±31.60 vs. 68.47±27.63, p=0.983) and non-cirrhotics (41.13±37.45 vs. 47.27±34.80, p=0.338), respectively. PSI least affected by electrocautery vs. BIS (p=<0.001).

Conclusion: Agreement between PSI and BIS during surgery is excellent among patients with healthy or cirrhotic livers. Both can be used to monitor trends of anaesthesia depth changes and equally consumed similar sevoflurane volumes. However PSI allowed for continuous monitoring without interruptions from electrocautery.

## 13AP06-1

Initial experience of new perioperative management versus conventional treatment of patient for colorectal carcinoma surgery- Double center study

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Background and Goal of Study: Colorectal cancer is the second most common cancer in the Republic of Srpska and also the leading cause of cancer in the western world. The aim of the study was to compare surgical outcomes between two cohorts; patients who underwent management using the enhanced recovery after surgery (ERAS) protocol; patients who underwent conventional treatment.(1) Materials and Methods: Prospective data was collected from the study group (40 patients) who underwent elective laparotomy for colorectal carcinoma Inclusion criteria included: age range 35-70 years. Exclusion criteria included: diabetes mellitus; prior colorectal surgery. The study was carried out at two separate institutions and the perioperative management was carried out by two anesthesiologist at each hospital. The ERAS protocol involved: no mechanical bowel preparation; no premedication; liberal fluid management(1 L intravenous crystalloid administered approximately one hour prior to surgery);induction of anesthesia with fentanyl, propofol, and atracurium; maintenance of anesthesia with sevoflurane, oxygen and air). The patients were mobilized the same day and liquid and solid food intake began the same day, or on postoperative day 1.Retrospective data was collected from the control group(40 patients)who had received conventional perioperative management.

Results and Discussion: The mean age of patients in the study and control groups was 62 and 64 years old, respectively. Higher incidence of comorbidity was in the study group vs. the control group(67.5% vs. 50%) such as hypertension, cardiovascular and endocrine disease. The control group endured a higher incidence of postoperative complications: anastomotic dehiscence 5% vs. none; wound-site infection 7.5% vs. none: but equal incidence for ileus 5% vs 5%. Total hospital stay for the study group was 10,22 days vs. 12,65 days for the control group, without statistical significance. Pearsons Chi Square test of connection between mortality(control group mortality 3/40) and postoperative complications.

showed statistical significance(p=<0.001,Pearson Chi Square 24.979,degrees of freedom 3).

**Conclusion**: Our study suggests using an evidence-based perioperative protocol such as the ERAS protocol can improve initial surgical outcomes in patients undergoing laparotomy for colorectal carcinoma. **References**:

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### 13AP06-2

Total intravenous anesthesia maintains systemic vascular resistance without increasing surgical complications in free flap surgery

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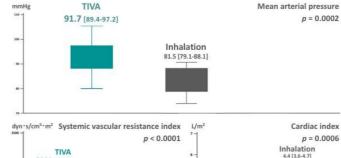
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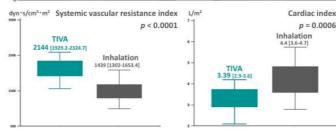
**Background**: We hypothesized that our previous reported results¹ regarding the lower perioperative fluid requirements in patients undergoing total intravenous anesthesia (TIVA) versus those undergoing inhalation anesthesia might be related to fundamental hemodynamic differences. To explore this idea further, we designed a prospective randomized control study comparing the hemodynamic differences between TIVA and inhalation anesthesia in free flap surgery.

Materials and Methods: After approval by the Institutional Review Board of Taichung Veterans General Hospital (CF16113B), thirty-four patients with head and neck cancer were randomized into TIVA (n=17) and inhalation (n=17) groups between December 2016 and June 2017. Hemodynamic therapy was guided by stroke volume variation (SVV), cardiac index (C.I) and systemic vascular resistance index (SVRI) in order to optimize the mean arterial blood pressure(MAP) above 75 mmHg as a hemodynamic goal during the operation.

**Results and Discussion**: Patients in the TIVA group had higher MAP (p=0.0002) and SVRI (p < 0.0001), with lower C.I that was still in the normal range (p=0.0006) (Figure 1).

Figure 1- Hemodynamic differences between TIVA and inhalation anesthesia





They also had less total fluid balance  $(1.76 \pm 0.85 \text{L vs.} 2.85 \pm 1.11 \text{L}, p=0.002)$  and none of them needed vasopressors to optimize the perioperative hemodynamic goal compared to patients in the inhalation group(0 vs. 11). Despite the significantly higher SVRI in the TIVA group, the surgical complications were the same between the two groups(4 vs. 4).

**Conclusion:** Total intravenous anesthesia maintains systemic vascular resistance and optimizes hemodynamic stability without causing surgical complications in free flap surgery.

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### 13AP06-3

Prognostic value of perioperative lung ultrasound for postoperative pulmonary complications after major upper abdominal interventions

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**Background and Goal of Study:** The major upper abdominal interventions are associated with a high risk and incidence of postoperative pulmonary complications (PPC) that can be recognized with lung ultrasound (LUS). The goal of this study was to assess the predictive value of perioperative LUS for PPC including transient hypoxemia and atelectases after major open pancreatoduodenal surgery.

Materials and Methods: Thirty-three adult patients scheduled for elective pancreatoduodenal interventions were enrolled into a single-centre ongoing prospective study. All patients were ventilated with protective parameters: V<sub>T</sub> 6 ml/kg and PEEP 5 cm H<sub>2</sub>O. The LUS studies were conducted preoperatively and at 24 hrs after the surgery with a summarized assessment of consolidations and pulmonary oedema in three standard points on both sides of the chest. Plain chest radiogram was performed at 24 hrs postoperatively. Cardiopulmonary and respiratory parameters were registered during surgery and up to 48 hrs of the postoperative period. The statistical analysis was performed using Mann–Whitney U-test, Wilcoxon's test and ROC-analysis. Data are presented as median (25th–75th percentiles). p values < 0.05 were regarded as statistically significant.

Results and Discussion: We found strong-to-moderate correlations between preand postoperative LUS scores for both consolidations (rho = 0.83 p < 0.001), and the number of B-lines (rho = 0.55; p = 0.007). The total degree of LUS consolidations in pre- and postoperative periods correlated only with PaO\_/FiO\_ ratio at 48 hours after intervention (rho = -0.37, p = 0.04; rho = -0.46, p = 0.008, respectively). We revealed the inadequate predictive role of the preoperative LUS consolidation score for to the hypoxemic events (PaO\_/FiO\_ < 300 mm Hg) at 48 hours after intervention (AUC 0.71, specificity 100%, sensitivity 30%), while the 24 hrs postoperative LUS score allowed a reliable prognosis for delayed hypoxemia at 48 hrs with AUC 0.79, specificity 82% and sensitivity 70%.

**Conclusions:** The perioperative LUS in open pancreatoduodenal surgery is a reliable and specific technique both to diagnose PPC including atelectases and to predict the delayed postoperative hypoxemia. Further studies are warranted to assess a clinical rationale to use the postoperative LUS as one from the "fit for ICU discharge" criteria.

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## 13AP06-4

The comparison of total intravenous anesthesia and volatile induction and maintenance anesthesia on perioperative blood glucose and insulin levels in lung lobectomy patients

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Background and Goal of Study: In spite of more stable blood glucose levels during propofol anesthesia than volatile anesthesia in surgical patients, differences in severity of surgical injury and opioid dosage, intravenous anesthetic use for anesthesia induction or lack of anesthetic depth monitoring may hinder the advantage of propofol anesthesia on glucose metabolism during surgery. This prospective study aimed to compare effects of total intravenous anesthesia (TIVA) with propofol and volatile induction and maintenance anesthesia (VIMA) with sevoflurane, both combined with remifentanil, on blood glucose and related hormones in non-diabetic surgical patients undergoing lung lobectomy.

Materials and Methods: 75 years, undergoing elective lung lobectomy surgery were enrolled. Patients were randomly assigned into two groups based on anesthetic agents used for general anesthesia: TIVA with propofol and remifentanil (group TIVA, n = 20) and VIMA with sevoflurane and remifentanil (group VIMA, n = 20). Serial measurement of hemodynamic variables, blood glucose, insulin and cortisol levels were measured before induction of anesthesia (T0), 1 hour after surgery (T1), end of surgery (T2) and 1 hour after surgery (T3). Adverse events during intraoperative and postoperative period were also recorded. The primary endpoint was changes in blood glucose levels during perioperative period.

Results and Discussion: Changes in blood glucose levels were comparable between two groups from anesthesia induction to 1 hour after surgery (Table 2, p = 0.472). There were no significant differences in insulin, cortisol, lactate and free fatty acid levels during perioperative period. Hemodynamic changes and adverse events were also comparable between two groups (Table 1).

**Conclusion**:TIVA with propofol and VIMA with sevoflurane, both combined with remifentanil infusion, have comparable effects on the changes in blood glucose and related hormones in non-diabetic patients undergoing lung lobectomy.

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## 13AP06-5

## The Association of laparoscopic surgeries and postoperative renal injury in noncardiac surgery - A retrospective analysis

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Background: Laparoscopic procedures are common and can enhance recovery, decrease postoperative pain, and shorten hospital length of stay (LOS). Nevertheless, increased intra-abdominal pressure (IAP) is associated with decreased renal blood flow, renal hypoxia and acute kidney injury. When combined with the Trendelenburg position, renal function may further deteriorate due to increased central venous pressure. The effects of intraoperative increase in IAP combined with Trendelenburg position on post-operative renal outcomes are

Hypothesis: Combination of laparoscopic approach and Trendelenburg position during adult colorectal surgery is associated primarily with decrease in estimated glomerular filtration rate (eGFR) and secondarily with increased incidence of acute kidney injury (AKI), compared to laparotomy without Trendelenburg position.

Methods: In this retrospective cohort study, adult patients undergoing laparoscopic colorectal surgery in Trendelenburg position in the Cleveland Clinic were propensitymatched to patients undergoing similar procedures in an open approach. Patients with preoperative renal failure or critical illness were excluded. Matching considered pre-operative potential confounders and was defined appropriate when the absolute standardized difference was <0.1. When matching was not achieved, multilinear regression was used. The primary outcome was eGFR, calculated according to the Chronic Kidney Disease Epidemiology collaboration (CKD-EPI), and secondary outcomes were AKI (defined by the Acute Kidney Injury Network - AKIN, modified to 7 postoperative days) and hospital LOS.

Results: Of 7,357 eligible patients, 1,846 laparoscopic cases with Trendelenburg were matched to 1,846 control cases. All considered confounders were well balanced aside from one that was adjusted by multilinear regression. No difference was found in eGFR reduction (difference between the groups of 1.12 mL/min/1.73 m2 [95%CI -0.42, 2.67] p=0.155). The relative risk of AKI in the laparoscopic group was 0.7 [95%CI 0.55, 0.90, p=0.006]. LOS was also shorter in the laparoscopic group, with 1.21 times higher chance of earlier discharge than the open surgery group [95%CI 1.14,1.29, p<0.001].

Conclusion: Despite compelling potential mechanisms, laparoscopic approach with Trendelenburg position in adult colorectal surgeries did not alter postoperative eGFR and decreased the risk for postoperative AKI. It also shortened LOS after these procedures.

## 13AP06-6

Prophylaxis of Diphenhydramine on Postoperative Catheter Related Bladder Discomfort in Patients Undergoing Gynecologic Laparoscopic Surgery: A Randomized Double-**Blind Clinical Study** 

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Background and Goal of Study: Prophylaxis of Diphenhydramine on Postoperative Catheter Related Bladder Discomfort in Patients Undergoing Gynecologic Laparoscopic Surgery: A Randomized Double-Blind Clinical Study.

Materials and Methods: A randomized, double-blind control study. 96 ASA physical status I and II adult female patients (20-60 yr) scheduled for elective gynecologic laparoscopic surgery. Patients were randomized into two groups of 48 patients each. The control (C) group received placebo (normal saline 2 ml) whereas the diphenhydramine (D) group received diphenhydramine 30 mg intravenously after induction of general anesthesia. Then, all patients were catheterized with a 14F Foley catheter and the balloon was inflated with 10 ml of normal saline. Bladder discomfort and its severity were assessed at 1, 2 and 6 h postoperatively. The severity of CRBD was graded as none, mild, moderate and severe. Adverse effects of diphenhydramine such as sedation, dry mouth or GI upset were recorded.

Results and Discussion: The incidence of CRBD was lower in the D group compared with the C group at 2 and 6 h postoperatively (P<0.05). Diphenhydramine treatment also reduced the severity of CRBD at 6 h postoperatively (P<0.05). There were no significant differences in side effects, such as sedation, dry mouth or gastrointestinal upset between the two groups (P>0.05).

Conclusion: Prophylactic administration of diphenhydramine 30 mg after induction of general anesthesia reduced the incidence and severity of postoperative bladder discomfort without significant side effects in patients receiving gynecologic laparoscopic surgery

### 13AP06-7

## Pre anesthesia evaluation: routine prescriptions or indicated prescriptions?

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Background and Goal of Study: The use of routine investigations before elective surgery is widespread during pre anesthesia evaluation. It is considered to ermine fitness for anesthesia and identify patients at high risk of postoperative complications. These preoperative investigations may be divided into two categories: routine screening or indicated tests (1).

The aim of this study was to assess the usefulness and cost-effectiveness of routine tests prescribed for pre anesthetic evaluation.

Materials and Methods: During one month, a prospective study at a university teaching hospital was conducted. Patients undergoing, a minor to major, elective surgery were included. The results of all routine tests, prescribed by surgeons or anesthesiologist, were noted during the pre anesthesia consultation. Two senior anesthesiologists assessed the abnormality of the findings and validated or not the usefulness of the prescribed exams according to an updated report by the American Society of Anesthesiologists Task Force on pre anesthesia evaluation [1].

Results: Of 128 patients included, 60.9% were ASA I physical status and general anesthesia were expected in 75%. In our cohort, 1089 laboratory tests were registered. Only 11.66% of these tests were abnormal. Our study revealed that only 32.5% of the investigations were useful for the pre-anesthetic evaluation. The cost of the routine tests, judged without utility, represented 68.6% of the total cost of all

Discussion: Performing routine screening tests in patients who are otherwise healthy is of little value in detecting diseases or changing anesthetic management and outcome. Several publications reported that the practice of routine investigations involves a sizable cost without a significant benefit for patients. Questioning and physical examination of the patient, followed by few selective tests guided by tient's health conditions, invasiveness of surgery and potential for blood loss are the best methods to assess anesthetic management and post operative outcome Conclusion: Routine investigations are pricey, often detect minor abnormalities

of no clinical relevance, may cause unnecessary delay or cancellation of surgery, and increase medico-legal liability. An approach of selective testing reduces cost without sacrificing safety or quality of perioperative care.

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## 13AP06-8

## Preoperative dependency and outcome after surgery in elderly patients

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Background and Goal of Study: The assessment of functional status is critical in health care. The aim of our study was to evaluate the physical status and clinical outcome in surgical elderly

Materials and Methods: After approval by the institutional ethics committee, an observational prospective study was conducted. Patients aged>60, submitted to elective surgery and admitted to Post Anesthetic Care Unit (PACU) from May to July 2017 were included. The Lawton Instrumental Activities of Daily living scale (IADL) was used to assess dependency on IADL, dependent patients (DP were considered if at least one activity was affected. Data collection included comorbidities. Comorbidities were quantified using the Charlson Comorbidity Index. Clinical Frailty Scale was used to evaluate vulnerability and frailty patients (FP). The EuroQOL (EQ-5D) was used before surgery (D0) and 3 months later (M3) to evaluate health related quality of life. Preoperative psychological status was analyzed using the Montreal Cognitive Assessment (MOCA) to assess mild cognitive impairment (MCI). Quality of recovery was evaluated with QoR-15 before (D0) and 24h (D1) after surgery. The Mann-Whitney test, Chi-square or Fisher's eyact test were used

Results and Discussion: Of 235 patients 52% were DP. DP were mainly men (53% vs. 48% p=0.038) and older (median age 72 vs. 67, p<0.001). DP had more frequently chronic kidney disease (p=0.002), *Diabetes mellitus* (p=0.024), congestive heart failure (p=0.027), ischemic heart disease (p=0.003), arterial hypertension (p<0.001), dyslipidemia (p=0.0031) and peripheral vascular disease (p=0.048). DP were more frequently on b-blockers (p<0.001) and statins (p<0.001). At D0, DP had more problems in all EQ-5D dimensions (p<0.0001 for all dimensions) but anxiety (p=0.067), At M3, DP had more problems in all EQ-5D dimensions (p<0.001 for all dimensions). DP were more frequently frail (p<0.001) at D0 and M3. DP had lower median total scores for qoR-15 at D0 (p<0.001) but not at D1, had more frequently MCI (87% vs. 62%, p<0.001) and higher Charlson score (p<0.001). DP stayed for longer at Hospital (p=0.002).

**Conclusion**: Dependent patients are common among old patients. These patients have more comorbidities and worse quality of life and health status prior surgery and have more frequently MCI and frailty. After surgery, they have similar quality of recovery but at 3 months follow-up they have poor quality of life and are still more

## 13AP06-9

## Patients with obstructive sleep apnea: evaluation of the sensitivity of the peripheral chemoreflex

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Background and Goal of Study: The increase in peripheral chemoreflex sensitivity in patients with obstructive sleep apnea (OSA) is associated with activation of autonomic nervous system and hemodynamic response (1). These disturbances may lead to a hemodynamic instability during anesthesia (2). Preoperative assessment of peripheral chemosensitivity may be helpful in prognosis of adverse hemodynamic events. The aim of the study was to compare the breath-holding test to single-breath carbon dioxide test in the evaluation of the sensitivity of the peripheral chemoreflex in subjects with OSA.

Materials and Methods: The study involved 45 patients with OSA, which was determined using overnight standard polysomnography. Patients were divided into 3 groups due to apnea-hypopnea index (AHI): mild (AHI was 5 to 20), moderate OSA (AHI was 20 to 50), and severe (AHI was more then 50). In all participants, breath-holding test was performed in the morning before breakfast: voluntary breath-holding duration was assessed three times, with 10 min intervals [2]. The single-breath carbon dioxide test (3) was performed the next day. The study was approved by the local ethics committee. All subjects provided signed informed consent to both tests

Results and Discussion: The average sensitivity of peripheral chemoreflex measured with single-breath carbon dioxide test was 0.38±0.11 L/min/mmHg. 0.43±0.12 L/min/mmHg and 0.54±0.14 L/min/mmHg in mild, moderate and severe OSA, respectively, the average breath-holding duration was 45±13 sec, 42±11 sec and 32±9 in mild, moderate and severe OSA respectively. A significant negative correlation between the results of two tests was noted (-0.81, p < 0.05).

Conclusion: Peripheral chemoreflex sensitivity increases with the severity of OSA A breath-holding test may be useful in preliminary preoperative assessment of peripheral chemosensitivity in patients with OSA. References:

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## 13AP06-10

## Perioperative anaemia and fasting period, an audit of clinical practice. Easy to do it better?

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Background and Goal of Study: Patient optimization prior to surgery is one of the keys of success in order to improve the postoperative outcomes. Pre-anesthetic evaluation can enhance preoperative physical status of surgical patients.(1) Yet, what are we actually doing in every-day practice? Can we find any factor to improve safety and quality? The aim of this audit is to report the anaemia prevalence and to analyze the length of the preoperative fasting period in a population scheduled for surgery and to assess the follow up of the current guidelines in a university tertiary referral hospital (UTRH).

Material and methods: During one week of clinical practice we audited all the patients scheduled for surgery in a UTRH (including obstetrics and excluding anaesthesia outside OR, emergencies, day case, ophthalmology, cardiothoracic and pediatric surgery). We retrospectively reviewed records from all patients (hemoglobin levels, time frame since the last blood test, most relevant metabolic disorders, type of surgery and previous fasting period).

Results and Discussion: We recorded a total of 254 patients. Anaemia prevalence was 14.9%(n=37), and 62.7%(n=23) of these patients were programmed for major surgery. 57%(n=21) of anaemic patients were women. Anaemia prevalence in orthopedic surgery patients was 25%(n=8) (higher than the mean prevalence). The blood tests to assess anaemia had been performed <1 month before surgery in 81.1%(n=30). 1-3 months in 13.5%(n=5) and >3 months in 5.4%(n=2). Patients fasting period before major surgery was: between 6-10 h in 31.8%(n=40), 10-14 h in 50.8%(n=64) and >14 h in 17.5%(n=22). Among diabetic patients, the fasting period was between 10-14 h in 64%(n=12) and >14 h in 16%(n=2). (3)

Conclusion: Anaemia prevalence is high in our cohort, especially in women and patients of orthopedic surgery. Fasting recommendations are exceeded in a large percentage of cases, even for diabetic patients. Major surgery, first step of patient blood management and accuracy or synchrony of surgical lists and fasting periods should be encouraged and implemented in our hospitals.

### References:

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### 13AP06-11

## Perioperative steroid management: a national survey

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Background and Goal of Study: Chronic steroid administration is a cornerstone treatment for a variety of medical conditions but may induce secondary adrenal insufficiency. Perioperative cessation of chronic steroid treatment may result in a full-blown adrenal crisis (1). Related to surgical severity, recently published guidelines file specific recommendations (2). The goal of this survey was to assess the knowledge and practical adherence to guidelines on perioperative use of steroids between Belgian anesthesiologists and endocrinologists.

Materials and Methods: A paper survey was handed out and collected at the annual meetings of the Society of Anesthesia and Reanimation of Belgium (SARB) and the Belgian Endocrine Society (BES) in 2016.

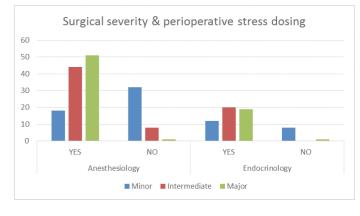
**Results and Discussion**: Only 50% of the responders had a hospital-based stress dosing protocol available. Respectively, 81% of the respondents would continue the patients' daily steroid dose on the day of surgery and 92% would add a steroid stress dosing schedule. Definition of the stress dose varied substantially. 50% of respondents indicated 20 mg hydrocortisone as initiation threshold; 64% would add stress dosing schedule in alternate day therapy and 9 respondents additionally differentiated between primary and secondary hypocortisolism. Even with proof of functioning adrenal glands, 84% initiated stress dose treatment.

For minor surgery, 61% limited the treatment to the day of surgery. For intermediate and major surgery, respectively 31% and 10% only supplemented for the day of surgery. Longer treatment continuation was preferred up to a day after surgery by anesthesiologists. Endocrinologists seemed to advocate a longer duration of supplemental therapy.

Conclusion: The results of this survey illustrate a void between contemporary practice and the recently published guidelines for steroid stress dosing. The paucity of available evidence and the illustrated variety in clinical practice serve as a call for adequate randomized controlled trials to generate relevant and reliable evidence.

## References

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## 13AP06-12 Anaesthesia for free flap surgery: what do anaesthesiologists think?

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Background: Microvascular free flap surgery is the main technique to ensure head and neck cancer reconstruction, improving survival and functional outcomes. Few scientific evidence exists concerning the best anaesthetic practice. We aimed to characterize current anaesthetic management for free flap head and neck surgery. Materials and Methods: A literature review was performed using the terms free flap. anaesthesia, head and neck. A survey was applied to Portuguese Anaesthetists from 05-12/2017. Results were analysed using Microsoft Excel 2016®.

Results and Discussion: We obtained 29 responses. The majority of anaesthesiologists (55%) anesthetize for this type of surgery on an irregular basis. In response to (clinical scenario question) what would be their first line strategy to raise arterial pressure when surgically needed, 55% answered they would reduce remifentanil. 34% would use crystalloids and 28% would use colloids. 86% responded they avoid vasopressors use whenever possible and 5% considered its safe. The majority (62%) responded they reached a neutral to 2L positive fluid balance at the end of surgery, against 27% who reached a final 2-5L positive fluid balance. Concerning the use of colloids, 48% stated that the most adequate type to use is a hydroxyethyl starch, 86% of the responders limited the use of colloids to a maximum of 2L. On the matter of fluid management, 48% considered measuring serum lactate the most useful parameter and 38% considered urinary output. Regarding monitoring, 93% use invasive blood pressure, but only 10% use cardiac

output monitoring. Conclusion: Although in reference centres, anaesthetists do this surgery on an irregular basis. In order to raise arterial pressure, crystalloids are preferred to colloids, but scientific evidence favours colloids. Only 5% of anaesthesiologists considered vasopressors safe, even if recent evidence suggests that its use is safe. contrarily to what has been published in the past.

Anaesthetic management for free flap surgery is controversial and there is much variability between anaesthetists and hospitals. More studies are needed to establish the best evidence-based strategy. References:

1 Gooneratne H et al. Acta Anaesthesiol Scand, 2013:57(10):1293-1300.

## 13AP07-2

## Incidence of postoperative delirium in oncologic patients after laparoscopic surgery in Trendelenburg position: preliminary results

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Background and Goal of Study: Postoperative delirium (PD) is an acute mental syndrome caused by diffuse cerebral dysfunction. It is consequence of association of predisposing and precipitating factors. PD results in increased mortality, morbidity and it prolongs the length of hospital stay (LOS). Incidence range from 10% to 50%. Oncologic surgeries usually are large and complex; and PD incidence may be even greater. Videolaparoscopic surgery (VS) has been increasingly used in oncologic procedures. VS may require Trendelenburg position (TP) for better visualization of the operative field. This position can increase intracranial pressure and alter cerebral perfusion.

Goal of Study: The goal is to study the incidence of PD in oncologic patients submitted to VS in TP and factors risk associate.

Materials and Methods: A prospective study has been realized with oncologic patients submitted to elective VS in TP, aged 18 years or over, ASA less than 3, minimum period of 2 hours in TP, who agreed to sign informed consent form.

Study was approved by the ethics and research committee. Induction of anesthesia Propofol, fentanyl and rocuronium. Maintenance: Desflurane /remifentanil TCI. Patients were evaluated in immediate postoperative until discharge from hospital to rule out PD. Confusion Assessment Method in association with Richmond Agitation Sedation Scale were used to PD diagnosis. Descriptive analyses of variables were used to summarize data. The Fisher's exact test and tests for non-parametric data were used for comparisons.

Results and Discussion: To date, we evaluated 40 patients, 25 men and 15 women. The incidence of PD was 30%; among male it was 36%, and among female 20%(p=0,477). All cases were hyperactive subtype and they occurred in operating room. There was no significant difference in any variable (table 1).

Table 1- Risk factors for PD

Risk factors	Not PD(n= 30 )	PD (n=10)	р
Age (year)	55,6	54,3	0.723
Angle TP (degree)	23,7	21.5	0,328
Time TP (min)	173.7	149,5	0.270
Morphine (mg)	1,25	1,58	0,529
LOS (day)	2.86	1.83	0.237
Pneumoperitoneum (mmHg)	12.57	13.17	0.198

Conclusion: The incidence of PD was 30%, within it is range reported in literature. There were no significant difference in factors studied, but our study is in progress. We believe a higher sample of patients will help clarify it.

Acknowledgements: Department of anesthesiology and all professionals involved.

## 13AP07-3

## In-hospital postoperative stroke: an out of focus picture

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Background and Goal of Study: In-hospital postoperative stroke is a complication with a non-negligible incidence, a high mortality and a worse outcome in comparison with the stroke not associated with surgery. Despite the improvement in diagnosis and treatment, the incidence and prognosis during the postoperative period has remained unchanged. The aim of our study was to assess the situation at our hospital and to have some data for establishing strategies to improve outcome.

Materials and Methods: During 2016 we performed a retrospective analysis including all patients who underwent surgery in our centre and afterwards diagnosed of in-hospital stroke. Demographic data, pathological history, surgical procedure, temporality stroke-surgery, as well as in-hospital stroke protocol activation, treatment and outcome at discharge were recorded.

Results and Discussion: Nine cases of in-hospital stroke out of 22.666 surgeries were detected (0.04%), 6 male and 3 female; age ranged between 55 and 92 y.o. All patients had cardiovascular risk factors, being the most frequent atrial fibrillation and previous stroke, and all of them were under anticoagulant or antiaggregant treatment that was stopped before surgery. Five stroke episodes occurred after scheduled surgery (4 cardiovascular; 1 neurosurgery) and 4 after emergent surgeries. Regarding temporality, 2 cases were detected within the first 24h, 6 within five days and only 1 was detected ten days after surgery. In 5 cases, inhospital stroke protocol was activated but only 2 cases were suitable to be treated (1 mechanic trombectomy and 1 decompressive craniectomy). One patient of our case series died. We observed a delay in diagnosis and treatment in these patients, maybe due to the complexity of this entity and factors that could act as confounders. A complete neurological examination is not at the present a routine in our postsurgical wards. These reasons, in synergy with prothrombotic state in perioperative period, overshadow the outcome.

Conclusions: A standardised neurological exam to all hospitalized postoperative patients, at least including those with previous stroke risk factors, is necessary for an early recognition and diagnosis. A multidisciplinary approach and a correct training of health professionals would increase stroke diagnosis, treatment options and possibly improve the outcome

Saltman AP et al. Care and outcomes of patients with in-hospital stroke. JAMA Neurol 2015;72:749-55

## Preoperative frailty and outcome after surgery in elderly

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Background and Goal of Study: Frailty is characterized by increased vulnerability to external stressors, it's a significant predictor of adverse outcomes. Our study aimed to determine the incidence of frailty and clinical outcome in surgical elderly. Materials and Methods: After approval by the institutional ethics committee, an observational prospective study was conducted. Patients aged>60, submitted to elective surgery and admitted to Post Anesthetic Care Unit (PACU) from May to July 2017 were included. Clinical Frailty Scale was used to evaluate vulnerability and frailty patients (FP) were defined as patients having a score ≥5. EQ-5D was

used to evaluate quality of life before surgery (D0) and 3 months later (M3). The World Health Organization Disability Assessment Schedule (WHODAS) 2.0 and the Lawton Instrumental Activities of Daily Living scale (IADL) were evaluated at D0, 30 days (D30) and M3, to assess disability and dependency. Preoperative psychological status was analyzed using the Montreal Cognitive Assessment (MOCA) to assess mild cognitive impairment (MCI). Data collection included comorbidities and the burden of comorbidity was quantified using the Charlson Comorbidity Index. The surgical Appar Score (SAS) and the American Society of Anesthesiologists physical status (ASA-PS) were combined into a single adjusted scale (SASA). The Mann-Whitney test, Chi-square or Fisher's exact test were used. Results and Discussion: Of 235 patients, 23% were FP. FP had more frequently chronic kidney disease (CKD) (p<0.001), congestive heart failure (p=0.004), arterial hypertension (p=0.023), Diabetes mellitus (p<0.001), obstructive sleep apnea (p=0.049) and peripheral vascular disease (p=0.03). FP were more frequently on b-blockers (p<0.001), oral hypoglycemic agents (p=0.03), insulin (p<0.001), statins (p=0.008) and aspirin (p=0.007). FP had more problems at all EQ-5D dimensions at D0 and M3 (p<0.001). FP had more frequently MCI (p<0.001), prolonged hospital stay (p<0.001) and lower SAS score (p=0.002). FP presented higher median WHODAS scores at D30 and M3 (p<0.001), lower Lawton scores at D0 and M3 (p<0.001) and higher Charlson score (p<0.001).

Conclusion: FP are common among old patients. Our study identified FP having more comorbidities and disability, with worse health status prior surgery, more frequently MCI and risk of post-operative major complications. FP had also poor quality of life and more dependencies and disability at 3 months follow-up.

## 13AP07-5

Number of

## Recognition of early postoperative delirium in the PACU with confusion assessment method by nurses during routine daily practice

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Background and Goal of Study: The aim of this study was to determine the incidence of early postoperative delirium in the postoperative Care Unit (PACU) by screening tool Confusion Assessment Method (CAM) during routine clinical practice

Materials and Methods: After approval of Ethics committee (KA17/227), at Baskent University Istanbul Hospital anesthesia records. CAM values of adult patients who received anesthesia in between 2016 August -2017 August were retrospectively

Results and Discussion: During the analysed period 5200 patients were operated With the exclusion of child patients, missed forms and local anesthesia patients; 3811 patients were included to the study. Total delirium in general anesthesia patients was (43/2976) (1,4 %) Delirium in regional anesthesia patients (4/788)( %0,5). The most frequent delirum was in orthopedic patients who received general anesthesia (22/151)(%14,5).

**Conclusion**: Postoperative delirium was recorded mainly in orthopedic patients following both general and regional anesthesia. Nurses can recognize delirium with CAM. We recognized that hypoactive delirium was not met by the nurses; and may be because this reason, delirium incidence was lower than the general postoperative delirium incidence

General General ane-

Regional

Regional

patients	anesthesia	sthesia	anesthesia	anesthesia
	Delirium YES	Delirium NO	Delirium YES	Delirium NO
General Surgery	18.1 (1.8 %)	980	1	267
Urology		387		105
Orthopedics	22 (14.5%)	151	3	85
Neurosurgery		243		
Vascular Surgery		229		
Ear Nose and Throat Surgery	3 (0.93%)	320		
Plastic Surgery		332		
Obstetrics Surgery		334		320
Total	43 (1.4%)	2976	4 (0.5%)	788

### 13AP07-7

Evaluation of the "Amsterdam Preoperative Anxiety and Information Scale (APAIS) and anxiety in patients in the pre-operative Hospital of Sao Paolo

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Background and Goal of Study: The preoperative period (PO) is a time of great expectation and apprehension for the patients. Anxiety symptoms are the most observed and their incidence is about 60%. It is noted that patients crave for information about the procedure and anesthesia, having a great influence on these symptoms. The scale "The Amsterdam Preoperative Anxiety and Information Scale (APAIS)" is a questionnaire that evaluates both, PO anxiety and the need for this knowledge at the time PO. The aim of study is to validate the APAIS scale and to estimate the prevalence of anxiety in patients during the PO period, in the private hospital in São Paulo.

Materials and Methods: A cross-sectional study including patients in the OP submitted to elective surgery, aged 18 to 65 years, ASA I, II and III. Assessment was performed through a questionnaire consisting of patients' demographic data, Spielberger State Trait Anxiety Inventory (STAI) and APAIS scale. The prevalence of anxiety assessed by APAIS (cutoff point: 11 points) was calculated. The assessment of anxiety with the APAIS scale was compared to that obtained by the STAI-state (>49).

Results and Discussion: From February 2016 to March 2017, 224 patients were interviewed. The median age was 48 [38-55] years, 56.3% were male and 21.4% had their first assessment procedure. The majority (52.7%) was submitted to a midsize surgery followed by major surgery (25%) and most patients (62.9%) had ASA status II. We observed that 25% need for information, 24.6% had anxiety assessed by APAIS and 17.4% had anxiety according to STAI-state. The median of total scores of the APAIS was 13 [10-17.75] and the median of STAI state was 38[31-46]. The combined anxiety component of APAIS correlated moderately with STAI-state (r = 0.669, p < 0.001). The information desire component of APAIS although lower, still had significant correlation with STAI-state (r = 0.222, p = 0.001). Crohnbach's alpha coefficient was 0.876 for APAIS anxiety and 0.785 for APAIS information's components and 0.831 for the complete questionnaire. The area under the curve for ROC analysis of an APAIS score of 11 compared to STAI-state is 0,883 (IC95% 0,831-0,935, p<0,0001).

Conclusion: We observed a significant correlation of the IDATE-state inventory with the APAIS scale. The APAIS is a valid and reliable tool for the assessment of patients' preoperative anxiety and their need for information.

## FAST (Frailty And Sarcopenia Trials): A qualitative investigation into frailty identification implementation into the general surgical pathway, in the UK

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Background and Goal of Study: Frailty is related to post-operative complications. In the United Kingdom (UK), frailty identification is not always part of the surgical pathway. This study investigates the perspectives and experiences of surgeons, general practitioners (GPs) and surgical assessment staff about identifying and managing frailty and explore the feasibility of implementing frailty identification at surgical pre-assessment

Materials and Methods: Surgeons and GPs were invited to individual interviews, and surgical pre-assessment staff to a focus group. Population-specific open-ended semi-structured topic guides were designed. Surgeons were asked how knowing about frailty might change surgical planning. GPs were asked how frailty should be identified and treated in surgical patients. Pre-assessment staff were asked who should be identifying frailty in surgical patients, and the barriers of implementation. Thematic analysis was used to examine the data, allowing interpretation within and across populations. Ethical approval was granted (15/YH/0513).

Results and Discussion: 5 consultant general surgeons were interviewed. All agreed identification of frailty is vital to ensure the correct post-operative care package is in place. Patients with frailty were expected to have a longer, less predictable recovery. Surgeons felt responsible for both identification and treatment of frailty in their patients. With reliable identification, current systems can support the additional care needs. 4 GPs were interviewed; all agreed frailty is becoming more prevalent. GPs interviewed identify frailty using an electronic frailty index though report limited clinical value. GPs may assess frailty before making a surgical referral, but do not consider it part of their role to assess fitness for surgery based on these scores. Surgical pre-assessment staff (N= X) at the focus group disagreed on the clinic's purpose; either to assess fitness for anaesthesia, or support discharge planning by referring to services that optimise patients prior to surgery. The staff agreed that frailty should be identified in their clinic. Adoption of frailty assessments should require minimal paperwork and utilise rapid clinical judgement.

Conclusion: Frailty identification is missing from Leeds hospitals' surgical assessments, yet all groups support its implementation. Whilst GPs can identify frailty, all populations felt management should come from surgeons and surgical

## 13AP07-9

FAST (Frailty And Sarcopenia Trials): Poor agreement between commonly-used frailty assessments in elective colorectal surgical patients

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Background and Goal of Study: Frailty assessment may be of value to identify high-risk surgical patients, highlighting additional post-operative care needs. A number of frailty assessment tools exist but there is uncertainty as to which is best in surgical patients. This study investigated the agreement between 9 widely-accepted frailty assessments.

Materials and Methods: Elective colorectal surgical patients were assessed using 9 frailty tools, as part of the FAST study. The clinical frailty scale (CFS); 36-point accumulative deficit (AD); frailty phenotype (FP); frailty, non-disabled tool (FiND); fatigue, resistance, ambulatory, illness and loss of weight tool (FRAIL); Edmonton frailty scale (EFS); Gerontopole frailty screening tool (GFST) polypharmacy as defined by 5+ medications (Poly); and PRISMA 7 frailty score (PRISMA) were used. Cohen's kappa statistic was used to assess agreement between tools. Ethical approval has been granted for the FAST studies by a UK National Health Service Research Ethics Committee.

Results and Discussion: 95 patients were recruited into FAST, mean age 74 (SD 6.2) years with 7 over 85. 66/95 patients had metastatic disease. Frailty was identified by the different measurements (Table 1).

Frailty tool	CFS	AD	FP	FiND	FRAIL	EFS	GFST	Poly	PRI- SMA	
Healthy (%)	79 (83.2)	29 (30.5)	36 (37.9)	69 (72.6)	51 (53.7)	88 (92.6)	86 (90.5)	47 (49.5)	77 (81.1)	
Frail (%)	16 (16.8)	66 (69.5)	56 (62.1)	26 (27.4)	44 (46.3)	7 (7.4)	9 (9.5)	48 (50.5)	18 (18.9)	

There was significant agreement between the different frailty tools ranging from K=0.096 to K=0.590 (figure 1).

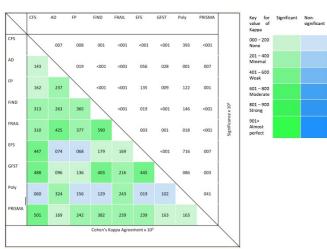


Figure 1: Kappa analyses between nine frailty assessments. Statistical significance P < 0.05.

**Conclusion**: Frailty tools have limited agreement in a surgical population. The adoption of a frailty assessment into a surgical pathway requires scientific and clinical rigour to ensure the optimal assessment is used, providing clinically significant information. We are currently exploring, as part of the FAST study, which assessment has the strongest validity in relation with post-operative adverse

### 13AP07-10

Impact of virtual reality (VR) with Hypnosis and VR with Distraction on anxiety and pregnancy rate before sedation for oocytes retrieval (OR): a doubled-blinded randomised study

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Background and Goal of Study: Anxiety can affect pregnancy rate following an invitro-fertilisation procedure¹. Hypnosis reduces emotional distress associated with medical procedures². VR is an immersive 3D experience, created using a visual headset and headphones. The goal of this study is to evaluate the effect of VR session with and without hypnosis on anxiety levels and on pregnancy rate before sedation for OR.

Materials and Methods: After written informed consent, 100 women scheduled for OR under sedation were included in a prospective randomised double-blinded study (NCT03064061). A visual anxiety scale (VAS) before (t1) and after VR (t2) session and before leaving the hospital (t3)was realised. For OR, remifentanil (0.1 μg/kg/min) and ketamine (0.15 mg/kg) were used and propofol added as needed. Group Distraction (n=56) received a VR session (underwater walk) and group Hypnosis (n=44) received a VR session with hypnosis focus on breathing, slowing respiratory rhythm and suggestions of reuse the technique later to find well-being and calm as needed (AQUA Oncomfort®). Pregnancy was evaluated 14 days after pick-up (blood beta-HCG).A repeated measure ANOVA was performed to analyse the effect of time and group. Mann Whitney, Chi-square tests were used; n<0.05 was considered significant

Results and Discussion: One patient in both groups was excluded. There was no significant difference regarding anxiety scores between groups(p=0.23) but the scores significantly decreased within groups. Table:\* p<0.001 t1 vs t2 and t1 vs t3 \$ p<0.002 t2 vs t3.

	VR	VR	
	Distraction	Hypnosis	p
VAS anxiety (0-100)	n=55	n=43	0.23
	34±23*	40±24*	
t1			
	22±21§	26±23§	
t2			
	12±17	14±24	
t3			
	0.6	0.6	
ropofol consumption (mg/ kg)median(P25-P75)			0.83
	(0.23-0.93)	(0.34-0.93)	
Embryo transfer	48	35	
Positif beta HCG	10/48 (20.8%)	16/35 (45.7%)	0.02

**Conclusion**: RV session before sedation for oocyte retrieval reduces significantly women's anxiety. Type of suggestions used during hypnosis RV session shows a significant positive impact on the pregnancy rate (posthypnotic suggestions of reuse the technique by self-hypnosis).

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## 13AP07-11

Prevalence and reasons for patient non-adherence to pharmacological acute pain therapy at home after day surgery: a prospective cohort study

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Background and Goal of Study: Good adherence to prescribed postoperative pain medication is crucial to suppress or even prevent moderate to severe acute postoperative pain after day surgery. Nevertheless, we know that patients are not always compliant to the prescribed orders by their treating physician. Therefore, our objective was to analyze the prevalence and reasons for patient non-adherence to acute pain therapy at home after day surgery.

Materials and Methods: We analyzed data from a cohort of patients who participated in a randomized trial investigating postoperative pain medication. Two hundred patients undergoing painful elective surgery in day setting were enrolled. All patients were treated with paracetamol, an NSAID or metamizole and tramadol as needed during the first 3 postoperative days. To measure adherence to prescribed pain medication, patients were asked every day, for the first three postoperative days, if they had used their analgesic medication as prescribed: 'yes' or 'no'. The level of analgesic adherence is defined as follows: Full adherence: analgesia use as prescribed "Yes", partial adherence: analgesia use as prescribed "Yes, sometimes", non-adherence: analgesia use as prescribed "No". Reasons for non-adherence were also assessed. All patients were interrogated by telephone call.

Results and Discussion: Four patients were excluded because they did not met the inclusion criteria. Five patients were lost-to-follow-up. From a total of 191 patients, 144 were fully adherent (75.4%), 26 (13.6%) were partially adherent (20.0%) and 11 were non-adherent (5.7%). Reasons for nonadherence were unwanted side effects (such as nausea, pyrosis and fatigue) (n= 25), no pain (n=11), fear of taking too much medication (n=3), personal reasons (n=4), excessive pain (n= 2) or following instructions from surgeon (n=2). One patient forgot to take the medication and one patient thought that medication is unhealthy.

Conclusion: Our data demonstrate that analgesic non-adherence and partial adherence after painful day surgery is rather common despite clear written and oral instructions that were given during the informed consent procedure and before discharge. Most frequent reasons for non-adherence are unwanted side effects of medication and the absence of pain. We think that anticipating and explaining unwanted side effects may improve adherence, but this clearly needs further investigation.

## 13AP08-1

## Cardiac arrest following reversal of muscle relaxation by neostigmine: A Case Report

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**Background:** Neostigmine is used to reverse non-depolarizing muscle relaxation in general anesthesia. We report a cardiac arrest requiring full CPR followed by administration of neostigmine.

Case Report: 82-year-old male patient with DM type2 and 1st degree AV block (PR-interval 210msec) with ICRBBB on preoperative ECG underwent urgent repair of an incarcerated inguinal hernia. His preoperative K was 4.5mmol/l, Hb 9.8Gr%, and Glu-6.7mmol/l. Rapid sequence induction was performed, followed by rocuronium 20 mg. Surgery was uneventful. Shortly (30sec) after the administration of neostigmine 0.04 mg/kg(2.5mg) with atropine 0.15 mg/kg(1mg) (both diluted to 10ml with NS), cardiac arrest was noted on the monitor that required CPR with chest compressions for about 4 minutes and the use of atropine 1mg, adrenaline 1mg, and CaCl 1g. On lab tests during CPR K was 9.54mmol/l that gradually returned to normal (K- 4.47mmol/I) only after CPR. The patient remained hemodynamically unstable after CPR and required noradrenaline infusion (0.1mcg/kg/min) for few hours. The patient was discharged from the ICU after 1 day and home on POD7. Discussion: Neostigmine is a potent anticholinergic agent. Nevertheless, full cardiac arrest with neostigmine when given with a cholinergic drug like atropine is very rare. Cardiac complications such as QT interval prolongation or ST-elevation on ECG related to neostigmine were reported in the early literature1. Additionally, cardiac arrests following neostigmine administration were reported in a case of combined general and spinal anesthesia, in pediatric or cardiac transplant patients<sup>2</sup> and in a patient with the background of coronary vasospasm<sup>3</sup> undergoing noncardiac surgery. To the best of our knowledge cardiac arrest requiring CPR after administration of neostigmine has not been previously reported in a patient with

**Learning points:** Using neostigmine for reversal of muscle paralysis can be dangerous. Perioperative neuromuscular monitoring to avoid unnecessary use of neostigmine or the alternative use of sugammadex can prevent this complication. Elderly patients, especially those with conduction abnormalities on pre-operative ECG or significant coronary disease are at particular risk.

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## 13AP08-2

Perioperative Medicine

Recovery of muscle function after deep neuromuscular block by means of diaphragm ultrasonography and adductor pollicis acceleromyography: Comparison of Neostigmine vs. Sugammadex as reversal drugs

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**Background**: The extensive use of neuromuscular blocking agents (NMBAs) during surgery lead to the concern of residual paralyzing effect in the post-operative period. To avoid residual effects neuromuscular monitoring is advocated in intra-operative setting to improve safety. Introduction of ultrasonography made the study of the diaphragm thickness more reliable and a good tool individuate residual effect of NMBAs in awake patients.

Methods/Design: A prospective, double-blind, single centre randomized study enrolling ASA I-II patients, 18-80 yo, undergoing deep neuromuscular block with rocuronium during ENT surgery. Primary objective was to compare the effect of Neostigmine (NEO group) versus Sugammadex (SUG group) on postoperative residual curarization by using diaphragm US and acceleromyography of the adductor of pollicis. Patients were extubated with TOF Ratio>0.9. Diaphragm US has evaluated thickening fraction (TF) (difference between the end expiratory thickness and the end inspiratory one normalized on the expiratory one). US was carried out before the induction, before extubation, 10 and 30 minutes after discharging from OR. Secondary objective was the reduction of the incidence of post-operative complications related to residual neuromuscular block. The statistical analysis has been carried out by using Generalized Estimating Equations (GEE) multiple linear regression model adjusting for time of the measurement and baseline TF whilst association between drug and collateral effect have been evaluated using logistic regression model. P<0.05 were considered statistically significant.

**Results:** The difference between basal TF and 30 minutes TF ( $\Delta$ TF30) was significantly lower in participants who have received sugammadex than in whom has received neostigmine as reversal drug (p<0.0001). Any postoperative respiratory complications were recorded in patients enrolled independently to group allocation. The incidence of PONV was on a major extent in the NEO group (27.59%) than in the SUG group (6.67%) with an overall adjusted odds ratio of 5.3 (p<0.05).

**Discussion:** In this study sugammadex has guaranteed a complete recovery of diaphragm thickening 30 minutes after extubation; by contrast the administration of neostigmine/atropine did not ensure a full recovery of basal TF. Moreover, PONV has occurred more frequently with the AChEi than with the γ-cyclodextrin. Diaphragm US could become a bedside evaluation tool in future in the context of perioperative medicine.

## 13AP08-3

## Opioid and propofol pharmacodynamic modelling during brain mapping in awake craniotomy

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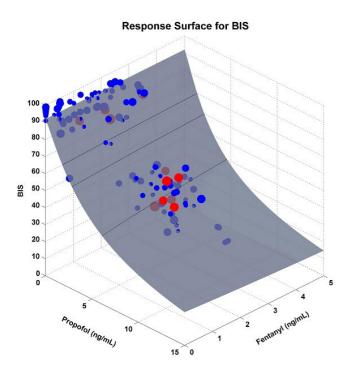
Background and Goal of Study: Awake craniotomy (AC) is performed when the patient's language center needs to be identified during tumor resection. The challenge of anesthesia is to maintain a calm, comfortable and cooperative patient during the mapping phase. Pharmacodynamic models and target drug concentrations have been used to predict and ensure patient's wakefulness. Response surface models (RSMs) are mathematical algorithms that take multiple drug interactions into account and cover the entire interaction spectrum. We investigate the first use of RSM with bispectral index (BIS) to predict patient's response to name calling (RNC) and full wakefulness (able to complete neurological tests) during AC.

Materials and Methods: The study is performed in two stages. First we prospectively enrolled 40 patients who received video-assist thoracoscopic surgery (VATS) using propofol target controlled infusion (Schnider model) and fentanyl. Effect-site concentrations (Ce) and BIS values were recorded during the induction phase before endotracheal intubation and a response surface model is built from the data set. In the second half of the study we verified the RSM retrospectively in AC patients. Corresponding BIS values were analyzed for RNC and wakefulness.

Results and Discussion: A total of 155 data sets of propofol Ce, fentanyl Ce and BIS pairs were available for model iteration in the VATS group. The range of propofol and fentanyl Ce were 0-9.95 mcg mL-1 and 0-3.69 ng mL-1 respectively. Observed BIS ranged from 21-98. The model identified an additive interaction between propofol and an opioid. RNC at BIS 64 is predicted by the model and 70 is required for wakefulness.

Conclusion: The applicability of a RSM derived from VATS patients is verified on a separate group of AC patient and the BIS target advised for RSM predicted wakefulness is 70. The model illustrates the timeline to wakefulness during the awakening process in AC with propofol and an opioid. It can aid anesthesiologists in guiding clinical dosing and estimate the time to wakefulness when multiple drugs are used

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## 13AP08-4 Respiratory Depression After Intraoperative Opioid-Containing Periarticular Multimodal Drug Injection

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**Background and Goal of Study:** Recently, opioid-containing periarticular multimodal drug injection (PMDI) has become a common practice for pain management after artificial joint replacement surgery. The aim of this study was to investigate the effect of opioid-containing PMDI on postoperative respiratory rate (RR).

Materials and Methods: This study was approved by the Ethics Committee of Fukushima Medical University (No.2818). We reviewed the digital records of patients who met all of the following conditions: 1) underwent total knee or hip arthroplasty at our institution between February 2016 and May 2017; 2) received an opioid-containing PMDI (morphine 5–10 mg, ropivacaine, and adrenaline) during surgery by a surgeon; and 3) had their postoperative percutaneous oxygen saturation (SpO₂) and RR simultaneously recorded using a Nellcor™ PM1000N moitor (Covidien Japan Inc., Tokyo, Japan) via a finger sensor. The incidence of postoperative respiratory depression (RD), defined as RR <10/min for a ≥5-minute duration, until the morning of the first postoperative day was examined.

Results and Discussion: Full data was obtained and analyzed for 23 patients. They underwent surgery under either general anesthesia, general anesthesia combined with epidural anesthesia, or spinal anesthesia with sedation by propofol. There were no cases in which opioid was either used for spinal/epidural anesthesia during surgery or was continuously administered intra and postoperative analysesia.

RD occurred in 5 out of the 23 patients (22%), 23 times in total (median 3, range 1–10) after surgery. The median time from PMDI to RD incidence was 180 minutes (range 70–505), and the median RD event duration was 400 seconds (309–1449). Other adverse events, such as hypoxia, were not observed.

In this study, no respiratory-affecting medications other than opioid included in PMDI were administered intra or postoperatively, suggesting opioid-containing PMDI as the cause of RD. Additionally, 3 of the 5 patients developed RD even 4 hours after PMDI. Therefore, continuous respiratory monitoring is required in patients who undergo opioid-containing PMDI.

**Conclusion:** PMDI containing opioids can cause postoperative RD.

Careful postoperative respiratory monitoring is essential to detect such conditions.

### 13AP08-5

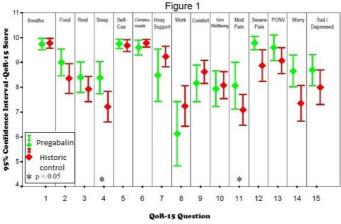
## Pregabalin for perioperative anxiety: A re-audit of quality of recovery in ocular oncology patients

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**Background:** Our previous audit showed high levels of peri-operative anxiety which negatively impacted recovery in our cohort of 71 ocular melanoma patients undergoing surgical treatment! Pregabalin already has an established role in the treatment of generalized anxiety and oculofacial pain<sup>2</sup>. It is routinely used in the perioperative period during joint replacement surgery and amputations within our Hospital. Hence, pregabalin, in a small dose of 75mg BD for 10 days, commencing on the day of surgery was introduced to enhance their recovery. Hence, we reaudited this cohort to evaluate our service provision.

**Methods**: This audit was duly approved by the Hospital Audit committee on (ref: TA0001514, Chairman: Dr C Williams) on 26/05/2017. 32 consecutive patients undergoing surgical treatment were audited prospectively over a 4 month period. A single QoR-15 questionnaire<sup>3</sup> administered at 48 hrs postop and Qor-15 scores thus obtained was compared with our previous results1 using Mann-Whitney U non parametric tests.



Results: These are summarized in figure 1. The mean QoR-15 scores improved marginally from 126.3 (95%CI: 122.2;130.4) to 130.4 (95%CI: 124.6;136.1). The scores improved for 9 areas with notable improvements in sleep, rest, food, pain, worry and feeling sad. Sleep and moderate pain were statistically better in the pregabalin cohort. There was a marginal decline in scores for work, hospital support & comfort. The rest were similar to baseline.

**Discussion**: Our results are in line with expectations following the introduction of an anxiolytic during the perioperative period. The obvious limitations of our audit methodology (lack of randomization & placebo controls) makes statistics and interpretation of results more difficult. We aim to gather data in a larger cohort to confirm the results.

**Conclusion**: Introduction of Pregabalin helped reduce postoperative pain and anxiety, improves quality of sleep and enhanced overall recovery in ocular oncology nationts.

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- Stark et al. Anesthesiology 2013; 118:1332-40

## 13AP08-6

## Perioperative anaphylaxis to intravenous paracetamol caused by allergy to mannitol - a hidden allergen

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**Background**: Allergy to excipients is rare but often overlooked due to lack of awareness of excipients and their allergenic potential (1). Excipients have many different properties and act as eg preservatives, stabilizers, sweeteners or to increase solubility. This case presents a patient who developed perioperative anaphylaxis (PA) shortly after administration of iv paracetamol (PCM) and highlights the importance of specialized investigation and of testing with the exact formulation of the drug.

Case: A 27-year-old woman was referred for investigation in the Danish Anaesthesia Allergy Centre (DAAC) due to anaphylaxis after a minor surgical procedure. She had a history of chronic urticaria with daily symptoms, and exacerbations 1-2 times/ week. She had experienced worsening urticaria when taking the antihistamine desloratadine. Induction and anaesthesia with propofol, remifentanil and fentanyl were uneventful. During recovery, just after removal of the laryngeal mask and 5 minutes after administration of iv PCM, she developed severe hypotension(55/20), tachycardia(175), universal flushing and pruritus. Total dose adrenalin iv 160 mg,

clemastin 2 mg, solumedrol 80 mg and, 2 l fluids were given. She required adrenalin infusion for 14 hours in ICU, and developed both angioedema and peripheral edema, but no respiratory symptoms or airway compromise. Serum tryptase after the reaction was elevated at 11.9 mcg/l, baseline level 6.51 mcg/l. She was discharged next day from ICU

Investigations in DAAC revealed negative testing for perioperative exposures, but skin testing was clearly positive for iv PCM and the excipient mannitol. Oral provocation with PCM was negative. She was advised to avoid foods and drugs containing mannitol e.g. diet coke, mushrooms, cauliflower and desloratadine and her exacerbations of urticaria were reduced.

**Discussion:** PA should always be investigated systematically in specialist centres with collaboration between allergists and anaesthesiologists. In this case the allergy was caused by a hidden allergen, which would have been missed if testing with the iv preparation of PCM had not been performed. This highlights the importance of retrieving detailed information about the exposures prior to PA.

## References

1. Jain et al. Anaphylaxis following iv PCM. Anesth Intensive Care 2015, 43:6 **Learning points:** Anaphylaxis in the perioperative setting is complex and subsequent investigations are required with focus on all possible causes including hidden allergens.

### 13AP08-7

## Rhabdomyolysis presenting as third-degree atrioventricular (AV) block: Differential diagnosis

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**Background**: Rhabdomyolysis is a rare but severe complication of urological surgery. We present a case with a patient who developed rhabdomyolysis after surgery. Diagnostic suspicion arose after the ECG exhibited a third-degree heart block caused by significant hyperkalaemia.

Case Report: Á 75 years old male with history of chronic kidney disease Stage 3a, and VVI Pacemaker with currently-appropriate native rhythm was scheduled for a left laparoscopic nephroureterectomy. The surgery lasted 300 minutes. Postoperatively, the patient developed acute kidney failure with moderate hyperkalaemia, and he was found to have a complete AV block because a pacemaker started triggered. Rhabdomyolysis was suspected, and definitive diagnosis was made by serum creatine kinase (CK) levels of 41138 U/L. Vigorous fluid resuscitation was required as well as treatment for hyperkalaemia, diuretics and urine alkalization¹. After stabilization of hyperkalemia he had his own rhythm back. His CK levels gradually dropped over the next hours, but creatinine peaked in a few days.

**Discussion**: Rhabdomyolysis is a well-known complication in urologic procedures<sup>2</sup>, with an incidence of 0.67-1%. A high index of suspicion is critical for diagnosing it and must be considered as the presence of renal failure and reddish-brown urine. The final pathogenetic pathway promotes muscle cell damage and release of myoglobin, creatine phosphokinase, potassium and other enzyme and electrolytes into systemic circulation. Postoperative renal failure was expected in this case; it was hyperkalaemia and complete AV block which triggered pacing that brought us on track to request further test and made the diagnosis. Rhabdomiolysis presenting as complete AV block it is uncommon. To our knowledge, there is only one case reported, and it wasn't related with a surgical procedure<sup>3</sup>. We believe hyperkalaemia made our patient suffered from cardiac dysfunction due to exacerbated chronic renal failure and rhabdomyolysis. Patient had his own heart rate back as soon as potassium levels tapered to a normal level.

## References

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**Learning points**: Third-degree heart block is an uncommon presentation of postoperative Rhabdomyolysis. It should be suspected following prolonged surgical procedures and acute kidney failure with hyperkalaemia.

## 13AP08-8

# Timing of blood sampling for butyrylcholinesterase (BChE) phenotyping in patients with prolonged recovery after mivacurium or suxamethonium

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Background and Goal of Study: About 76% of the population is homozygous for usual BChE, while 24% carries at least one genetic variant allele. Most of these variants have reduced BChE activity ([BChE]) that can lead to prolonged neuromuscular block (NMB) after suxamethonium (SUX) or mivacurium (MIV). BChE can be characterized by phenotyping and by determination of genotype. Inappropriate timing of blood sampling can interfere with results of BChE assay. However, guidelines regarding desirable delay between exposure to anaesthesial neuromuscular blocker and testing are not clearly defined. We therefore compared

BChE phenotype based on blood samples collected during or shortly (<6h) after recovery from NMB (T1) with that assessed on blood drawn after >1 week (T2). **Materials and Methods**: After ethical committee approval and written informed consent 19 patients with a prolonged NMB after MIV and SUX were selected. Screening at T1 and T2 was done in all patients. [BChE] was assayed using benzoylcholine as a substrate. Phenotyping was based on dibucaine and fluoride inhibition. Genotyping was done by the Centre of Medical Genetics (University of Ghent). [BChE] at T1 and T2 were compared using a paired t-test. The effect of neostigmine on [BChE] was assessed by analysis of co-variance.

Results and Discussion: We included 19 patients with prolonged NMB following

MIV (18) and SUX (1). MIV dose was 0.17 (0.1) mg·kg<sup>-1</sup> and NMB duration (TOF90)

was 184 (42) min. [BChE] were significantly different at T1 and T2, i.e. 2459

(1905) U·L·¹ and 4287 (2636) U·L·¹, respectively (p<0.002). Values are mean (SD). Neostigmine did not significantly decrease [BChE] at T1. In 3 patients at T1 and 2 patients at T2, [BChE] was too low to determine phenotype. In all other patients phenotyping yielded identical results at T1 and T2. The presumed presence of at least one allele for the atypical variant on phenotypic characterization was confirmed by sequence analysis of patient's DNA. Phenotyping failed to identify one new variant (p.Tyr146Cys) and in detecting the K variant in 14 out of 15 patients. Conclusion: Anaesthesia interfered with [BChE], but not with phenotyping Phenotyping can be performed on blood drawn during or immediately after recovery of NMB to screen for clinically relevant variants of BChE. However, accurate diagnosis of BChE deficiency needs further confirmation by determination of genotype [1]. References:

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## 13AP08-9

# Effect of chronic exposure to dexamethasone and its withdrawal on rocuronium-induced neuromuscular block and sugammadex reversal in in vitro study of rats

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Background and Goal of Study: Chronic exposure to dexamethasone is associated with resistance to non-depolarizing neuromuscular blocking agents. Previous studies have reported that chronic dexamethasone treatment induced alteration and upregulation in immature subunits of nicotinic acetyl-choline receptor in diaphragm of rats. However, there was no previous report about the effect of chronic exposure to dexamethasone on sugammadex reversal in rat diaphragm.

Materials and Methods: Male SpragueDawley rats (7-8 week-old; 242 ± 20 g) were randomized to receive a daily intraperitoneal injection of dexamethasone (500 ug/kg) in dexamethasone group or same amount of saline (0.9% NaCl) in control for 14 days. At 1, 3, 7 days after the last dexamethasone, the rats were anesthetized. The hemi-diaphragm with attached phrenic nerve intact was immediately obtained. After the elicited twitch tension by phrenic nerve had been stabilized, Train-of-four (TOF) was determined. Rocuronium 250 ug was then applied to the organ bath. Following

Recovery time to TOF-ratio (TOFR) > 0.9 and recovery index were observed.

Results and Discussion: No significant difference between groups with regard to diaphragm size and weight. Dose-response curve of rocuronium in 1 day after dexamethasone withdrawal (D1) group was shifted to right compared to control (p < 0.05), but curves in 3 and 7 days after dexamethasone withdrawal (D3, D7) groups were not significantly different.

stabilization. TOF was again determined with repetitive administration of cumulative

dose of Rocuronium 250 ug. After complete block (T1 is less than 5% of baseline)

was achieved, SGX twice as much as rocuronium-equimolar dose was applied.

Recovery time to TOFR > 0.9 and recovery index were  $12.8 \pm 4.9$ ,  $15.0 \pm 7.1$ ,  $10.2 \pm 3.3$ ,  $10.1 \pm 3.8$  and  $5.36 \pm 1.9$ ,  $5.8 \pm 3.3$ ,  $3.8 \pm 1.3$ ,  $3.12 \pm 1.2$  (min) in group C and group D1, D3, D7 respectively. It was not statistically significant in time to TOFR > 0.9, but recovery index in group D7 were significantly shorter than group C and D1. **Conclusion**: Chronic exposure to dexamethasone cause resistance of the rat diaphragm to rocuronium, as demonstrated by a right shift of the doseresponse curves. Furthermore, the pharmacodynamics change in dexamethasone treatment was recovered in 3 days after withdrawal. TOFR > 0.9 when reversed with SGX was not affected by dexamethasone administration. However, the recovery index in group D7 was shorter than group C and D1.

### 13AP08-10

Effects of perioperative single-dose dexamethasone on the recurrence and overall mortality after breast cancer surgery: A retrospective cohort study

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Background and Goal of Study: Although the potential concern that perioperative glucocorticoids may cause immunosuppression was raised, dexamethasone is widely used in cancer patients. However, existing reports which investigated the influence of dexamethasone on the oncological outcomes after curative surgery showed controversial findings. The aim of the present study was to compare postoperative recurrence and overall mortality in breast cancer patients between who received perioperative dexamethasone or not.

Materials and Methods: This retrospective study included the electronic medical documents of patients who underwent breast cancer surgery between November 2005 and December 2010. Identified patients were categorised according to whether or not received dexamethasone for any purposes by anaesthesiologists. Cox regression univariate and multivariate analyses were performed to evaluated any association with the postoperative recurrence and mortality according to dexamethasone usage. Additionally, propensity score matchings were conducted to adjust for selection bias.

Results and Discussion: Of 2,628 patients, 236 (8.5%) received perioperative dexamethasone. No differences on the recurrence and overall mortality after surgery were identified between the patients who received dexamethasone or not. After propensity score matchings, there were also no significant differences on the postoperative recurrence (HR, 1.188; 95%CI, 0.728-1.939; P = 0.491) and overall mortality (HR, 1.210; 95%CI, 0.715-2.050; P = 0.483) between two groups.

Conclusion: Perioperative single-dose of dexamethasone was not found to be associated with the recurrence or overall mortality after curative surgery in breast cancer patients. Our finding needs to be confirmed in further prospective randomised clinical trials.

### 13AP08-11

Elderly patients are one of the high-risk groups of recurarization due to insufficient dose of sugammadex

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Background and Goal of Study: Although sugammadex (SGX) is an effective reversal drug for rocuronium (Rb)-induced muscle paralysis, a 5 % incidence of postoperative residual paralysis after reversal with SGX without neuromuscular (NM) monitoring, and even recurarization cases were reported. Elderly patients are reported to have slow response to Rb and SGX. We aimed to test a hypothesis that recovery from deep NM block with insufficient SGX is slower in elderly patients.

**Materials and Methods**: The hypothesis was tested by comparing changes of the train-of-four ratio (TOFR) during recovery from Rb-induced NM block between 20 elderly patients (77  $\pm$  5 yrs) and 20 non-elderly patients (54  $\pm$  13 yrs) under total intravenous anesthesia with propofol and remifentanyl. TOFR was continuously measured during spontaneous recovery from Rb-induced NM block (0.6 mg kg-1) and after infusion of insufficient SGX (50µg kg-1 min-1) with using an acceleromyograph NM monitor. The study was completed after complete TOFR recovery by additional SGX. TOF recovery speed was estimated by the slope of the TOFR linear regression after spontaneous TOFR emergence (Spon TOFR recovery speed) and after cessation of the SGX infusion (SGX TOFR recovery speed: primary variable). Mann-Whitney rank sum test was used for comparisons of the NM variables between the groups. A multiple linear regression model and the minimum adequate model was obtained by minimizing the AIC for explaining SGX TOFR recovery speed. All p values were two sided, and a value of p < 0.05 was considered statistically significant.

Results and Discussion: Spontaneous TOFR recovery speed was significantly slower in the elderly group. After inadequate SGX infusion, TOFR recovery speed was significantly slower in elderly (median (25%, 75 percentiles): 0.55(-0.29, 1.54) %/min) compared to the non-elderly group (1.68(0.73, 3.13) %/min, p=0.006). Recurarization incidence was significantly higher in elderly compared to the non-elderly group (35% vs. 5%, p=0.044). Slower spontaneous TOFR recovery speed and impaired renal function are two major contributing factors for slow TOFR recovery speed after insufficient SGX.

Conclusion: Elderly patients are one of the high-risk population for recurarization or residual muscle paralysis due to insufficient SGX dosage. SGX dosage should be determined by NM monitoring, and not by clinical signs particularly in elderly patients with impaired renal function.

### 13AP08-12

Intravenous provocation with Neuromuscular Blocking Agents in the investigation of perioperative anaphylaxis – preliminary findings from the Danish Anaesthesia Allergy Centre(DAAC)

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Background and Goal of Study: Neuromuscular blocking agents (NMBA) are the most common culprits in perioperative anaphylaxis (PA) in many countries. As there is cross reactivity within NMBA's, testing with several drugs is needed to identify a safe alternative. Investigation of PA comprise in-vitro and skin testing, but due to the skin irritant properties of NMBA's the sensitivity and specificity of NMBA skin-tests are debated. In drug allergy investigation provocation tests are "Gold Standard", however it is not routine in PA. In DAAC, the national reference centre for investigation of PA, drug provocation has been routinely performed for most drugs since 2004. Since 2016 provocations have been performed with NMBA's in patients with negative or doubtful skin tests to ensure the highest accuracy of PA investigations. The aim of this study is to present the preliminary findings of this extended investigation program.

Materials and Methods: From 2004-2017 554 patients were investigated in DAAC. Since 2016 in total 49 NMBA provocations with the 4 NMBA's available in Denmark have been performed. Patients are fully monitored(ECG, saturation, BP), have nasal oxygen and anesthetic back up is available. Titrated provocation is done in 3 ten-fold steps up to a maximum of 1/10 of a full dose: cisatracurium 1 mg, suxamethonium 5 mg, rocuronium 5 mg, mivacurium 2 mg. Highest doses are given over 5-20 minutes by a trained anesthesiologist, and patients are closely observed for signs of allergy or effects of NMBA.

Results and Discussion: In the 554 patients 261 tests were positive; main culprits being antibiotics, chlorhexidine and patent blue. Only 14 tests(5,4%) were positive for an NMBA on skin testing. One patient out of 49 NMBA provocations in patients with negative or doubtful skin tests, had a positive provocation test. None of the patients experienced any NMBA effects at doses of 1/1000 and 1/100. Most patients experienced transient visual disturbance and two patients (both elderly ladies) had transient disturbance of tongue movement. None experienced respiratory difficulties or desaturation

Conclusion: Due to the skin irritant properties of NMBA's skin testing may be difficult to interpret and may lead to false positive results restricting future choice of NMBA. This study shows that low dose provocation with NMBA's is safe and well tolerated by patients. It should still be considered a high-risk procedure which should only be performed in highly specialized centres.

## 13AP09-1

Anaphylactic reaction in a patient undergoing open appendectomy and right hemicolectomy

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**Background:** Latex is one of the most common causes of intraoperative anaphylactic reactions. Despite the increasing number of detected latex allergies in general population, severe anaphylactic reactions during surgical procedures are still rare.

Case Report: A 19 year old male presented for an emergency appendectomy and right hemicolectomy after a car accident that resulted in necrosis of the appendix and right colon. The patient denied allergies and his preoperative medical history and physical examination were unremarkable. A rapid sequence induction was performed with fentanyl, propofol and rocuronium, and anaesthesia maintained with desflurane. At the beginning of the surgery the patient was hemodynamically stable. Approximately 50 minutes later, bronchospasm, tachycardia (135 beat/min) hypotension (68/40 mmHg) and desaturation (SpO2 89%) developed and wheezing and rales were detected. The patient was ventilated with 100% O2 and desflurane was replaced by sevoflurane. Two more large bore accesses were placed and rapid infusion of 1500 mL of Ringer's Lactate was initiated. Phenylephrine 100 μg, hydrocortisone 200 mg and 6 "puffs" of salbutamol were administered. No rash was noticed. The patient's vital signs recovered. At the end of the surgery, bronchospasm, tachycardia and desaturation developed again and skin eruptions involving the whole body and periorbital angioedema were seen. We assumed an anaphylactic reaction to latex, administered adrenalin 5 µg/kg (350 µg) and repeated salbutamol. After 10 minutes, all vital signs returned to normal. After a report of normal arterial blood gas values, the patient was transferred intubated to the ICU. The family of the patient was interviewed again and they refered that the patient had had periorbital and perioral edema when he used to blow rubber balloons during his childhood. No complications occurred during the postoperative course and the patient was discharged 3 days after surgery.

**Discussion:** The early recognition of signs and symptoms of anaphylaxis is essential for immediate treatment and prevention of adverse outcomes. A high suspicion index is also extremely important.

**Learning Points:** After clinical stabilization, measures should be taken to guide the diagnostic hypothesis (levels of tryptase). It is important to follow-up on these patients in order to confirm the latex allergy, thus allowing for safer future procedures.

## 13AP09-2

## Anaphylaxis in pregnancy: a case report

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**Background:** Anaphylaxis is currently defined as a serious allergic reaction that is rapid in onset and might cause death. Data regarding prevalence among pregnant women is limited, with an estimated prevalence near or at the time of delivery reported as 2.7 cases of anaphylaxis per 100.000 deliveries.1 During the first 3 trimesters, aetiologies are similar to those in non-pregnant women.

Case Report: A 19-year-old pregnant woman (30 weeks' gestation) presented to the emergency department complaining of back pain and flank tenderness. She had history of inadequate prenatal care and multiple urinary tract infections, with hospitalization at 28 weeks of pregnancy for pyelonephritis and treatment achieved with intravenous cefuroxime. This time hospitalization was also decided for surveillance and treatment with antibiotic therapy. Within 2 minutes after initiation of ceftriaxone IV, the patient developed facial swelling, dyspnoea (SpO2 92%) and severe hypotension. Ceftriaxone was immediately suspended. Hydrocortisone 200 mg IV, clemastine 2 mg IV and adrenaline 1 mg IM (mid-outer thigh) were administered. She had clinical improvement, presenting blood pressure was 92/57 mmHg, heart rate was 53 bpm, oxygen saturation was 98% (supplemental oxygen 6 L/min). Throughout the whole episode the obstetric evaluation was unremarkable and fetal sonographic examination was reported as normal. A cesarean delivery was not undertaken. The patient's hospital course was uneventful and she was discharged home 5 days later.

**Discussion:** Anaphylaxis during pregnancy, labour, and delivery is rare and can be catastrophic for the mother and, especially, the infant. In cases of anaphylaxis during pregnancy, both mother and fetus must be treated and continuous vigilance of fetal well-being for 48–72h after the episode is important in order to identify precocious signs of fetal distress.

Learning Points: Management of anaphylaxis in pregnant women is similar of that in non-pregnant ones. Treatment should start immediately to prevent further development of the anaphylaxis reaction and fetal neurological deficiency. References:

**1.** Mulla ZD, Ebrahim MS, Gonzalez JL. Anaphylaxis in the obstetric patient: analysis of a statewide hospital discharge database. Ann Allergy Asthma Immunol 2010:104:55–9

## 13AP09-3

# Hypothermia during general anaesthesia was associated with the postoperative delirium after endovascular repair of aortic aneurysm

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Background and Goal of Study: Postoperative delirium (POD) is an adverse complication that often occurs in patients undergoing vascular surgery. Endovascular repair of aortic aneurysm (EVAR) decreased the incidence of POD compared to open aortic aneurysm repair. Patients undergoing EVAR also exposed hypothermia during EVAR procedure because it is difficult to prevent heat loss from the body surface. We retrospectively investigated the risk factors of POD after EVAR to prove our hypothesis, the hypothermia during the surgery caused POD in patients undergoing EVAR.

Materials and Methods: After approval of Institutional Ethics committee, we conducted a retrospective review of all patients who underwent EVAR at our hospital from July 2015 to July 2017. Body temperatures (after anaesthesia induction, lowest, emergence from anaesthesia) and established risk factors were enrolled in multivariate logistic regression models. The POD was diagnosed using the Confusion Assessment Method for the ICU.

Results and Discussion: One hundred forty-one patients were enrolled. POD was present in 43 (30.5%) patients. Multivariate logistic regression identified two risk factors for POD: body temperature after induction of general anaesthesia (odds ration (OR)=0.261, 95% confidence interval (CI)=0.100-0.684) and pre-existing psychiatric disease (OR=11.627, 95%CI=1.171-115.438).

Our results showed that hypothermia at the end of general anaesthesia induction was associated to the POD. Twenty-four patients showed hypothermia (body temperature <36°C) at that time point. However, the lowest temperature during the anaesthesia or the body temperature at the emergence from general anaesthesia was not the risk factor for the POD in our result. Even though we did not measure the body temperature before the induction of general anaesthesia, the rapid dropping of the body temperature in the beginning of general anaesthesia seemed to be the risk factor for the POD. As our investigation is retrospective, the POD may be under-diagnosed in the ICU.

**Conclusion:** The hypothermia during general anaesthesia was associated with postoperative delirium in patients who had undergone endovascular repair of aortic aneurysm. Prospective study should be conducted to show the efficacy of intraoperative body temperature maintenance to prevent POD.

### 13AP09-4

## Introducing clevidipine in phaeochromocytoma surgery protocols

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**Background:** Phaeochromocytoma resection surgery implies potential hemodynamic instability that may require the use of vasoactive drugs to achieve an adequate blood pressure control. In this line, new drugs could be used as antihypertensives in this kind of surgery, in our case clevidipine.

Case Report: A 64-year old woman is admitted in our hospital for laparoscopic adrenalectomy in the context of a phaeochromocytoma. Other medical record: arterial hypertension with hypertensive cardiopathy, left ventricle hypertrophy, multinodular goitre, anxiety disorder. The patient is prepared for surgery with adrenergic blockade and volume optimization. Once the patient is optimized, she is taken to the operating theatre for surgery. After anesthetic induction with close blood pressure monitoring with an arterial cannula surgery starts. As the surgeon manipulates de tumour a hypertensive peak (SBP>180mmHg) occurs. A continuous infusion of clevidipine is administered with a maximum speed of 16mg/h. During the whole procedure hemodynamic stability is assured. Once the tumour is removed from the patient the requirement of clevidipine drops to 4mg/h, which continues to be necessary for some hours in the ICU. The next day the patient presents blood pressure values that can be controlled with oral nifedipine which allows to withdraw the clevidipine continuous infusion. The patient is discharged from the ICU to regular hospitalization area with optimal blood pressure control.

**Discussion**: Clevidipine continuous infusion use in phaeochromocytoma surgery is not common. Clevidipine can be a new and very useful resource to be introduced in this kind of surgery. Its rapid onset of effect and ultra-short half-life make it a really interesting drug. On top of that it has a very low incidence of adverse effects and it can be very easily titrated to get to our target blood pressure.

### References:

- Naranjo J, et al. (2017), Perioperative Management of Pheochromocytoma. Journal of Cardiothoracic and Vascular Anesthesia , Volume 31 , Issue 4 , 1427 – 1439
- Augoustides et al. Perioperative Management of Pheochromocytoma: Focus on Magnesium, Clevidipine, and Vasopressin. Journal of Cardiothoracic and Vascular Anesthesia, Vol 26, No 3 (June), 2012: pp 526-531

**Learning points**: This case report wants to call attention to the potential benefits of clevidipine in phaeochromocytoma surgery. Its pharmacokinetic and pharmacodynamic properties make clevidipine a safe and highly useful drug.

## 13AP09-5

## Perioperative Takotsubo: What have we learnt? A case series study

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Background and Goal of Study: Takotsubo Syndrome (TS) is a reversible acute cardiomyopathy triggered by either physical or emotional stress. TS may be classified as: a) perioperative Takotsubo Syndrome (PTS), occurring in the context of surgical or anaesthetic procedures, or b) non-perioperative Takotsubo Syndrome (NPTS), occurring in the context of an acute medical illness. There are few reports on this subject. We aimed to study this condition and its physical triggering events, and to compare the inpatient course and outcomes between PTS and NPTS.

Materials and Methods: We conducted a retrospective review of the medical records of 51 consecutive patients admitted and diagnosed with TS due to physical triggers between 2008 and 2017. Patients were divided into PTS or NPTS groups, based on the triggering event. Qualitative variables were compared using the chi-square test or Fisher's exact test. The Student's t test or Wilcoxon rank-sum test was used to compare the distribution of quantitative data as appropriate.

Results and Discussion: Twenty-one patients were diagnosed with PTS and thirty were diagnosed with NPTS. Coronary stenosis was ruled out using coronary angiography in thirty-four patients (66%). Two patients (9%) underwent cardiac magnetic resonance, and one patient (4%) had a myocardial perfusion scan. The patients were also classified using the American Society of Anesthesiologists (ASA) physical status classification system. Of patients with PTS, eleven (52.4%) were categorized as ASA I-II. Eight (38%) cases of PTS occurred intra-operatively, seven (33.33%) cases occurred within 72 hours postoperatively, and six (28.67%) cases occurred beyond 72 h after surgery. Patients with PTS were significantly younger than those with NPTS (74 vs. 84 years, p = 0.0046) and had significantly lower left ventricular ejection fractions (EF) upon diagnosis (35% vs. 42.5%, p=0.0244), higher inotrope use (71.4% vs. 40%; p=0.027), and longer inpatient stays (7 days vs. 5 days, p=0.045). Both groups had complete left ventricular motion recovery upon discharge. Overall mortality was 9.8%, with no significant difference between the groups, probably due to low power.

**Conclusion**: Our single-centre experience showed a mortality rate close to 10%, matching the experiences of other centres. Patients with PTS had worse EFs at diagnosis, higher rates of inotrope use, and required longer inpatient stays.

### 13AP09-6

## Poor Quality of Recovery in postpartum period

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**Background and Goal of Study**: Quality of recovery is an important measure with impact in satisfaction and quality of life. The study aims to evaluate the incidence of poor quality of recovery (PQR) during the first 24 hours and the impact on overall satisfaction with the delivery experience.

Materials and Methods: After approval of Ethics Committee a prospective observational study was conducted during one month in labor women submitted to epidural analgesia (EA). Sociodemographic, obstetric, anesthetic and puerperal data were collected. The verbal numerical pain scale (NPS) was used and two questionnaires were performed: one of satisfaction with the delivery experience and the QoR-15 quality of recovery questionnaire. PQR was defined as a QoR-15 score lower than the mean QoR-15 score at T1 minus 1 standard deviation. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.

Results and Discussion: One hundred thirty-one patients were enrolled for this study. The incidence of PQR was 13%. There were no differences in demographic and obstetric data and in anaesthetic conduct. Women with caesarean delivery presented more often PQR than those with vaginal delivery (53% vs 47%, p=0.048). In postpartum, women with PQR presented higher scores of NPS (5 vs. 3, p=0.007) and more frequently nausea (35% vs. 14%, p=0.03) and pruritus (50% vs. 21%, p=0.01). They also had a longer hospital stay (4 vs. 3, p=0.001). PQR had lower scores at all QoR-15 items and in total score (86 vs 121, p<0,01). These patients were less satisfied when questioned about "Pain after epidural bothered me a lot." (24% vs. 10%, p=0.04), "In a future birth, I wish to have the same labor analgesia. " (36% vs. 5%, p=0.03) and "Overall, I enjoyed the experience I had with the birth of my baby." (42% vs 10%, p<0.01).

**Conclusion**: PQR in obstetrics is not rare condition. Women with PQR had more pain, longer hospital stay and were less satisfied with the delivery experience.

## 13AP09-7

## Postoperative functional disability for patients undergoing surgery with general anesthesia

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Background and Goal of Study: The postoperative functional disability is one of the most important concerns for the patients who undergo surgery. The study was designed to determine the occurrence and the risk factor of postoperative functional disability.

Materials and Methods: The clinical research ethics committee of our hospital approved this study. Individuals aged ≥55 years who were scheduled to undergo surgery in our hospital between April 2016 and March 2017 were eligible. Patients with diseases requiring psychiatric treatment and patients who were unable to complete the questionnaire without help were excluded. The 12-item WHODAS2.0 was used to evaluate functional disability before surgery for baseline assessment and on 3 months after surgery. Patient's demographics and intraoperative data were also collected. The weighted WHODAS2.0 score of greater than or equal to 25% was considered as clinical disability according to previous reports. Cox proportional hazards model was applied to determine risk factors for postoperative functional disability.

Results and Discussion: Of 1759 recruited patients, 1331 (75.6%) were included in our study. Mean age was 69.6-year-old and 55% of the patients were male. At 3 months after surgery, 428(32%) had clinical functional disability. Table 1 shows the risk factors for postoperative functional disability. The study indicates that evaluation of preoperative patient's condition is mandatory to improve patients postoperative outcome.

**Conclusion**:In total, 32% had postoperative functional disability on 3 months after surgery. Risk factors for these included variables such as nutritional condition, respiratory function and surgery time.

Table 1 Risk factors of postoperative functional disability

	Risk Ratio	95.0% CI	P value
Age(y)	1.01	1.00-1.03	0.027
Body mass index 30≤	1.66	1.12-2.47	0.011
Restrictive lung disease	1.48	1.05-2.09	0.024
Mixed lung disease	1.83	1.06-3.15	0.03
Preoperative use of steroid	1.69	1.28-1.92	0.015
Risk of malnutrition	1.57	1.28-2.34	0.001>
Malnutrition	1.63	1.13-2.35	0.009
Blood loss(100-499mL)	1.39	1.12-1.73	0.003
Blood loss(500mL≦)	1.44	1.09-1.94	0.009

## 13AP09-8

## Postoperative hypothermia and clinical outcome in elderly patients

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Background and Goal of Study: Early postoperative hypothermia is a preventable complication with adverse consequences on morbidity and patient well-being, particularly in elderly. Our study aimed to determine the incidence of early postoperative hypothermia and its related clinical outcome in elderly patients.

Materials and Methods: We conducted an observational prospective study after approval by the Institutional ethics committee. Patients aged>60 years, submitted to elective surgery and admitted to Post Anaesthetic Care Unit (PACU) were included. Clinical Frailty Scale was used to evaluate vulnerability and frailty was defined as a score ≥5. The score of the World Health Organization Disability Assessment Schedule (WHODAS) was used to assess disability. The Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) was calculated. At PACU admission, patients with an auricular temperature <35°C were considered to be hypothermic patients (HPP). Richmond Agitation Sedation Scale (RASS) was used at PACU admission (T0) and 15 minutes later (T15). Quality of Recovery was evaluated using Quality of Recovery-15 (QoR-15) 24 hours (T24) after surgery. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparison.

Results and Discussion: Of a total of 235 patients, 26% were HPP at PACU admission. HPP had lower scores of RASS at T0 (p=0.044) but at T15 these scores were similar. Hypothermia incidence was related to type of anesthesia (62% for general anesthesia vs. 22% for combined general and regional vs. 17% for regional anesthesia, p=0.030) and HPP had a median longer time of anesthesia (141 vs.125 minutes, p=0.030). These patients were less frequently frail (13% vs. 26%, p= 0.048) and had lower median global WHODAS scores (8.3 vs 14.6, p=0.018). According to POSSUM, HPP had higher risk of morbidity (43% vs 36%, p=0.016) and higher risk of mortality (11% vs. 10%, p=0.023). These patients developed more frequently cardiac events (5% vs. 0%, p=0.003). At T24 HPP median total scores for QoR-15 were similar.

Conclusion: The incidence of hypothermia was considerably high and was less frequent among frailty patients and in patients with problems in physical functioning and quality of life. Patients with hypothermia were at higher risk of mortality and morbidity and had more frequently cardiac events but their quality of recovery was similar.

## 13AP09-9

## Post-operative nausea and vomiting in bariatric patients undergoing laparoscopic sleeve gastrectomy

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Background and Goal of Study: Studies have shown the incidence of postoperative nausea and vomiting (PONV) in patients undergoing bariatric surgeries was very high in spite of pharmacological prophylaxis or adjustment of anesthetics. Nevertheless, evidence has indicated goal-directed fluid therapy (GDFT) improves outcomes including PONV in major abdominal surgeries. The aim of our study is to investigate the effect of GDFT on reducing the incidence of PONV in patients undergoing laparoscopic sleeve gastrectomy (LSG).

Materials and Methods: Twenty-one bariatric patients undergoing LSG were randomly assigned into two groups in this prospectively pilot study. All patients received general anesthesia following consistent anesthesia protocol. In the treatment group (n=10), stroke volume variation (SVV)-based GDFT with crystalloid was utilized. In the control group (n=11), weight-based fluid management as routine perioperative care was applied. PONV was evaluated by a standardized questionnaire at 1h, 24h and 48h after the surgery.

The baseline characteristics and comorbidities between the two groups of patients were similar. There was no significant difference in intraoperative infused fluid between GDFT group and control group (1633±381 vs. 1699.3±314.7 ml). The PONV data at post-op 1h, 24h and 48h showed no significant reduction in the incidence of PONV in GDFT group compared with control group (5/10 vs. 5/11, 6/10 vs. 4/11, and 1/10 vs. 2/11, respectively).

Results and Discussion: The GDFT group did not represent obvious intraoperatively infused volume difference compared with the control group. It was speculated that LSG is a relatively hemodynamically-stable surgery without massive hemorrhage or intravascular volume shifting. The surgical duration is usually 2~3 hours. Weight-based fluid strategy would not easily diverge adequate intraoperative volume. In addition, using crystalloid as a fluid challenge option to achieve the setting cut-off of GDFT (SVV<10%) would expand the demand of intraoperative fluid compared to colloid.

**Conclusion:** In conclusion, there was no significant effect of GDFT with crystalloid on reducing the incidence of PONV in patients undergoing laparoscopic sleeve gastrectomy (LSG). The effect of GDFT with other types of fluid to reduce PONV should be further investigated and determined.

## 13AP09-10

## Urinary strong ion difference as an early marker of acute kidney injury following major abdominal surgery

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Background and Goal of Study: Perioperative Acute Kidney Injury (AKI) is associated with significant morbidity and mortality [1]. The kidneys play a crucial role in regulating acid-base homeostasis. Normal kidneys counteract increases in circulating acids by increasing urinary chloride excretion, hence decreasing the urinary strong ion difference [(SIDU) = NaU+KU-CIU]. AKI could be manifested by the early inability to increase urinary chloride excretion, resulting in higher SIDU values, as shown in critically ill medical patients [2]. Aim of this prospective observational study was to evaluate SIDU as an early indicator of perioperative AKI in a cohort of major surgery patients.

Materials and Methods: 68 patients were studied. AKI was defined according to AKIN criteria within 48 hrs after surgery [3]. At pre-defined time points (preoperatively, recovery room and on postoperative days 1 to 3) simultaneous serum and urine samples were analyzed for urea, creatinine, Na, K, CI, while SIDU was calculated. The change in SIDU (ΔSIDU) values compared to the preoperative SIDU was calculated as well.

Results and Discussion: 16 patients (23.5%) developed AKI. While there was no difference in preoperative SIDU values between AKI and non-AKI patients (60.3±24.2 vs 62±27.9 mEq/l, p=0.36), postoperative SIDU was higher in AKI patients at all time points. This was already evident in the recovery room, where ΔSIDU was significantly lower in AKI compared to non-AKI patients (-15.4±39.3% vs -54.8±56.3% respectively, p=0.02), indicating early impaired chloride excretion. Conclusion: In a general surgery population a significantly smaller decrease in postoperative SIDU values was an early indicator of perioperative AKI development, preceding formal AKI diagnosis. Additional studies must confirm these findings and re-evaluate this simple parameter as potential AKI monitoring tool.

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## 13AP09-11

## Smoking cessation causes temporary hyper-activation of human platelets induced by collagen

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Background and Goal of Study: Smoking is a risk factor for diseases including myocardial infarction, stroke and peripheral vascular disease. In addition, smoking is also recognized to increase the risk of postoperative morbidity and mortality. Thus, smoking cessation is recommended for patients undergoing surgery. Thrombosis is triggered by platelet activation. It is known that platelet hyper-aggregability is observed in smokers than in non-smokers. Collagen is one of the most important stimuli for platelet activation. Accompanied by platelet aggregation, activated platelets secrete platelet-derived growth factor-AB (PDGF-AB), a potent mitogenic growth factor. However, influence of smoking on human platelet activation remains controversial. In the present study, we investigated the effect of smoking cessation on collagen-induced platelet aggregation and PDGF-AB secretion.

Materials and Methods: We enrolled 21 patients who visit smoking cessation outpatient services between January, 2012 and November, 2014. After obtained written informed consent, blood samples were donated 4 times as follows: before smoking cessation, and 4, 8 and 12 weeks after smoking cessation. Platelet-rich plasma (PRP) was stimulated by collagen. Platelet aggregation was monitored using laser-scattering aggregometer. After the stimulation, the mixture was centrifuged, and supernatant was analyzed by enzyme-linked immunosorbent assay (ELISA) for PDGF-AB. The data were analyzed by Student's t-test.

Results and Discussion: Human platelet aggregation by collagen was accelerated at 4-8 weeks after smoking cessation compared with before cessation and returned to almost similar levels before cessation at 12 weeks after cessation. The levels of secreted PDGF-AB by collagen were higher at 4-8 weeks after cessation compared with before cessation, and returned to similar levels before cessation at 12 weeks. Smoking cessation caused transient up-regulation of human platelet aggregation and PDGF-AB secretion.

**Conclusion**: Smoking cessation causes temporary hyper-activation of human platelets. We should be careful to the possibility of complications due to the upregulated activation of human platelets in the short term after smoking cessation.

## 13AP09-12

Saline poisoning caused by Laser-Photo-Vaporization XPS-180W: A different irrigation fluid absorption syndrome. Acute pulmonary oedema and hyperchloremic metabolic acidosis without hyponatremia

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**Background**: Photoselective vaporization of the prostate (PVP) is an endoscopic urological technique using saline 0.9% as irrigation fluid, preventing the Transurethral Resection Syndrome (TURP). Fluid absorption is frequent, but clinical symptoms are rare and only mild to moderate. We present a case of irrigation fluid absorption syndrome in a PVP, with significant clinical manifestations.

Case Report: 75-years-old male was scheduled for a Laser PVP. The procedure lasted 35 min. under spinal anaesthesia. Ending the surgery patient becomes breathless, abdomen was distended and he has subconjubctival oedema. Abdominal ultrasound found free fluid and he was reoperated objectifying a capsular perforation. During the procedure he developed acute pulmonary oedema. Blood test results showed pH 7.17, PCO2 49.2 mmHg, bicarbonate 17.5 mmol/L, Na 147 mmol/L and Cl 118 mmol/L. Furosemide 40 mgr was prescribed to achieve negative fluid balance, with good response allowing extubation after 7 hours, and -2240 ml of balance. He left the recovery room next day.

**Discussion**: Complications of endourologic procedures are well-known<sup>1</sup>. The most fearful is the TURP associated to Monopolar Transurethral Resection; it results from the absorption of hypotonic irrigation solution (glycine). It leads to a fluid overload with hyponatremia, causing neurological and hemodynamic symptoms. New technologies try to prevent it, replacing the irrigation fluid for saline solution; that's the case of the Green-Light laser vaporisation, which has been shown to be safe and effective<sup>2</sup>. Fluid absorption during the PVP using the 2nd generation laser has been assessed and reported but without clinical correlation<sup>3</sup>. Our patient had hypervolemia, leading to lung and metabolic failure. The hemodynamic alterations are similar to those described in the TURP, but with hyperchloremic metabolic acidosis and no hyponatremia. They both have the same treatment, forcing negative balance and support measures.

### References:

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**Learning points:** Laser-photo-vaporization of the prostate is not a risk-free technique; reabsorption of the irrigation isotonic fluid (saline solution 0.9) can lead the patient to a dangerous situation. Fortunately serious complications are

## 13AP10-1

# A predicting severity surgical scoring system and outcome in elderly patients undergoing anesthesia

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**Background and Goal of Study**: A new scoring system that assesses perioperative patient statuses was developed to predict outcome and severity at the end of anesthesia. The surgical apgar score and the American Society of Anesthesiologists physical status (ASA-PS) were combined into a scale: SASA. We aimed to determine SASA score and its clinical outcomes in elderly patients undergoing anesthesia.

Materials and Methods: We conducted an observational prospective study after approval by the ethics committee. Patients aged >60 years, submitted to elective surgery and admitted to Post Anesthesia Care Unit were included. Charlson comorbidity index(CCI) evaluated preoperative morbidity. Clinical Frailty Scale assessed vulnerability before surgery(D0) and 30 days(D30) later: frailty patients were defined as having a score≥5. The Lawton Instrumental Activities of Daily Living Scale and the World Health Organization Disability Assessment Schedule(WHODAS) were evaluated on D0, D30 and 3 months later(M3) to assess dependency and disability. Intraoperative data -lowest heart rate, mean arterial pressure and estimated blood loss- and ASA-PS were used to calculate SASA. Patients with SASA<13 were considered patients with predicted poor outcome(PPO). The Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) was calculated. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparison.

**Results and Discussion**: From a total of 235 patients, 32.3% were PPO. They were older (p=0.037), more frequently were ASA-PS III/IV (p<0.001) with a higher median score of CCI (8 vs 5 p=0.001). Patients were frailer at D0 (p<0.001) and M3 (p<0.001) and more dependent at D0 (p=0.001) and M3 (p=0.001), with higher median scores on WHODAS at D0 (29 vs. 8 p<0.001) and D30 (31 vs.17 p<0.001). Intraoperatively, they needed more frequently colloids infusion (9,3% vs. 3% p=0.028) and blood transfusions (8 %vs. 1% p=0.014). According to POSSUM, these patients had higher risks of morbidity (46% vs 34% p<0.001) and mortality

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abdominal surgery

(13% vs. 9% p<0.001). They had a longer hospital stay (8 vs. 4 days p<0.001). higher mortality (8% vs. 2% p=0.034) and rate of reoperation at M3 (19% vs 7% p=0.005).

Conclusion(s): In our study, SASA score<13 had shown to be useful to identify dependent and frail patients having more comorbidities and blood transfusion needs. It was also related with higher hospital stay, mortality and reoperation rate in elderly patients.

### 13AP10-2

## Postoperative outcome after hip fracture surgery in Östergötland county council in Sweden

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Background and goal of study: Almost 18 000 hip fractures occur annually in Sweden. Although these patients have an increased mortality compared to an ageand gender-matched population all prognostic factors are not yet fully understood or identified. The relative contributions of process-, patient-, surgery- and anaesthesiarelated factors have seldom been studied together. This study aimed to identify important predictors of short- and mid-term mortalities after hip fracture surgery

Methods: We conducted a retrospective registry-based cohort study of 1318 patients undergoing hip fracture surgery in Östergötland County Council between January 2014 and December 2015. Several process-, patient-, surgery- and anaesthesia-related factors were examined to investigate their association with risk of death - age, sex, ASA-PS-class, time to surgery, length of surgery, length of stay at the postoperative care unit (PACU-LOS), ICU-admission and university hospital status. Multivariable logistic regression analysis was used to identify risk factors independently associated with mortality. The main outcomes were 30-day and 12-month mortalities

Results and Discussion: 30-day mortality was 8.6% and 12-month mortality was 24.4%. Despite similar baseline patient characteristics, non-university hospital status was independently associated with increased mortality for both outcome measures, ICU-admission was a statistically significant determinant for an increased risk of death 30 days after surgery but not at 12 months. Time to surgery, length of surgery, type of anaesthesia and length of stay at the postoperative care unit were not predictors of mortality. (see Table)

Conclusions: Age, sex and ASA-PS-class are independent predictors for shortand mid-term mortality. Our results also indicate that ICU-admission post-surgery is independently associated with short-term mortality for hip fracture patients. For Östergötland County Council there seems to be a discrepancy in surgical outcome dependent on university hospital status. These findings require confirmation in larger populations with adjustment for other potential confounders.

## 13AP10-3

## Days alive and out of hospital within 90 days after fasttrack total hip and knee arthroplasty

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Background: Davs alive and out of hospital (DAOH) could be an alternative outcome measure for medical [1], and perioperative outcome studies. [2] However, lack of procedure specific data and standardized perioperative care may hinder interpretation. The aim of this study was to investigate DAOH in fast-track total hip (THA) and knee arthroplasty (TKA)

**Methods**: An 8 center cohort study from 2012-2015 with prospective data on comorbidity and complete follow-up on length of hospital stay (LOS) and 90-days readmissions/mortality using the Danish National Patient Registry and evaluation of discharge records. LOS was counted as postoperative nights in hospital Readmissions were counted as days in hospital, excluding emergency room/ outpatient visits. We compared high vs. low-risk patients according to a previously published preoperative risk-score for medical complications.[3]

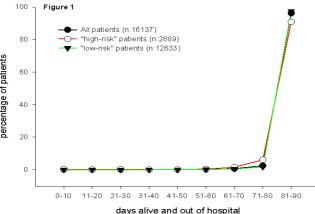
Results: Of 16137 procedures, 2889 (19%) were in high-risk and 12633 (81%) in low-risk patients (data missing in 615 patients). Median LOS was 2 days (IOR 2-3). 90-days readmissions were 8.2 % and mortality was 0.3%. Median DAOH was 88 days (IQR 87-88) and >96 % of patients had DAOH of 81-90 days, but reduced in high vs. low-risk patients (91% vs. 97% p<0.001) (fig. 1 and table 1)

Discussion: We found a high rate of DAOH in fast-track THA an TKA, although less in high-risk patients. In contrast to a study in mixed procedures measuring 30 days DAOH [2], the clinical relevance of 90-days DAOH was limited considering the rarity of DAOH <81. including in high-risk patients.

Conclusion: The clinical relevance of 90-days DAOH as an outcome measure may be limited in fast-track THA and TKA, although high-risk patients have significantly fewer DAOH.

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	All patients (n:18241) n (%; 95%CI)	LOS ≤5 days (n:17474) n (%; 95%CI)	LOS >5 days (n:767) n (%; 95%CI)
Any TEE	165 (0.9; 0.8-1.1)	118 (0.7; 0.6-0.8)	47 (6.1; 4.6-8.1)
Any VTE	90 (0.5; 0.4-0.6)	72 (0.4; 0.3-0.5)	18 (2.4; 1.5-3.7)
- DVT	44 (0.3; 0.2-0.3)	39 (0.2; 0.2-0.3)	5 (0.7; 0.3-1.5)
- PE	41 (0.2; 0.2-0.3)	29 (0.2; 0.1-0.2)	12 (1.6; 0.9-2.7)
- Both	5 (0.0; 0.0-0.1)	4 (0.0; 0.0-0.1)	1 (0.1; 0.0-0.7)
Any ATE	75 (0.4: 0.3-0.5)	46 (0.3: 0.2-0.4)	29 (3.8: 2.6-5.4)
- MI	33 (0.2; 0.1-0.3)	23 (0.1; 0.1-0.2)	10 (1.3; 0.7-2.4)
<ul> <li>Stroke/TIA</li> </ul>	42 (0.2; 0.2-0.3)	23 (0.1; 0.1-0.2)	19 (2.2; 1.4-3.5)
All-cause mortality	47 (0.3; 0.2-0.4)	34 (0.2; 0.1-0.3)	13 (1.7; 1.0-2.9)
<ul> <li>Fatal PE</li> </ul>	3 (0.0; 0.0-0.1)	3 (0.0; 0.0-0.1)	0 (0.0; 0.0-0.0)
<ul> <li>Fatal MI</li> </ul>	5 (0.0; 0.0-0.1)	5 (0.0; 0.0-0.1)	0 (0.0; 0.0-0.0)
<ul> <li>Fatal stroke/TIA</li> </ul>	4 (0.0; 0.0-0.1)	1 (0.0; 0.0-0.0)	3 (0.4; 0.1-1.0)
- Unknown	17 (0.1; 0.1-0.2)	15 (0.1; 0.1-0.2)	2 (0.3; 0.1-0.9)

### 13AP10-4

**Development of the Combined Assessment of Risk** Encountered in Surgery (CARES) surgical risk calculator for prediction of post-surgical mortality and need for Intensive Care Unit admission risk - A Single-Centre Retrospective Study

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Background and Goal of Study: Accurate surgical risk prediction is paramount in clinical shared-decision making. Existing risk calculators have limited value in local practice due to lack of validation and inclusion of non-routine variables. We aim to develop a simple, locally-derived and validated surgical risk calculator predicting 30-day postsurgical mortality and need for intensive care unit (ICU) stay (>24 hours) based on routinely collected preoperative variables. We postulate that accuracy of a clinical history-based scoring tool could be improved by including readily available investigations, such as Haemoglobin (Hb) level and Red Cell Distribution Width (RDW)

Materials and Methods: Electronic medical records of 90785 patients, who underwent non-cardiac and non-neuro surgery between 2012 and 2016 in Singapore General Hospital were retrospectively analysed. Patient demographics. comorbidities. laboratory results, surgical priority, and surgical risk were collected. Outcome measures were death within 30 days of surgery and ICU stay longer than 24h. After excluding missing data, the final data set had 79,914 cases, which was divided randomly into derivation (70%) and validation cohort (30%). Multivariate stepwise logistic regression analysis identified 7 variables that predicted 30-day mortality, and 7 variables that predicted ICU stay > 24h. These variables were combined into a single model with 9 variables predicting both outcomes. The odds ratios of the variables on multivariate regression were assigned ranks, which were used to construct the calculator

Results and Discussion: Observed mortality was 0.6%. The CARES surgical risk calculator had 9 variables - Age, Surgical Risk, Anaemia, RDW, ischaemic heart disease, American Society of Anaesthesiology Physical status score, Surgical priority, gender and presence of congestive heart failure. AUROC of the derivation and validation cohorts for mortality were 0.934(0.917-0.950) and 0.934(0.912-0.956) respectively, while AUROC for ICU admission was 0.863 (0.848-0.878) and 0.837(0.808-0.868) respectively. CARES had better AUROC than ASA-PS for both outcomes. CARES scores can be divided into low, low-moderate, moderate-high and high risk bands for both outcomes based on incidence of outcomes in these

Conclusion: The CARES surgical risk calculator offers a simple and accurate prediction of both postoperative mortality and need for ICU admission after surgery.

However, there are no studies investigating the association between AKI and CKD after major abdominal surgery. In addition, recent investigations suggested that patients with cancer develop CKD after AKI2). The aim of this study was of to determine the association between CKD and AKI in cancer patients after major abdominal surgery. To this end, we retrospectively studied non-CKD patients who underwent major abdominal surgery and developed AKI after surgery Materials and Methods: A total of 478 patients who underwent major abdominal

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Background and Goal of Study: Several studies showed that acute kidney injury

(AKI) is associated with chronic kidney disease (CKD) after cardiac surgery

Cancer and acute kidney injury are independent risk

factors of postoperative kidney disease after major

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surgery (excluding renal and urological surgery) between 2013 and 2015 were followed for 2 years. AKI was defined as KDIGO classification and CKD was defined using guidelines of Japan Society of Nephrology. Cox regression analysis and multivariate logistic analysis were performed for abdominal surgery with cancer and non-cancer patients by matching propensity scores. The propensity score for abdominal surgery for cancer was estimated using age, preoperative eGFR and AKI covariates.

Results and Discussion: A total of 101 patients developed CKD (21%). AKI was associated 26 patients (36%, p=0.002) and cancer surgery was included 70 patients (69%, p=0.003). Matching was possible for 110 cases. During the 2-years followup, 11 cases (20%) developed CKD after cancer surgery as opposed to 2 cases (3.6%) in non-cancer surgery (hazard ratio: 4.9; 95% CI: 1.3 to 31.6; p=0.016). On the other hand, 6 cases (46%) developed AKI as opposed to 13 cases (8.1%) in the non-AKI group (hazard ratio: 4.7; 95% CI: 1.5 to 14.2, p=0.009). Multivariate logistic analysis showed that AKI and cancer surgery are risk factors for CKD (AKI: odds ratio: 6.6, 95% CI 1.3 to 39.4, p=0.025; cancer surgery: odds ratio: 8.8, 95% CI: 1.6 to 81.5, p=0.009). These results indicate that the risk of CKD in cancer patients who undergo major abdominal surgery and have AKI during the perioperative period is higher than in non-cancer patients without AKI.

Conclusion(s): This study shows that cancer and AKI are independent risk factors for CKD after major abdominal surgery.

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## 13AP10-6

## Association of intravenous maintenance fluid with acid base balance in adult postoperative critically ill patients

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Background and Goal of Study: We reported that the use of intravenous maintenance hypotonic fluid was significantly associated with an increased risk of hyponatremia compared to the use of isotonic fluid in adult postoperative critically ill patients (J Anesth 2017). The change in serum sodium concentration may affect the metabolic acid base balance by a change in the strong ion difference. We compared the postoperative changes in the metabolic acid base balance in patients who received hypotonic fluid and those who received isotonic fluid as postoperative intravenous maintenance fluid

Materials and Methods: This retrospective before/after study was approved by the ethics committee. We screened adult patients who underwent an elective operation for esophageal cancer or for head and neck cancer. Among them, we included patients who received postoperative intensive care for more than 48 h during the period from August 2014 to July 2016. In those patients, hypotonic fluid had been administered as maintenance fluid until July 2015. From August 2015, the protocol for postoperative maintenance fluid was revised to the use of isotonic fluid. We compared the changes of metabolic factor in acid base balance and electrolyte in the patients from intensive care unit admission to the morning of postoperative day 2 in these two periods.

Results and Discussion: We included 129 patients. As postoperative maintenance fluid, hypotonic fluid was used in 66 patients and isotonic fluid was used in 63 patients. Although the serum sodium concentration in the hypotonic fluid group was significantly lower than that in the isotonic fluid group (-4.7 vs -1.4 mmol/L, p<0.001), the change in the base excess was not significantly different (+1.7 vs +1.0 mmol/L p=0.11). We examined this mechanisms using Stewart approach. It was found that the serum chloride concentration also decreased significantly in the hypotonic fluid group, and there was therefore no significant difference in the change in the strong ion difference. There was also no significant difference between the two groups in postoperative changes in effective strong ion difference and total weak acid.

Conclusion: The use of hypotonic fluid as postoperative maintenance fluid reduced the serum sodium and chloride concentrations compared with those when isotonic fluid was used. There was no difference in strong ion difference. As a result, the choice of fluid did not affect the acid base balance

### 13AP10-7

## Effect of intra-operative hyperoxia on the incidence of surgical site infections: a meta analysis

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Background: Whether supplemental intraoperative oxygen reduces surgical site infections remains unclear. Recent recommendations from the World Health Organization and Center for Disease Control to routinely use high inspired oxygen concentrations to reduce infection risk have been widely criticized. We therefore performed a meta-analysis to evaluate the influence of inspired oxygen on infection risk, including a recent large trial.

Methods: A systematic literature search was performed. Primary analysis included all eligible trials. Sensitivity analyses distinguished studies of colorectal and noncolorectal surgeries, and excluded studies with high risk of bias. Another post-hoc sensitivity analysis excluded studies from one author that appear questionable.

Results: The primary analysis included 26 trials (N=14,710). The RR [95%CI] for wound infection was 0.81 [0.70, 0.94] in the high vs. low inspired oxygen groups. The effect remained significant in colorectal patients (N=10,469), 0.79 [0.66, 0.96], but not in other patients (N=4,241), 0.86 [0.69, 1.09]. When restricting the analysis to studies with low risk of bias, either by strict inclusion criteria (N=5,047) or by researchers' judgment (N=12,547), no significant benefit remained: 0.84 [0.67, 1.06] and 0.89 [0.76, 1.05], respectively.

Conclusions: When considering all available data, intraoperative hyperoxia reduced wound infection incidence. However, no significant benefit remained when analysis was restricted to objective- or investigator-identified low-bias studies, although those analyses were not as well powered. Meta-analysis of the most reliable studies does not suggest that supplemental oxygen substantively reduces wound infection risk, but more research is needed to fully answer this question

### 13AP10-8

Effect of preoperative forced-air warming on intraoperative tissue oxygenation, microperfusion and body core temperature in patients with ovarian cancer undergoing major cytoreductive surgery

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Background: Cytoreductive surgery is associated with extensive fluid resuscitation, inadvertent period. hypothermia and high dose usage of vasopressors which may alter intraop, tissue oxygenation (SpTiO2), microperfusion and subsequently reduce postop, outcome. We hypothesize that preop, forced-air warming (PW) may help to prevent intraop. hypothermia as a prerequisite to improve SpTiO2 and

Materials and Methods: After ethics approval 47 women scheduled to have cytoreductive surgery were prospectively enrolled. All women received thoracic PDA, arterial line, central venous catheter during induction of GA and intraop. forced-air warming. According to their randomization women were treated with either 30min. of 43°C PW (gr. 1), PW + subcutaneous microdialysis (MD, upper arm, gr. 2), MD without PW (gr. 3) or no intervention (gr. 4). SpTiO2, central venous-arterial carbon dioxide difference (dCO2) and ethanol ratio via MD for microperfusion and core temp. (hourly) were defined as primary outcome. Additionally, hemodynamic parameters (MAP, CVP, HF, norepinephrine) and glucose, lactate and glycerol in MD were obtained. Statistical analysis was performed using the Mann-Whitney-U-Test and non-parametric-longitudinal analysis.

Results: No significant differences in SpTiO2 of 86.0% (84.0-88.0) in group 1+2 (n= 24) compared to 84.0% (80.0 - 87.5) in group 3+4 (n=23) were detectable at 60min and over the entire intraop. period. The dCO2 at 60min (gr. 1+2: 6.3mmHg (5.4 - 7.8) vs. gr. 3+4: 5.7mmHg (4.7 - 6.9)) and over the entire intraop. period remains without significant differences. In MD the ethanol ratio in gr. 2 (n= 7) is fairly constant at 0.4 compared to a slight decrease from 0.45 to 0.25 in gr. 3 (n=7). Lactate, glucose and glycerol in gr. 2 tend to be more constant over the entire intraop, period without significant differences to gr 3. The median core temp. of 36.7°C (36.6-36.9) in gr. 1+2 at 60min was significantly (p<0.001) increased compared to 35.8°C (35.5 -36.2) in gr. 3+4. A significant intraop. temperature gap of 0.8°C (p< 0.001) between both groups was registered in. Hemodynamic parameters showed no significant differences between the groups

**Conclusions**: No effect in SpTiO2 and microperfusion as function of PW is detectable. Nevertheless, MD parameters should provide further information on stabilized intraop. microperfusion in normothermic patients. PW in order to maintain normothermia in cytoreductive surgery is effective.

### 13AP10-9

## Diaphragm ultrasound as a predictor of patients at risk of pulmonary postoperative complications after phrenic nerve compromise

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Background and Goal of Study: In some patient, procedures (anesthetic or surgical) that could produce phrenic nerve palsy should be avoided because it produces ipsilateral hemidiaphragm palsy, this significantly reduces FVC and FEV, by 30%. Currently, the use of diaphragmatic ultrasound applied during weaning in critical care patients has shown that after unilateral phrenic nerve injury, extubation was possible when there was a contralateral health hemidiaphragm with at least diaphragmatic thickening Fraction (DTF)>30%(1) and diaphragmatic excursion (DE)>25mm. Diaphragm evaluation using DTF and DE during the perioperative period can be useful in detecting patients at risk of suffering postoperative pulmonary complications(PPC) if hemidiaphragm palsy occurs.

Materials and Methods: We conducted an observational study in 6 patients with ipsilateral hemidiaphragm palsy due to interscalenic block (ISB) for shoulder surgery at post-anesthesia care unit (PACU). In all the patients DTF and DE were obtained pre and postoperative. DTF was calculated measuring diaphragm thick at TLC and FRC in apposition zone (5-8th intercostal space at axillary line) with a linear 12Mhz probe. DE measures diaphragm movement with a convex 3-5 Mhz probe at subcostal space; we recorded SaO<sub>2</sub>/FiO<sub>2</sub>, FR, and PPC at PACU.

Results and Discussion: The echographic evaluation of the diaphragm lasted 8±3 minutes. 83% of patients (5/6) has postoperative complete palsy of ipsilateral hemidiaphragm after ISB. But only 16% of patients (1/6) has postoperative pulmonary complications. Patient ID₂ has Dyspnoea, tachypnoea of 34 rpm, and SaO/FiO₂ reduction from 466 to 247 at PACU. Diaphragm evaluation of ID₂ shows DTF=28% and DE=14mm. In this small observational study, patients with ipsilateral hemidiaphragm palsy after ISB were common, this fact didn't produce PPC because contralateral healthy hemidiaphragm has DTF>30% and DE>25mm. the only patient with PPC has DTF<30% and E<25mm. This cut point is only validated for weaning not for PPC prediction, a new study is granted to validate this test because this evaluation could increase patient safety.

**Conclusions**: When phrenic palsy could be produced, perioperative Point-of-Care Ultrasound measuring DTF and DE of contralateral healthy hemidiaphragm seem a fast and simple test to detect and prevent complications.

## References:

1. DiNino E, et al. Diaphragm ultrasound as a predictor of successful extubation from mechanical ventilation.Thorax.2014 May;69(5):423-7

## 13AP10-10

## Use of the Lee index for the prediction of cardiovascular morbidity and mortality events after hip fracture surgery

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Background and Goal of Study: Hip fracture is one of the main health problems of the elderly population. The appearance of medical complications during hospital admission is very high. Overall hospital mortality is 5%, ranging from 2% to 8%. Reaching 30% of patients 12 months after fracture. On the other hand, the Lee index is considered the best index available for prediction of cardiac risk in non-cardiac surgery. In this study we have tried to relate its value to cardiovascular morbidity and mortality derived from hip fracture surgery.

Materials and Methods: An observational study was carried out analyzing all the hip fracture surgeries performed in our hospital over a month. 32 consecutive patients were selected. The Lee Index was calculated with de clinical history data. The appearance of complications and death in the first 30 days was recorded from the clinical evolution. Data analysis was performed with the IBM SPSS Statistics. We carry out a comparison of the means through the Mann-Whitney U test. The comparison of proportions was made by the Fisher's exact test.

Results and Discussion: We analyzed a total of 32 patients (78.1% of women). The mean age was 85.34 years (SD: 7.19). 71.9% of patients had a Lee Index of 0; 15.6% of 1 and 12.5% ≥2.

Major complications	68.8%
Acute myocardial infarction	0.0%
Heart failure	6.5%
Cardiorespiratory arrest	6.5%
Exitus	6.5%

An increase in the value of the Lee Index is statistically related in our sample with a higher incidence of CRP and death (p=0.006). This is so that, according to Fisher's exact test, a Lee Index ≥2 was statistically related to the probability of mortality (p=0.013). 50% of patients with these scores died. No statistical relationship could be found between the Lee Index and the occurrence of episodes of heart failure or other cardiovascular events.

Conclusion: The Lee index allows a moderately good discrimination of patients at low risk of patients at high risk of cardiac events after different types of non-cardiac surgery. Taking into account the results of our study and the simplicity of its calculation, we believe that this should be added to our daily clinical practice to help us identify patients at greater risk and improve their study and optimization as far as possible to face surgery, as well as pointing out those who would benefit from modifications in the postoperative follow-up.

## 13AP10-11

The prevalence of cardiovascular autonomic neuropathy and its influence on post induction haemodynamic variables in patients with and without diabetes; a prospective cohort study

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Background and Goal of Study: Cardiovascular autonomic neuropathy (CAN) is a known complication of diabetes but is also diagnosed in patients without diabetes. CAN may be related to perioperative haemodynamic instability. Our objective was to investigate if patients with diabetes would have a higher prevalence of CAN compared to patients without diabetes in the preoperative setting. We further studied the relevance of diagnosing CAN preoperative by studying its relation to changes in post-induction haemodynamic variables.

Materials and Methods: We prospectively studied 82 adult patients, 55 with DM, 27 without DM, scheduled for major abdominal or cardiac surgery. Patients performed four autonomic function tests according to Ewing (1) on the day before surgery. Primary outcomes were the prevalence of CAN and the relation between CAN and severe post-induction hypotension, defined as mean blood pressure (MBP) < 50 mmHg or ≥ 50% decrease from baseline. Secondary outcomes were the relation between CAN, intraoperative hypotension, MBP < 65 mmHg for more than 13 minutes, and the use of vasopressor therapy

than 13 minutes, and the use of vasopressor therapy. **Results and Discussion**: Prevalence of CAN in patients with or without DM was 71% versus 63%, (p=0.437). CAN was not associated with severe post induction hypotension (CAN+ vs. CAN-: 21% vs. 19.2%, p=0.819) nor with intraoperative hypotension (16% vs. 15%, p=0.937). Patients with CAN received more norepinephrine in the postoperative period (0.06 mcg/kg/min (IQR 0.04 – 0.13) vs. 0.04 (IQR 0.02 – 0.05) p=0.033).

Conclusion(s): The majority of patients presenting for major surgery had mild to moderate CAN, regardless of the presence of DM. Assessing CAN before surgery did not identify patients at risk for post induction and intraoperative hypotension in our cohort.

Reference:

1. Ewing DJ, Clarke BF Autonomic neuropathy: its diagnosis and prognosis. Clin Endocrinol Metab 1986; 15: 855-88.

## 13AP10-12

## **Evaluation of Quality Indicators in Anaesthesia Consultation for Urologic Surgical Patients**

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Background and Goal of Study: Surgical procedures can be delayed or cancelled due to inadequate preoperative patient assessment and preparation. Anaesthesia consultation (AC) allows improvement of preoperative patient evaluation and achievement of an appropriate patient scheduling, contributing to reduce case cancellation. Our audit aimed to evaluate the efficacy of AC for urologic patients in our hospital using pre-determined quality indicators (QI).

**Materials and Methods**: Retrospective audit to patients undergoing nonemergent urologic surgery at our hospital between October and December 2016. Predetermined QI evaluated:

**A** – Outpatients, American Society of Anaesthesiology physical status (ASA)  $\geq$  3 or oncologic patients should all have AC (100%); **B** – Urgent AC request should have AC scheduled in less than 1 month; **C** – Time interval between AC and surgery (AC-S) should be less than 3 months for ASA  $\geq$ 3 and oncologic patients; **D** - All other patients should have AC-S interval of less than 6 months. Surgery (elective, outpatients), AC request (normal, urgent), and previous AC date were collected by patient's electronic clinical process consultation. Descriptive statistical analysis was conducted using Microsoft® Excel worksheet.

**Results**: Included 394 patients: 269 elective (68%) and 125 outpatients (32%). There were 196 patients with AC (50%). Patients with criteria for QI A - 309. From these, 149 had AC (48%) respectively: ASA  $\geq$ 3 (n=97) - 55 had AC (57%), oncologic patients (n=87) - 37 had AC (43%) and outpatients (n=125) - 57 had AC (46%). There were 160 patients in QI A without AC (52%), in these without AC

request n=142 (89%). All patients (n=10) with urgent AC request had AC scheduled in less than 1 month – QI B accomplished in 100%. Time interval AC-S in ASA ≥3 and oncologic patients (n=92) was less than 3 months in 56 patients - QI C accomplished in 61%. From the remaining 104 patients, 85 had surgery in less than 6 months - QI D accomplished in 82%.

Discussion and Conclusion(s): One reason for quality indicator A to be less than expected may be failed identification of patients ASA≥3. Surgeons must also be aware of the need for AC for outpatients. Our action plan is to increase surgeon's awareness of patient's criteria for preoperative AC by means of training actions and creation of a quick reference guide table. We hope that compliance with predetermined time intervals can be improved after these training actions.

### 13AP11-1

# The effects of a combination of intravenous dexamethasone and ketamine on postoperative mood in patients undergoing laparoscopically assisted -gynecologic surgery

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**Background and Goal of Study**: Many studies have reported an effect of these two drugs on mood disorders, such as depression. This study aimed to investigate the effects of each drug individually along with their combined usage on perioperative mood changes in patients undergoing gynecologic surgery.

Materials and Methods: Ninety-three patients were randomly allocated into one of three groups; Group K (n = 31) received a single dose of ketamine (0.5 mg/kg i.v.), Group D (n = 31) received a single dose of dexamethasone (0.5 mg/kg i.v.), and Group KD (n = 31) received both ketamine (0.5 mg/kg i.v.) and dexamethasone (0.5 mg/kg i.v.) 5 minutes after the induction of anesthesia. A change in the patient health questionnaire (PHQ)-9 scores on the 1st and 3rd day after surgery, the duration of anesthesia, the postoperative visual analog scale (VAS) for pain, and the patient controlled analgesia (PCA) consumption were evaluated.

Results and Discussion: Groups K and KD showed a significant reduction in PHQ-9 score on both the 1st day and the 3rd day after surgery compared with those recorded preoperatively and in Group D (P < 0.01). There were no differences in the Group D PHQ-9 scores pre- and post-operatively. The VAS for pain 24 hrs after surgery and the PCA consumption in Group KD decreased significantly compared to the other two groups (P < 0.05). In the present study, ketamine and the combination of ketamine with dexamethasone improved mood postoperatively, compared to the preoperative mood. The combination of ketamine with dexamethasone did not improve the outcome compared to ketamine alone. There was no synergic effect of combining the two drugs on mood change.

Conclusion(s): There is great interest in developing novel and rapid antidepressants with greater target specificity and/or decreased adverse effects. Ketamine alone and in combination with dexamethasone, showed satisfactory effects on mood change after surgery. Future research into the pharmacotherapy of mood change in response to dexamethasone in patients undergoing surgery is needed.

## 13AP11-2

## The difference between being sober and using oral preoperatory carbohydrates in the patients' state

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Background and Goal of Study: Usually during surgery the patients are stressed, there are changes on the cascade endocrine, hyperglycaemia increase of the insulin resistance. The patients can eat food 6 hours before anaesthesia and clear liquids 2 hours before anaesthesia. The purpose of this study is comparing being sober and using oral preoperatory carbohydrates in the patients' state.

Materials and Methods: This study involves the planned patients for surgery of urinary apparatus with general anaesthesia. The age of them is 20-80 years old. ASA I-II. Excluded were: the patients with mellitus diabetes, septic states, ASA>3, patients who were under corticosteroid therapy, as well as those that had anamnesis for gastro-oesophageal reflux. This survey studies 120 patients separated in two groups: a group GS 60 that as usual were sober and the other group GC 60 that 3 hours before anaesthesia took from the mouth 250 ml Sol glucose 12,5%. With the help of a questionnaire these parameters were evaluated: anxiety, hunger, inability to focus, nausea, pain, thirst, fatigue, and weakness. To compare both groups the chi square test is used. Where the value of P<0.5 is considered statistically significant. In both groups glucose in blood was metered before anaesthesia. Hemodynamic changes during anaesthesia were monitored Results and Discussion: In both groups no changes were observed regarding glycemy: not in the sober group nor in the one that took the 12.5% carbohydrate (P = 0.812). There were also no changes between the two groups in terms of

intraoperative hemodynamic changes (P = 0.6), pain (P = 0.64), postoperative

vomiting (P = 0.6), hospitalization (P = 0.612). Among the groups there were no changes in the type of surgery (P = 0.8), its duration (P = 0.6), gender of the patients (P= 0.725) nor of the awakening time (P = 0.6). but there were differences regarding anxiety P=0.1, hunger P=0.05, thirst P=0.01, fatigue P=0.05, weakness P= 0.01, changes in depression as well as ability to concentrate where the value of P= 0.01. No case of gastro-oesophageal reflux was observed at the time of induction of anaesthesia, consequently no aspiration of gastric contents.

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**Conclusion:** The use of 12.5% carbohydrate the morning of the operation decreases preoperatory discomfort without increasing the risk of aspiration of gastric contents.

References: Nutrition and the Elderly Surgical Patients. MOJ Surgery ,Volume 4 Issue 5-2017.

## 13AP11-3

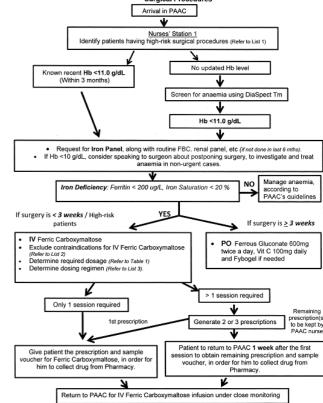
## One-stop centre for intravenous iron administration to irondeficiency anaemic patients planned for major surgery

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Background & Goal of Study: A large percentage of preoperative patients suffer from iron-deficiency anaemia. Correction of iron-deficiency anaemia has been shown to decrease the need for blood transfusions, morbidity and mortality. Iron supplementation preoperatively is not common in our region. As such, we sought to develop a pathway to manage patients with iron-deficiency anaemia who were planned for major surgery. We would identify this group of patients among all preoperative patients being routinely screened by anaesthetists at the Pre-Anaesthesia Assessment Clinic (PAAC). The PAAC would then serve as a one-stop centre to minimise frequency of blood sampling, clinic visits and administer IV iron or prescribe oral iron at the same siting.

**Materials and Methods**: After multi-disciplinary consultations, we formulated a pathway for administration of IV iron.

Pathway for the Administration of IV Iron In PAAC for Patients Undergoing High-Risk \_\_\_\_\_Surgical Procedures



Please check Full Blood Count preoperatively (pre- or post-induction) to monitor the Hb response to IV Iron therap

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### LIST 1: High-risk surgical procedures

Any procedure with an anticipated blood loss of > 1000mi

- Vascular: Any aortic procedure
- General Surgery: Any Colorectal, Hepatic, Gastric or Oesophageal surgery
- Jrology: Nephrectomy Orthopaedic: Any major joint replacement (knee, hip, shoulder) or spine surgery
- OMS/ENT/Plastics: Major Head and Neck surgery and/or any flap surgery

### LIST 2: Contraindications for IV Ferric Carboxymaltos

- History of asthma Allergic eczema or other atopic allergy
- Iron overload or disturbances in utilization of iron (e.g. haemochromatosis)
- Active infection (including sepsis, acute and chronic infection) Decompensated liver disease (cirrhosis and henatitis with abnormal liver function)
- Rheumatoid arthritis with evidence of active inflam

Patients on oral Iron can receive IV iron but the oral iron needs to be withheld immediately.

On the other hand, the resumption of oral iron should only be started 3 days after the IV iron therapy

### TABLE 1: Total required dose of IV Ferric Carboxymaltose

Hb (g/dL)	Patients with body weight 35 - 70kg	Patients with body weight >70kg
< 10	1500 mg	2000 mg
≥ 10	1000 mg	1500 mg

### LIST 3: Dosing regimen

Maximum dose of IV Ferric Carboxymaltose: 20 mg/kg, up to maximum of 1000 mg per week If more than 1 dose is required, each dose should be 1 week apart.

40 kg patient with Hb 9 g/dL will require 1500 mg of IV Ferric Carboxymaltose.

30 kg patient with Hb 11 g/dL will require 1500 mg of IV Ferric Carboxymaltose.

Maximum dose per week is 1000 mg. Prescribe 1000 mg of IV Ferric Carboxymaltose for 1<sup>st</sup> session and another 500mg for 2<sup>nd</sup> session (which should be 1 week from the 1st session).

60 kg patient with Hb 10.5 g/dL will require 1000 mg of IV Ferric Carboxymaltose

Maximum dose per week is 1000 mg.
Prescribe single dose of 1000 mg of IV Ferric Carboxymaltose.

Results and Discussion: Over 6 months, 14 patients were treated with IV iron and 4 were treated with oral iron tablets. In the group treated with IV iron, the mean Hb level at 1st PAAC visit was 9.6 g/dL (range from 8.4 to 10.8 g/dL). The mean Hb level after IV iron was 10.1 g/dL ( 8.4 to 11.9 g/dL), with a change of +0.7g/dL (-0.9 to +2.4 g/dL), 6 patients received blood transfusion perioperatively, 1 patient developed severe hypophosphatemia secondary to phosphaturia due to IV iron. Conclusion: Detection and treatment of iron-deficiency anaemia could be safely and effectively instituted at a one-stop centre as part of perioperative optimisation. IV iron administration was able to raise the Hb levels of our patients prior to their surgeries. Phosphate level is now checked in patients who had received IV iron.

Further studies will be required to determine the side effects and extent of decrease

in blood transfusion requirement, morbidity, mortality with iron supplementation in

## 13AP11-4

this high-risk group of patients.

The feasibility of adapting an over the counter multi-criteria decision analysis (MCDA) model to assess the benefit/risk profile of postoperative analgesics to inform prescribers' optimal choice of medication

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Background and Goal of Study: Quantifying the benefit/risk profile of medicines is difficult for clinicians, particularly when there are limited published adverse event data, and clinical studies and meta-analyses use different measures of efficacy, safety and tolerability. We tested the ability of an adapted MCDA model to incorporate published data of varying quality and used clinical judgement to assess the benefit/risk profile of postoperative analgesics.

Materials and Methods: Efficacy and safety data from 4 classes of intravenous or intramuscular prescription analgesics indicated for postoperative pain management were used to populate an MCDA model adapted from Moore et al. 2017. Using European Medicines Agency accepted methodology, data were evaluated against the 3 favourable effects (pain relief, duration of action, opioid sparing effect) and the 3 unfavourable effects (cardiac effects, respiratory depression, renal effects) that were judged to potentially impact patient outcomes the most

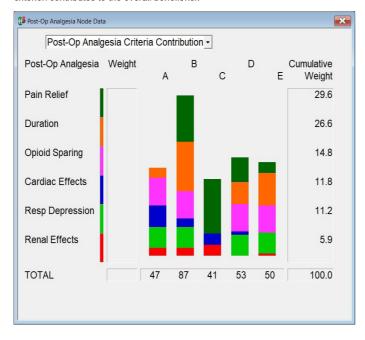
Results and Discussion: Applying the MCDA model to 5 postoperative analgesics showed a marked favourable benefit/risk profile for drug B. Figure 1 shows the

overall weighted preference scores (maximum=100). Drug B performed well on the favourable effects, particularly pain relief and duration of action, with minimal impact of the unfavourable effects. The model was robust over a range of sensitivity analyses, confirming that results remained relatively unchanged even wit significant changes in weights or published evidence. For example, changes of ≥2.5 times the weight were required to make drug A the most preferred option.

Conclusions: The MCDA model presents a useful output that can be adapted to provide clinicians with an easy to interpret benefit/risk analysis to help inform decision making. Data inputs and their clinical interpretation require validation by prescribers who are experts in the field of postoperative pain management. This study was sponsored by Pfizer.

References: Moore A. et al. J Pharm Pharmacol. 2017:69:1364-73.

Figure 1 Bar graph of the overall benefit/risk total scores showing how each erion contributes to the overall benefit/risk



## 13AP11-5

Laparoscopy influence on length of stay at the post anesthesia care unit (PACU) and at the hospital, in patient submitted to laparoscopic surgery

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Background and Goal of Study: Literature shows that laparoscopic surgery for the treatment of colorectal cancer has advantages regarding safety and postoperative recovery (1), resulting in shorter hospitalization (2). However, there are few data about the implication of laparoscopy in the length of stay in post anesthesia care unit (PACU). This is important because it influences patient flow on the operating room (3). The goal of this study is to evaluate the impact of laparoscopic surgery on the length of stay at the hospital and at PACU.

Materials and Methods: During a one-year period, hospital and PACU length of stay of patients submitted to elective colorectal surgery were evaluated. Statistical analysis was performed using T-Student model, considering p <0.05 for statistical significance.

Results and Discussion: 96 patients were included in this study. In the groups undergoing laparoscopic (n = 58) and non-laparoscopic surgery (n = 38), the mean length of stay in PACU were 133.5 (± 57) minutes and 148 (± 78) minutes, respectively, while mean hospitalization time were 10.2 (± 8.2) days and 13.7 (± 15.1) days. Length of stay in hospital and PACU was shorter in patients undergoing aparoscopic surgery (p<0.05).

Conclusion: Elective colorectal surgery by laparoscopy appears to be associated with shorter length of stay at PACU and hospital. Further studies may clarify whether this conclusion extends to other types of laparoscopic surgery

References: 1. Vacante M, Cristaldi E, Laparoscopic surgery for colorectal cancer: advantages and challenges, Updates in Surgery (2016); 2. Levy B, Mobasheri M, Principles of safe laparoscopic surgery, Surgery (2017); 3. Ganter et al. Perioperative Medicine (2014) 3:10.

## 13AP11-6

## Postpartum pain: Impact on maternal satisfaction

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Background and Goal of Study: Maternal satisfaction with partum is a recognized instrument for measuring quality of services provided. Pain control is referred as an important criteria of maternal satisfaction. The aim of this study was to determine incidence of postpartum severe pain (PPSV) during the first 24h and evaluate its impact on maternal satisfaction.

Materials and Methods: After approval of Ethics Committee a prospective observational study was conducted during one month in labor women submitted to epidural analgesia (EA). Inclusion criteria: pregnant >18 years. Exclusion criteria: abortion labor, postpartum admission on critical care unit. Verbal numerical scale of pain (VNSP) was used during labor and postpartum. It was also applied a satisfaction questionnaire related to EA at 2 hours of postpartum, another related to satisfaction with the labor experience and finally the Quality of Recovery 15 (QoR-15) questionnaire at 24h postpartum (T1). PPSV was defined as a score <10 on 12th item of QoR-15 and poor quality recovery (PQR) as a score on QoR-15 inferior to median in T1 less one standard deviation. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.

Results and Discussion: In this study 113 women were included and the incidence of PPSV was 22%. A spontaneous vaginal delivery was observed in 50,4% of cases, instrumental in 27.4% and caesarean section in 22.1%. There were no differences in demographic and obstetric data, anaesthetic conduct and satisfaction with EA. Women with PPSV presented more often incorrect weight gain during pregnancy (64% vs. 40%, p=0,032) and analgesic prescription previous to EA. At postpartum they presented superior scores on VNSP (6 vs. 2, p<0,001), needed more often analgesic drugs such as paracetamol and morphine (60% vs. 32%, p=0,012; 32% vs. 13%, p=0,0025, respectively), had moderate pain more frequently (84% vs. 51%, p=0,0005) and more complications (36% vs. 17%, p=0,041). PPSV group presented lower scores on total QoR-15 (106 vs. 128, p<0.001) and PQR more often (28% vs. 6%, p=0,001). Women with PPSV were less satisfied relatively to questions "I was always enlightened and supported by health professionals" (12% vs. 1%, p =0,039) and "Overall, I enjoyed the experience I had with the birth of this baby" (24% vs. 5%, p=0.01).

Conclusion: PPSV is not rare. At 24h postpartum women with PPSV presented worse quality of recovery and were less satisfied.

## 13AP11-7

## Multimodal opioid-sparing analgesia protocol in colorectal laparotomic surgery: when epidural catheter is not possible

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Background and Goal of Study: ERAS programs (Enhance Recovery After Surgery) decrease surgical damage, resulting in the reduction of morbidity, mortality, length of hospital stay and costs. In Japarotomic surgeries analgesic gold standard is epidural analgesia although sometimes is not possible. We analyze the enhancement of the surgical patient in laparotomic colorrectal surgery (CRS)

Materials and Methods: We collected laparotomic CRS patients without epidural catheter: group A (N: 25) were submitted in ERAS program in 2017 and group B (N: 16): an historic group where CRS was held without ERAS program in 2015. Group A followed an opioid-sparing analgesia protocol including: preoperative gabapentin 300 mg, intraoperative magnesium IV (30 mg/kg) and lidocaine IV (bolus 1,5mg/kg + continuous infusion 1mg/kg) and transversus abdominis plane (TAP) block. Group B analgesia was opioids and NSAID without premedication. Due to contraindication, impossibility or laparoscopies converted to laparotomies we did not place epidural catheter.

Medium age is 67.54±12.34 years in group A and 65.8±13.88 in group B. Physiological and surgical CR-POSSUM are: 16±0.71, 8.5±11.31 in group A and 9.43±3.37, 7.57±0.65 in group B. Chronic opioids consumption is 0% both groups. Length of surgery is 188.46±61.58 minutes in group A and 171.67±53.87 minutes

Results and Discussion: VAS score 12 hours after CRS and on the first, second and third postoperative days is: 1.24±1.30, 2.18±2.34, 2.2±3.24, 1.74±2.58 in group A and 3.25±1.26, 2.4±1.14, 1±1.15, 1.5±2.12 in group B. Morphine consumption 12 hours after CRS and on the first, second and third postoperative days is: 5.05±6.42. 5.71±7.94, 4.48±7.84, 4.06±8.33 mg in group A and 16.75±5.12, 15.72±7.88, 19±10.54, 11.75±8.5 in group B. Nauseas and vomiting occur in 27% of the patients in group A and 53.34% in group B. Ileus occurs in 19.2% of the patients in group A and 46.67% in group B.

Reactive C protein (CRP) on the first, third and fifth postoperative days is (mg/ dL): 50.45±26.17, 110.53±50.18 y 59.65±20.69 in group A and 100.25±53.75, 107.67±57.49 and154±112.19 in group B. Length of hospital stay is 11.29±6.84 days in group A and 16±9.9 in group B.

Conclusion: Multimodal opioid- sparing analgesia program seems to decrease opioids consumption, side effects, CRP and length of hospital stay in CRS patients even if epidural analgesia is not possible.

### 13AP11-8

The influence of perioperative systemic steroid administration in diabetic patients receiving fast track primary Total Hip or Knee Arthroplasty. Results of a retrospective study

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Background and Goal of Study: As part of the fast track total Hip or Knee Arthroplasty (THA/TKA) in our hospital, patients receive dexamethasone 0.15 mg/ kg/iv preoperatively. Steroids or glucocorticoids provides effective pain relief by reducing inflammation, reduces PONV and LOS in hospital. The aim of this study is to evaluate the influence of 0,15 mg/kg/iv dexamethasone on serum glucose levels in patients with diabetes in the early postoperative phase in fast track THA/ TKA surgery

Materials and Methods: In this retrospective cohort study, serum blood glucose levels in the first 24 hours after surgery were analyzed. All patients underwent THA or TKA in 2016 or 2017 and received 0,15 mg/kg dexamethasone intravenously. Data on demographics, surgery and outcomes were retrieved from their medical records. The hospital medical ethical board granted permission for the study.

Results and Discussion: A total of 214 patients were analyzed, mean age was 71.2 ± 8.21 years, 60,7% were female, mean ASA score was 2.38 ± 0.50, 63.1% received TKA and 36.9% THA. Mean blood glucose before surgery was 8.08 ± 2.07 mmol/l. General Linear Models for repeated measures indicated a significant increase in blood glucose levels after surgery (p<.001) with a clear peak 4-8 hours post-surgery (M = 17.33 ± 4.65). After 24 hours, blood glucose levels turned to baseline levels. The increase in blood glucose levels was significantly related to interventions for high blood glucose levels (e.g. additional measurements, change in insulin) Such interventions were needed in 51.6 % of the patients

Conclusion: Our study suggests that by providing lower incidence of postoperative nausea and vomiting and less postoperative acute pain, systemic steroid plays a critical role in rapid recovery to TKA and THA. The preliminary results also show the superior possibility of systemic steroid in functional rehabilitation and inflammation control. In diabetes patients the use of dexamethasone increases blood glucose levels temporarily, which needs interventions in diabetes regime in about half of the patients. However, in light of the advantages this seems acceptable and changes in our ducose and insulin policy are advised. Well powered randomized clinical trials are needed to investigate the safety and dose-response relationship.

## 13AP11-9

## Transversus abdominis plane block for radical prostatectomy

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Background and Goal of Study: The transversus abdominis plane (TAP) block involves the sensory afferents of the anterior abdominal wall (T7-L1). It has been described as an alternative to epidural analgesia in retropubic radical prostatectomy without prolonged hospital stay

Materials and Methods: This retrospective comparative observational study was performed through electronic clinical process consultation, from January to November 2017. TAP group – bilateral block with 0.5% Ropivacaine (20mL for each side) was performed after induction - and the Non-TAP group. General anesthesia was inducted with intravenous fentanil, propofol and rocuronium and maintained with desflurane. Both groups had the same conventional analgesia protocol for the postoperative period – tramadol 100 mg plus droperidol 0.625 mg every 8h and paracetamol 1g every 6h; morphine was prescribed in SOS. We reviewed demographic characteristics, consumption of opioids in the intra and 24 hourpostoperative period, pain at rest and on movement during 24 hours, time in the recovery room, conscience level, timing of the first rescue analgesia and nausea and vomiting episodes. Statistical analysis was performed using SPPS 20, with the Fisher test for categorical variables and the Mann-Whitney test for continuous variables. A P value < 0.05 was considered as statistically significant.

Results and Discussion: 37 patients were included (12 in the TAP group, 25 in the Non-TAP group). Both groups were comparable in terms of demographic and surgical parameters. Mean fentanil consumption during intraoperative period was 0.167 mg in the TAP group versus 0.344 mg in the Non-TAP group (p<0.001). There was lower morphine consumption and pain intensity at rest and on movement up to 4 hours in the TAP group. Similarly, to other variables, this difference was not statistically significant.

Conclusion: Despite not having a better pain control, the TAP block enabled a lower opioid consumption during the intraoperative period. Since opioid's immunosuppressive role is well established these results may bring to light an alternative and effective approach to oncologic patients. Nonetheless, larger size prospective studies are required to better clarify the long-term impact of lowering opioid consumption during the intra-operative period

## 13AP11-10

# Ultrasound assessment of gastric volume in adults after drinking carbohydrate-containing fluids two hours before anesthetic induction

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Background and Goal of Study: Perioperative aspiration of gastric contents is a rare complication of anaesthesia, but it may have devastating consequences. The goal of perioperative fasting guidelines is to reduce the risk of complications related to the perioperative regurgitation and aspiration of gastric contents, while enhancing the quality and efficiency of anaesthesia care due to aspiration. On the other hand, prolonged fasting increases insulin resistance and the organic response to trauma. In addition, symptoms such as nausea, vomiting, hunger, thirst and anxiety are also related to prolong fasting. After 1980, evidence-based multimodal protocols to enhance postoperative recovery recommend oral carbohydrates up to 2 h before elective surgery. Gastric ultrasound is a valid tool for non-invasive assessment of the nature and volume of gastric contentes. The objective of this study is to evaluate the gastric residual volume after the intake of 200ml of a carbohydrate-containing beverage two hours before anesthetic induction. Besides, symptoms such as hunger, thirst and anxiety may be minimized by fasting abbreviation.

Materials and Methods: We evaluated gastric volume in 90 patients, between the ages of 18 and 65 years of age, ASA I and II, BMI < 35 kg/m2, scheduled for laparoscopic cholecystectomy and maxillofacial surgeries. They were randomized in a crossover fashion to intake 200 mL of a beverage containing 12.5% maltodextrin (carbohydrate group) or to be fasting for at least 8 hours (control group). Before induction of general anaesthesia, the gastric volume was assessed.

**Results and Discussion**: The results showed statistic relevant reduction in gastric volume in the carbohydrate group (p<0,05). It was noticed reduced hunger, thirst and anxiety in the carbohydrate group, however there was no difference in incidence of nausea and vomiting between the two groups. There were no instances of aspiration.

**Conclusion**: In conclusion, carbohydrate fluids ingested 2 h before anesthetic induction reduced the gastric volume and did not increase the risk of complications related to the perioperative regurgitation and aspiration of gastric contents.

## 13AP11-11

## ¡Perdón, doctor, no le entiendo! (I Am Sorry, Doctor, I Don't Understand You!)

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**Background:** A lot of factors are involved in an effective health care. In our geographic situation, several cultures live together, so language barriers are a real difficult which is not well studied in the literature. Though the hospital usually have translators, it is usually difficult to find someone that helps us to communicate with our patients in the moment that we need, especially in a context of budget cuts due to the economical crisis

Case Report: We present the case of a Chinese 43 year old patient, in her first visit with the anaesthesiologist. She was scheduled for hysterectomy. The patient came alone, and there was not any possibility of communication with her, except by using gestures. Clinical antecedents were not possible to be investigated. The only thing we could get was a bag full of boxes of medication written in Chinese, all them bought in her country, that she showed us (see photographs 1 and 2). We tried to find a Chinese translator in the hospital, but there was no one available to help us. We even tried the use of tools like Google Translator and Chinese dictionary, ineffectively. The patient had to be re-scheduled, so the anaesthetic valuation had to be delayed until a translator was available, but she did not come back to the hospital again. The patient, in addition, reported a complain to the Hospital, due to this situation

**Discussion:** Several studies have demonstrated that the language barrier is an independent variable responsible of having worse health status in immigrants. The health outcome is positively correlated with the physician-patient communication, as some studies have demonstrated. In our case, a language barrier is an obvious challenge to be overcome during a discussion regarding medications, which is indispensable information in order to plan a proper anaesthetic act. The absence of translators and other logistic facts, especially in context of economic crisis, gets worse the health care.

Learning points: 1. The foundation of primary care is the physician-patient relationship, especially in pre-anaesthetic visits. 2. Language barrier is a great obstacle to the therapeutic bond, so more attention needs to be given to the process of communication between both. 3. This logistic problem could carry latrogenic consequences: anaesthesia in patient taking medications that we cannot determine may be fatal for the patient.

### 13AP12-2

Japanese multi-herbal medicine, Hochuekkito, protects cyclophosphamide-induced neutropenic mice from Streptococcus pneumoniae lung infection by inducing various antimicrobial proteins

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Background and Goal of Study: Pneumonia is a common cause of death worldwide. While the mainstay of basic bacterial pneumonia therapy is antibiotics, this results in an increase in drug-resistant bacteria; thus, a multidisciplinary approach is required to improve the outcome of pneumonia. We investigated whether the Japanese multi-herbal medicine Hochuekkito (HET) could prevent Streptococcus pneumoniae lung infection in cyclophosphamide (CY)-induced neutropenic mice.

Materials and Methods: Female BALB/c mice (6 weeks old) were orally administered water (control group) or a water-based HET solution (1.0 g/kg/day; HET group) once a day from day -12. Following CY intraperitoneal injection (200 mg/kg) on day -5, the mice were intranasally inoculated with 1.3 to 2.5×10² colony-forming units of S. pneumoniae on day 0. We evaluated the survival of the mice, number of bacteria in the bronchoalveolar lavage fluid (BALF), and interleukin-6 (IL-6) levels in the BALF and blood. The lung mRNA expression levels of antimicrobial proteins and marker proteins for lung tissue cells were measured by quantitative PCR. Between-group differences were analysed using analysis of variance followed by post-hoc analyses with Scheffe's test. The survival of the mice was compared by a log-rank test. P<0.05 was considered statistically significant.

Results and Discussion: All mice in the HET group survived, whereas 50% of the control-group mice survived. The number of bacteria in the BALF significantly decreased in the HET group compared with that in the control group on days 1 and 3. Similar trends were observed in the IL-6 levels in the BALF and blood. The mRNA expression levels of the various antimicrobial proteins, such as *Splunc, Ltf, Chil1*, *Sftpd*, and *Ficolin B*, increased in the HET group on day 1. The mRNA expression levels of *Lpcat1* and *Foxj1*, marker genes for type 2 alveolar cells and ciliated epithelial cells respectively, increased in the HET group compared with those in the control group on days 0 and 2.

**Conclusion**: Prophylactic treatment with HET protects CY-induced neutropenic mice from *S. pneumoniae* lung infection possibly by inducing several antimicrobial proteins.

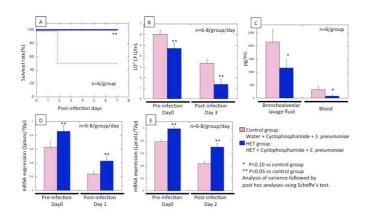


Figure: Effect of prophylactic treatment using Hochuekkito (HET) on mice infected with *S. pneumoniae*A) Survival Curve, B) Bacterial number in bronchoalveolar lavage fluid, C) Interleukin-6 level in bronchoalveolar lavage fluid and blood, D) Lung mRNA expression of *Splunc*, an antimicrobial protein that modulate innate immune system of respiratory tract, E) Lung mRNA expression of *Lpcatl*, a marker protein for type2 alveolar cell. Representative data are shown in regard to the results of quantitative PCR analysis.

## 13AP12-3

## Pretreatment with halogenated alcohol and alkane anesthetics protects S. cerevisiae yeast from heat stress

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Background and Goal of Study: Anesthetic action and preconditioning are conserved across all living organisms. *S. cerevisiae* is a eukaryotic organism whose growth is inhibited by halogenated anesthetic compounds (1). Moreover, when exposed to a moderate stress, its cellular stress response is activated, making it more resistant to subsequent more severe stresses of the same or a different kind (2). We hypothesize that anesthetics can also invoke the cellular stress response in yeast protecting it from an otherwise lethal heat stress.

Materials and Methods: Anesthetic potency was determined by measuring growth inhibition through optical density of *S. cerevisiae* w303 yeast culture in presence of carbon tetrabromide (CBr4), 2,2,2-tribromoethanol (TBE), 2,2,2-trichloroethanol (TCE), 1,1,1,3,3,3-hexafluoroisopropanol (HFP), 2,2,2-trifluoroethanol (TFE) and ethanol (EtOH). Potency for protection was determined by comparing colony forming units after exposure to a usually lethal heat stress with and without pretreatment with a concentration range of the anesthetic compounds.

Results and Discussion: The studied halogenated alcohol and alkane anesthetics dose-dependently inhibit *S. cerevisiae* growth. EC<sub>50</sub> for anesthetic activity of CBr4, TBE, TCE, HFP, TFE and EtOH are 300μM (95% CI: 110-824μM), 400μM (95% CI: 300-540μM), 800μM (95% CI 625-896μM), 2.74mM (95% CI: 2.00-3.65mM), 5.57mM (95% CI: 4.08-7.71mM) and132mM (95% CI: 55.7-879mM), respectively (n=3 for each concentration). The rank order of the anesthetic compounds for protection correlates with their anesthetic potency. Maximum effective doses for CBr4, TBE, TCE, HFP, TFE and EtOH are 40μM, 5.3mM (SEM±2.6), 30mM, 40mM, 270mM (SEM±90) and 770mM respectively (n=1-3 for each concentration).

**Conclusion**: Halogenated alcohol and alkane anesthetics protect yeast from an otherwise lethal heat stress. Yeast is a useful model organism for studying the underlying mechanisms for anesthetic preconditioning and to determine a structure activity relationship of preconditioning agents.

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## 13AP12-4

## Proadrenomedulin as a marker of perioperative risk in major abdominal surgery

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**Background and Goal of Study**: The preoperative detection of patients with risk of complications can facilitate the optimization of their treatment.

Proadrenomedulin (ProADM) is a biological marker that has been used successfully in the prognosis of patients with pneumonia and sepsis, although its value as a predictor in surgical patients is not known.

The objective of this study is to determine the preoperative incidence of elevated serum levels of ProADM in adult patients scheduled for major nocardial surgery and its relation to the incidence of postoperative organic failure and mortality in the first 30 days.

**Materials and Methods**: Prospective observational study in 59 adult patients scheduled for major abdominal surgery. Baseline levels of ProADM were obtained immediately before surgery. Demographic variables were collected, as well as a score of preoperative risk scales. The incidence of postoperative organ failure and the appearance of postoperative complications were recorded, as well as the postoperative stay and mortality in the first 30 days postoperatively.

A descriptive analysis of the study variables was carried out: mean and median of the quantitative variables were calculated and frequencies were calculated for the qualitative variables. The median of the baseline levels of ProADM was used to categorize the patients included in the study into two groups. Comparisons of qualitative variables were performed using the Chi square test or Fisher's exact test and the analysis of the quantitative variables using Student's t test.

**Results and Discussion**: The incidence of postoperative organ failure was 8 patients (13.6%), the 30-day mortality of 3 patients (5,1%), and the six months mortality of 6 patients (10,2%). The ProADM value of 0.75 nmol / L was the median of the sample. A total of 29 patients (49.2%) had plasma ProADM values higher than 0.75 nmol / L, which in the univariate analysis was associated with a higher incidence of postoperative organ failure (87.5% vs 43.1%, p <0.05) and higher incidence of mortality (20.7% vs 0%, p <0.01). The mean hospital stay was also significantly longer in patients with proADM> 0.75 nmol / L (21.4  $\pm$  20.5 vs 8.7  $\pm$  9.4 days, p <0.05).

Conclusion: High levels of preoperative proADM are predictors of postoperative organic failure and of all-cause mortality, after major noncardiac surgery in adults.

## 13AP13-1

Estimated continuous cardiac output and noninvasive stroke volume variation: pulse wave transit time (PWTT) versus arterial pulse contour analysis technique during major abdominal surgery

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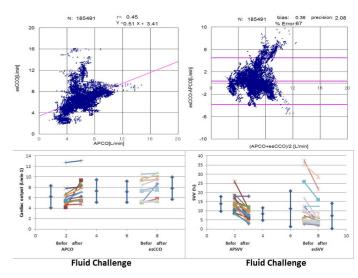
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Background and Goal of Study: New estimated continuous cardiac output (esCCO) uses a technique based on the relationship between pulse wave transit time (PWTT) and stroke volume. The noninvasive device provides esCCO and estimated stroke volume variation (esSVV) using routine electrocardiogram (ECG), pulse oximeter, and blood pressure. This study evaluated the overall efficacy of esCCO and esSVV using PWTT compared with the arterial pressure contour analysis (APCO) during major abdominal surgery.

Materials and Methods: Twenty major abdominal surgery patients were received routine monitoring. The radial arterial blood pressure were attached to a sensor (FloTrac, Edwards Lifesciences, Irvine,CA) has a bifurcated cable with one going to the BSM-9101 (Nihon Kohden, Tokyo, Japan) bedside monitor to display routine arterial blood pressures, esCCO and esSVV, and the other going to the Vigileo monitor to analyze for the APCO and SVV. All hemodynamic data including bedside monitor, vigileo APCO and esCCO will be automatically recorded simultaneously into the attached computer during the entire operation.

**Results and Discussion**: A total of 185,491 pairs of simultaneous cardiac output measurements were recorded. The esCCO showed a poor to moderate correlation with the APCO (R = 0.45; esCCO = [0.51\*APCO] + 3.41). Bland-Altman analysis showed fairly good overall agreement between the two methods. Bias (limits of agreement) was 0.36, precision was 2.08, and % Error was 67. However, fluid challenge test increase APCO 17.9%  $\pm$  9%, and increase esCCO by 10.4%  $\pm$  2%, whereas it decrease APSVV 40.7%  $\pm$  7%, and decrease esSVV by 34.7%  $\pm$  27%.



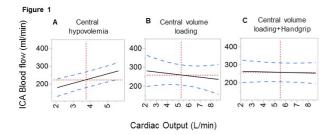
**Conclusion**: The esCCO showed a fairly good agreement with the APCO during perioperative major abdominal surgery. However, the trend changes of both estimated cardiac output and estimated stroke volume variation after fluid challenge test were in the same direction with the pulse contour analysis technique.

**Reference**: Lorsomradee S., et al. Uncalibrated arterial pulse contour analysis versus continuous thermodilution technique: effects of alterations in arterial waveform. J Cardiothorac Vasc Anesth 2007;21.5:636-43.

### 13AP13-2

## Differential response of internal carotid artery blood flow to cardiac output changes

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Background and Goal of Study: Cerebral perfusion can be threatened by a low cardiac output (CO) despite stable mean arterial blood pressure (MAP); CO was found to be linearly related to internal carotid artery blood flow (ICABF)during hypovolemia (Figure 1A)¹. We now study the response of ICABF to non-pharmacological CO elevations in healthy humans.

Materials and Methods: A -10 head-down tilt (HDT) alone or combined with 3 min isometric handgrip (HDT+HG, 30% of maximal voluntary contraction) were used in thirteen subjects (4 males, 9 females) after 5 minutes of rest to increase central blood volume and CO. ICA blood velocity (Doppler ultrasound), MAP, CO (Finometer), and end-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) were recorded. ICABF was calculated beat-by-beat. The ICABF response to CO was modelled by linear mixed-effects multiple regression (JMP 12). ETCO<sub>2</sub>, MAP and CO were continuous covariates. In order to account for the correlation among the within-subject repeated observations, Subject Identity was entered as random effect in the model.

Results and Discussion: During HDT and HDT+HG, none of the covariates contributed significantly to ICABF variance (p>0.2 for all covariates). Figure 1B and 1C show the absence of relationship between CO and ICABF during volume loading (B) and sympathetic activation combined with volume loading (C). MAP did not change from Rest to HDT, but increased from Rest to HDT+HG (+12%, p=0.007) due to sympathetic activation without affecting ICABF though. These findings in combination with previous work from our group (Figure 1A) imply that cerebrovasculature can buffer effectively CO elevations but not CO reductions. Cerebral vasoconstriction due to sympathetic activation might have counteracted the increase in CO during HDT+HG, while it may have contributed to ICABF decrease during LBNP.

Conclusion: Cerebral blood flow responds differently to CO changes with a linear response to CO drops and no change during mild CO elevations. Cerebrovasculature cannot fully compensate for a decrease in CO despite a preserved MAP, which should be considered in the treatment of hemodynamically compromised patients.

References:

1. Skytioti et al., 2016, Physiol Rep.

## 13AP13-3

Effect of 6% Hydroxy Ethyl Starch 130/0.4 (HES) on renal function, coagulation and mortality in patients undergoing hemipelvectomy surgery involving major haemorrhage- a retrospective study

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Background and Goal of Study: The use of 6% hydroxyethyl starch 130/0.4 (HES) in patients with severe sepsis is associated with increased acute kidney injury (AKI), coagulopathy and mortality but fluid resuscitation with HES in relatively healthy surgical patients may not be associated with adverse long-term outcomes. We aimed to compare the incidence of AKI, coagulopathy and mortality in patients who received HES with those who did not receive HES for major haemorrhage in surgery for pelvic hone tumours.

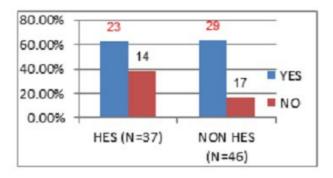
Materials and Methods: After Ethics Committee approval, records of 102 patients between January 2011 and June 2016 were reviewed. Patients were classified as those who received HES during surgery and those who did not.

Primary outcome- A composite end-point of the number of patients developing postoperative AKI (RIFLE Stage Injury or Failure by creatinine criteria) OR coagulopathy (platelet count < 80,000/cu mm or INR > 1.5 or APTT > 1.5 times control value) OR death prior to hospital discharge.

Secondary outcome- the number of patients with AKI, coagulopathy and mortality during the hospital stay and at 90 days after surgery.

Preoperative values of Serum creatinine, Platelet count, INR and APTT were compared to the worst post-operative values during the hospital stay. Values of Serum creatinine and survival status at 90 days after surgery were also recorded. Data was analyzed using Chi square test / Fishers exact test, independent "t" test and Multivariate binary logistic regression analysis. P-value < 0.05 was considered statistically significant.

Results and Discussion: 42 patients received HES (including 12 who received gelatin in addition) while 60 patients did not receive HES (of these, 52 patients received gelatin and 8 received only crystalloid). Composite end point (figure 1) was similar in both groups of patients (p – 0.934). Hospital mortality (HES, 1 /42 vs. Non-HES, 1/60) was similar. No difference was observed in the other secondary outcomes.



**Conclusion**: 6% HES (130/0.4) is not significantly associated with AKI, coagulopathy or mortality during hospital stay or at 90 days after surgery.

## 13AP13-4

## A comparison of several ways to assess Pulse Wave Transit Time (PWTT) to find "best-PWTT" for prediction of fluid responsiveness

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Introduction: Pulse wave transit time (PWTT) is a flow-based non-invasive monitoring parameter that is assessed in real time at the bedside. It consists of two parts: pre-ejection period (PEP) and vessel transit time (VTT). The respiratory variation of PEP (ΔPEP) has been shown to be a predictor of fluid responsiveness (1). Looking for a noninvasive method to assess blood pressure, PEP+VTT=PWTT has been found more suitable than PEP alone (2). Thus, PWTT or the respiratory variation of PWTT (ΔPWTT) might be a predictor of fluid responsiveness. However, at present it is unknown how to obtain PWTT correctly in a clinical setting. Therefore, this study was conducted to find "best-PWTT".

Methods: Following IRB-approval and written informed consent 40 patients scheduled for major urological surgery with an expected fluid turnover intraoperatively were enrolled. PWTT was monitored continuously (LifeScope® Modell J BSM-9101 Nihon Kohden Europe GmbH, Rosbach, Germany). Stroke volume was monitored by Oesophageal Doppler Monitoring (CardioQ-ODM®, Deltex Medical Ltd, Chichester, UK). In case of hypovolemia a fluid bolus of 7 ml/kg ideal body weight was administered at the discretion of the attending anaesthetist. An increase in stroke volume of 10% was considered to reflect fluid responsiveness. Beginning of PWTT was detected by either R-wave in the ECG. End of PWTT was detected by pulse oximetry either at the finger, or the ear lobe. PWTT measurements were either corrected by Bazett's formula (3), or were left uncorrected. PWTT was analyzed either as monitored, or the respiratory variation of PWTT (ΔPWTT) was analyzed. ROC curves and corresponding AUCs were used to compare the 16 methods of determing PWTT, a Wilcoxon test was used to discriminate fluid responders from non-responders...

**Results:** 87 fluid boluses were given. 66 datasets were complete and were used for ROC analysis. "Best-PWTT" is assessed by the respiratory variation of PWTT ( $\Delta$ PWTT), with the heart rate corrected by Bazett's formula, the beginning of PWTT to be detected by the R-wave in ECG, and pulse oximetry attached at the earlobe. AUC is 0.716, the Wilcoxon test showed a p-value of 0.014.

**Conclusion:** Various ways to assess PWTT are not created equal, "best PWTT" should be used. Further clinical studies are required.

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## 13AP13-5

## A comparison of assessing fluid responsiveness by Pulse Wave Transit Time ( $\Delta$ PWTT) and $\Delta$ PP

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Introduction: Hemodynamic stability based on normovolaemia is mandatory for patients' outcome (1). A dynamic parameter like  $\Delta PP$  is suitable to assess fluid responsiveness (2). A completely non-invasive monitoring technology would be helpful. Pulse wave transit time (PWTT) is a real-time flow-based hemodynamic parameter to be used at the bedside. The goal of the present study is to investigate how suitable PWTT is for predicting fluid responsiveness in the perioperative setting compared to  $\Delta PP$ .

Methods: Following IRB-approval and written informed consent 40 patients scheduled for major urological surgery with an expected fluid turnover intraoperatively and a need for arterial blood pressure monitoring were enrolled. The respiratory variation of PWTT (ΔPWTT) after correction by Bazett's formula with detection of PWTT's beginning by the R-wave in ECG, and detection of PWTT's end by detection of pulse oximetry at the ear lobe was monitored continuously (LifeScope® Modell J BSM-9101 Nihon Kohden Europe GmbH, Rosbach, Germany). The assessment of  $\Delta PP$  was performed after cannulation of the non-dominant hand by reliable standard monitoring technology (3). Stroke volume was monitored by Oesophageal Doppler Monitoring (CardioQ-ODM®, Deltex Medical Ltd, Chichester, UK). In case of hypovolemia a fluid bolus of 7 ml/kg ideal body weight was administered at the discretion of the attending anaesthetist. An increase in stroke volume of 10% was considered to reflect fluid responsiveness. ROC curves and corresponding AUCs were used to compare ΔPWTT and ΔPP, a Wilcoxon test was used to discriminate fluid responders from non-responders. Difference between ROC curves was tested using the method by DeLong, DeLong, and Clarke-Pearson.

**Results:** 87 fluid boluses were given in this clinical study. 66 datasets were complete and were used for ROC analysis. AUC was 0.7164 for  $\Delta$ PWTT, and 0.6265 for  $\Delta$ PP, respectively. The Wilcoxon test showed a p-value of 0.014 for  $\Delta$ PWTT, and 0.008 for  $\Delta$ PP, respectively. However, no difference in discriminative ability could be established between the three methods (p > 0.05).

**Conclusion:** ΔPWTT shows promise as a noninvasive parameter to predict fluid responsiveness. Further study is required.

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- 5. 25.16.1a.1 4 7 1 51 a.1, 2.11 6 7 a.1a65a.1 2666, 166.67 6

## 13AP13-6

## Impact of A Clinical Decision Support for Goal Directed Fluid Therapy Implementation on Protocol Adherence and Time in Hemodynamic Target: A Quasi-Experimental Cohort Study in Patients Undergoing Major Abdominal Surgery

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Background and Goal of Study: The aim of this study was to assess the effect of implementing a decision-support system, "Assisted Fluid Management" (AFM), for goal directed fluid therapy (GDFT) guidance. We compared the system to a historical cohort of patients (control group) who received a manually conducted GDFT strategy during major abdominal surgery. Adherence to the protocol was defined as the relative intraoperative time spent with a stroke volume variation (SVV) below 13%. We hypothesized that patients in the AFM-group would spend more time during surgery with a SVV below 13% compared to the control group. Materials and Methods: All patients had a radial arterial line connected to a pulse contour analysis monitor and received a 2 ml/kg/h maintenance crystalloid infusion. Additional 250 ml crystalloid boluses were administered whenever measured

suggested a fluid bolus in the AFM group

Results and Discussion: We compared 46 AFM to 38 cohort-controls. Patients in the AFM group spent significantly more time during surgery with a SVV below 13% compared to the control group (median 92% [82, 96] vs 76% [54, 86]; P<0.0005), with less fluid given overall (1775ml [1225, 2425] vs 2350ml [1825, 3250];P=0.010). The incidence of postoperative complications was comparable in the two groups.

Conclusion: The implementation of a decision support system for GDFT guidance resulted in a significantly higher time spent during surgery with a SVV below 13%. Interestingly, the total amount of fluids administered was also substantially reduced.

stroke volume variation (SVV) ≥ 13% in the control group, and when the software

### 13AP13-7

Monitoring of inter-beat-intervals and accuracy of atrial fibrillation detection with wrist photoplethysmography in post-operative patients

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Background and Goal of Study: Atrial fibrillation (AF) causes marked risk for patients, while silent fibrillation may remain unnoticed if not suspected and screened. Development of comfortable yet accurate beat-to-beat heart rate (HR) monitoring with good AF detection sensitivity would facilitate screening and improve treatment. The purpose of this study was to evaluate whether a wrist-worn photoplethysmographic (PPG) device can be used to monitor beat-to-beat HR and to detect atrial fibrillation accurately during postoperative treatment.

Materials and Methods: Thirty patients with multiple comorbidities scheduled to surgery and treated post-operatively at post anaesthesia care unit were recruited. Patients were recruited into two equal sized groups having either AF or sinus rhythm (SR). The group allocation was decided at the beginning of the measurement. Initially, one patient had an AF rhythm which was reversed to SR and therefore the patient was excluded from the final analysis. The monitoring was conducted during postoperative treatment and it included standard ECG and a wrist-worn PPG-based optical HR Monitor, (PulseOn Itd, Espoo, Finland) using green light. Inter-beat intervals (IBI) from the wrist PPG signals were compared to RR intervals obtained from the ECG readings. IBI values were further used to evaluate the AF or SR condition.

Results and Discussion: 29 patients (15 with AF, 14 with sinus rhythm (SR), mean age 71.5y) were analysed. The average duration of each recording was 1.5 hours. The wrist PPG monitor had a very good beat detection accuracy. For the SR group, the mean absolute error (MAE) for IBI was 7.64ms. For the AF group, the MAE for IBI was 14.67ms. The AF detection sensitivity was 99.00% and specificity 92.96%. By discarding periods with movement artefact, the AF detection sensitivity was improved to 99.88% and specificity 99.92%.

Figure 1 Bland-Altman Plot showing the comparison of Inter-beat interval between ECG and wrist measurement. The numbers indicate mean error and limits of agreement

**Conclusion**: Results suggest that wrist PPG measurement allows accurate IBI detection, which could be used for differentiating between SR and AF with very good sensitivity. By discarding the periods with artefacts, usually caused by motion, the performance was found excellent.

## 13AP13-8

## Microcirculatory perfusion in obese patients undergoing cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Microcirculatory perfusion is impaired during and after cardiac surgery with cardiopulmonary bypass (CPB). A substantial part of the cardiac surgical population is obese and it is known that obese patients have impaired microcirculatory function. It is however not known how CPB affects microcirculatory perfusion in this obese group, and we hypothesized that CPB-induced alterations are more severe in obese patients.

**Materials and Methods**: Obese (BMI>35kg/m²) and lean (BMI 20-25kg/m²) patients without diabetes undergoing cardiac surgery with CPB were included (n=9 vs. 16 respectively). Sublingual microcirculatory perfusion was determined with Sidestream Darkfield Imaging at baseline (T=0), after induction of anesthesia (T=1), after start of CPB (T=2), after weaning from CPB (T=3) and 24 hours after surgery (T=4).

Results and Discussion: Microcirculatory perfusion did not differ between groups at baseline (T=0) nor did induction of anesthesia (T=1) alter perfusion in either group. In obese patients, the start of CPB (T=2) decreased the proportion of perfused vessels (PPV: 6% decrease, p=0.05) as well as the microvascular flow index (MFI: 12% decrease, p=0.03). Interestingly, in the lean group these changes did not occur until weaning from CPB (T=3) (PPV 8% decrease, p=0.03; MFI 9% decrease, p=0.01). Twenty-four hours after surgery (T=4), microcirculatory perfusion was restored to baseline values in both groups.

Conclusion(s): These pilot data show that cardiopulmonary bypass-induced changes in microcirculatory perfusion occur earlier in obese patients when compared to lean patients. This suggests that obese patients may be less able to compensate for hemodynamic and endothelial stress caused by CPB. Future research will focus on how this is related to the development of postoperative complications.

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## 13AP13-9

## Inconsistent correlation between MAP and cardiac output during anaesthesia induction and patient positioning

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Introduction: Intraoperative anesthetic management can influence long-term patient outcomes and surgical mortality. Anesthesia induction with propofol is associated with cardiac output (CO) reduction and surgical positions are also responsible for hemodynamic (HD) changes. Our study aims to evaluate the HD changes during anesthesia induction and knee-chest positioning, using LiDCO rapid®

Methods: A prospective observational study of patients scheduled for lumbar spinal surgery in the KC position was conducted following IRB approval. ASA standard monitoring, BIS, neuromuscular monitoring and invasive arterial pressure were used. LIDCO rapid® extracted CO, SV, SVR, PPV and SVV every second Induction with remifentanil by TCI to achieve a target Ce of 2.5ng/ml and propofol 1% at 200ml/h until loss of consciousness (LOC), at which moment propofol was switched to TCI (Schnider's pharmacokinetic model). At this point, the study was divided in 2 protocols: P1-maintain propofol Ce at LOC and guide anesthesia with BIS; P2-reduce propofol immediately after induction (propofol Ce target calculated from LOC Ce through a formula developed previously, which obtained a reduction of ≈30%). Three study moments were considered: M0 (before induction), M1 (10' after induction), M2 (10' after KC positioning). Rugloop® software was used to collect data every 5" and to drive remifentanil and propofol pumps, ANOVA analysis was used to compare the mean differences of the repeated measured variables between phases and moments and paired tests when differences were founded. Results are mean ± SD

Results: Twenty ASA I-II patients were included. Table 1 presents patients' data and Table 2 the HD parameters. In P1, CO decreased 25,6% after induction (M1) and 38,4% after KC position (M2). In P2, despite reduction of Ce propofol, CO decreased 19,8% at M1 and 46,9% at M2. ANOVA analysis didn't find any difference between HD parameters from both protocols. Correlation coefficient (Correl) between MAP and CO variation was inconsistent, especially in P1 after KC position (Correl P1: M1/M0=0,34; M2/M0=0,004 and Correl P2: M1/M0=0,56; M2/M0=0.75).

**Discussion and conclusion:** These results show that the reductions we performed in propofol Ce were insufficient to compensate HD changes. In addition to standard monitorization, the use of cardiac output monitorization in high-risk patients anesthetized in KC position, may be necessary to detect serious HD changes and quide therapy.

## 13AP13-10 Monitoring of microsurgical flaps with the INVOS™ system

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Background and Goal of Study: Early detection of circulatory compromise threatening free flap viability is essential for offering surgical intervention and offering better outcome in flap salvage. Usually clinical examination is the method for postoperative monitoring of free flaps but sometimes it is not quite accurate. The INVOS™ system is a non-invasive optical method that utilizes near-infrared spectroscopy for measuring regional tissue saturation of O2 (STisO2). This device is most frequently used in cerebral oxygenation monitoring. The objective of the study is to determine if this system could be useful to detect early problems in the microvascular anastomosis.

Materials and Methods: This a prospective observational study of patients who underwent a free flap procedure conducted from April to October of 2017. At the end of surgery the probe was attached to the skin of the flap, where vascular anastomosis was performed. StiO2 was monitored and recorded during 24 hours postoperatively. The baseline value was registered and further values every 4 hours. A decline of 50% from the baseline value (50%-BV) was determined as an alarm limit. The U of Mann Whitney was used for comparing quantitative variables and the Chi-square for categorical variables. A p value ≤0.05 was considered significant.

Results and Discussion: Forty-eight patients were included, 35 female (73%), age 52 (25-77); 32 (67%) from breast surgeries, 2 (4%) from head and neck and 14 (29%) from extremities. Fourteen flaps (29%) required surgical intervention (SI), with 32 (87%) flap survival. The SI was in 6 cases for venous thrombosis, 2 cases were arterial compromise, 1 hematoma and 4 infections.

	SI n=14	Not SI n=34	р
STis02-baseline	57 (31-77.5)	73,5 (64-84.7)	0.02
STisO2-4h	38,5 (28.5-74)	72 (60.5–85)	0.01
STisO2-8h	57 (38–80)	70 (57–83)	0.07
STisO2-12h	44 (34–79)	71 (57–83)	0.11

Twelve patients without 50%-BV required SI and 2 with 50%-BV required SI (p=0.079).

**Conclusion**: Lower values of STisO2 are associated to a higher incidence of SI of free microsurgical flaps. A 50%-BV is not an adequate cut-off value for determining SI as it offers a low sensitivity and high specifity. Whether a lower cut-off value may increase sensitivity should be further studied.

## 13AP13-11

## Passive Leg Raise as predictor of hemodynamic stability on induction of anesthesia: a prospective study

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Background and Goal of Study: Patients undergoing surgery require perioperative fluid supplementation, however the amount needed is variable and affected by anesthesia, especially during induction. This has been commonly attributed to the hypovolemic state caused by fasting. We hypothesized that by recognizing a state of hypovolemia prior to induction of general anesthesia and optimizing the volume deficit, there would be less hemodynamic instability on induction of GA and prior to incision

Materials and Methods: After IRB approval, a total of 119 patients undergoing cystectomy with general anesthesia (GA) were analyzed and divided in two groups. 65 patients had Passive Leg Raise prior to induction of GA, via an arterial line connected to the Flotrac Hemodynamic monitor (GDT Group). Their stroke volume (SV) was measured and optimized if needed with 250 cc of crystalloids boluses. 54 patients were treated per standard of care (Standard group), with no preoperative measures or fluid optimization. The lowest Mean Arterial Pressure (MAP) between the time of induction and incision was measured, and a decrease of more than 30% from baseline (defined as MAP at Presurgical Testing visit) was considered positive. Results and Discussion: There was no statistical significant difference in MAP changes after induction of GA between the two groups (table 1). Even when analyzing only the GDT group, there was no correlation between positive PLR and MAP changes after induction. These results persisted after adjusting for body mass index (p=0.5) and age at surgery (p=0.3, respectively).

Conclusion: Our data suggest that there is no advantage in optimizing patient volume status prior to induction of general anesthesia. A decrease in MAP of at least 30% is a common occurrence, optimization before induction does not prevent the drop. Age and BMI at the time of surgery also do not seem to significantly affect hemodynamic stability.

Results	MAP D ≥30%	MAP D <30%	p
GDT	46	18	0.5
Standard	43	11	0.5
PLR +	14	3	0.3
PLR -	32	15	0.5

GDT Goal Directed Therapy, PL Passive Leg Raise, MAP D MAP Drop.

## 13AP13-12

## Optimization of Anesthetic Management in free flap Reconstruction Surgery: "Before-after study"

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**Background**: Free flap reconstruction is nowadays the best technic after complex surgery of the head and neck. In our center, a professional practices evaluation showed a 74% rate of postoperative complication. The practices have been modified by virtue of the latest evidences and this study aim is to evaluate these modifications.

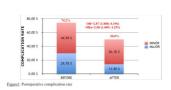
**Methods**: This is a single center before-after design study. All patients who underwent free flap surgery within the study period were included. Table1 shows the points of difference between the two periods

	Before	After
Period	2009 – 2014	2014 - 2017
Vascular filling	Liberal	Monitored
Regional Anesthesia	Optional	Systematic
Catecholamine	Dobutamine	Noradrenaline
Blood Pressure Level	MAP = 90 mmHg	Basic MAP ≤ 30% less.
Hemoglobin Objective	10 g/DI	7-8-9-10 g/dL according to patient
Depth of Anesthesia	Non monitored	Monitored

## Table1: Points of difference between the periods

The main outcome is the rate of postoperative complications. The major complications are flap loss or any medical complications required ICU admission. The minor complications are surgical revision for wound disunion and surgical site infection. The Chi 2 test is use for categorial data. An inverse weight adjustment of the propensity score was performed.

Results and Discussion: 31 patients are in the «before» group and 34 in the «after», the characteristics of the patients are comparable, the rate of postoperative complications are showed in figure 1.



Optimization of perioperative care for free flap reconstruction reduces the rate of postoperative complications. This result is in approval with the recent recommendation of the ERAS group in Major Head and Neck Cancer Surgery With Free Flap Reconstruction.

## Patient Safety

### 14AP01-1

## Lung ultrasound for postoperative pneumothorax diagnosis after Nuss procedure

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Background and Goal of Study: Nowadays Nuss procedure is a gold standard of pectus excavatum correction. This method consists of placing metal bar under the sternum under thoracoscopic control with ipsilateral lung collapse or artificial pneumothorax. In order to recruit the lung and to eliminate pneumothorax recruitment manoeuvre (inspiratory pressure 40 mm H2O during 40 seconds) with pleural tube in situ is carried out at the end of surgery. Safety concerns require lung recruitment assessment and pneumothorax diagnosis postoperatively. Current scientific literature shows that point of care lung ultrasound has number of advantages over X-ray such as higher sensitivity and specificity, possibility lung ultrasound of repeated examination, fast result and no radiation. The goal of this study was to compare lung ultrasound with chest X-ray in diagnosing of pneumothorax after Nuss procedure in patients with pectus excavatum.

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Materials and Methods: Thirty-seven 12-16 years old patients after Nuss procedure were examined with chest X-ray and lung ultrasound (with 3 MHz convex probe according BLUE protocol) immediately after operative theatre discharge. Ultrasound examination was performed in "A" and "B" points in order to identify presence or absence of pleura sliding and "lung point" in case of pleura sliding absence

**Results and Discussion**: According to chest X-ray results pneumothorax was found in 2 of 37 (5.4%) patients. Results of X-ray were obtained during  $25.1\pm0.94$  minutes. Lung ultrasound showed presence of pneumothorax in 3 of 37 (8.1%) patients and it took  $3.1\pm0.15$  minutes for diagnosis. Patients did not have respiratory failure and there was no need for chest tube placing. Pneumothoraxes resolved in  $4.5\pm0.5$  days.

Ultrasound is more informative in diagnosing the pneumothorax compared to X-ray after Nuss procedure. Metal bar in the patient's chest can obstruct lung sonography in "B" point or searching for "lung point" and this can be limitation of lung ultrasound after Nuss procedure.

**Conclusion**: Lung ultrasound is faster and more sensitive method of pneumothorax diagnosis after Nuss procedure compared to chest X-ray, however its use can be limited by metal bar.

## 14AP01-2

## Facial nerve paralysis and synkinesis after general anaesthesia and mask ventilation

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**Background:** A 77 year old female developed facial nerve paralysis and subsequent synkinesis after prolonged mask ventilation for cystoscopy. Reporting this rare complication is paramount given that alternative airway management techniques are readily available.

Case Report: A 77 year old female with past medical history of hypertension, hyperlipidaemia, hydronephrosis and peripheral neuropathy presented for cystoscopy for exchange of ureteral stent. To avoid instrumenting the patient's airway, the anaesthesiologist delivered general anaesthesia with mask ventilation. Total mask ventilation time was 65 minutes. A mask and oral airway were used, but no head strap. The patient complained of right cheek numbness in PACU. Evaluation by neurology confirmed facial neuropraxia affecting the mandibular branch of the facial nerve likely due to compression from anaesthesia mask. Over the next 3 months, the facial nerve palsy progressed into synkinesis - the patient's right eye would involuntarily twitch during every attempt to smile.

Discussion: The incidence of facial nerve palsy after mask ventilation is extraordinarily rare - a total of 14 cases had been reported in the years 1938-1988. The facial nerve, after leaving the skull, becomes superficial to the mandibular ramus and enters the parotid gland where it divides into branches. Pressure behind the mandible to relieve respiratory obstruction may injure the mandibular branch. Additionally, downward pressure exerted by the mask can result in ischemic injury of the mental nerves as they pass the mental foramina of the mandible. Facial nerve paralysis may occur as a result of direct compression or stretching of any branch of the facial nerve. Synkinesis due to mal regeneration causes involuntary movements during a voluntary movement. Our case report suggests that sensory and motor deficits of the face may occur more frequently than previously reported in the literature. The avoidance of mask ventilation with the use of a supraglottic device or endotracheal intubation must be considered in light of the rare but debilitating complications of facial nerve palsy.

**Learning points:** Facial nerve palsy (FNP) and synkinesis are known complications of prolonged mask ventilation. FNP and synkinesis are debilitating conditions associated with negative psychosocial effects. This complication may be avoided by securing a definitive airway and limiting mask ventilation.

### 14AP01-3

## Perioperative hypothermia evaluation: quality review

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Background and Goal of Study: Perioperative period induced hypothermia is a common complication and is usually associated to poor outcomes. In patients submitted to elective surgical procedures, hypothermia's incidence is estimated to be between 26 and 90%. Temperature evaluation is a mandatory component of anaesthetic procedures' standard monitoring. Stable perioperative normothermia is considered to be a quality indicator of the provided health care.

Objective: Evaluate hypothermia's incidence and identify high-risk patients.

Materials and Methods: During January 2017, a prospective review of patients submitted to elective and urgent surgery in a central hospital was carried out. One hundred and twenty patients were included, after exclusion of under 18-year-old patients. Demographic data, type of anaesthetic procedure, warming methods, temperature on arrival to the operating room (T1), temperature on admission to the Post Anaesthetic Care Unit (PACU) (T2), temperature on PACU discharge (T3) and fluid therapy administered were registered. Tympanic temperature was evaluated, classifying normothermia as temperature equal or above 36°C and hypothermia as temperature under 36°C. A descriptive and statistical analysis was performed using SPSS. P<0.05 was considered to be statistically significant.

**Results and Discussion**: Average temperature at arrival to the OR was 36.6°C and at admission to the PACU was 35.7°C, with a minimum of 34.1°C and 37.9°C. At discharge from the PACU, it averaged 36.0°C, with a minimum of 35.0°C and maximum of 37°C (p<0.05). Hypothermia incidence was 5% in T1, 65.8%°C in T2 and 36.6% in T3. Sixty-two percent of the patients develop hypothermia and only 26.1% recovers normothermia.

Conclusion:This study confirms that perioperative hypothermia is common, which is in accordance to the existing literature. Once inadvertedly induced, few patients manage to recover from hypothermia until being normothermic, being temperatures of <36.0°C recorded by the time of discharge from the PACU. In conclusion, this study reinforces the need to invest in warming methods within the perioperative period, establishing adequate protocols for each hospital or unit, thus assuring better quality and safety in the health care provided.

## 14AP01-4

## Temperature changes during robotic assisted surgery

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**Background, Goal of Study**: Robotic assisted surgery is considered as a minimal invasive procedure, however it requires a long positioning time and causes a limited access to warm patients. Associated temperature changes are still poorly reported, for this reason we aimed to evaluate them.

Materials and Methods: 32 patients anesthetised for robotic assisted urologic surgery were studied. Patients were warmed with a forced-air warming blanket at 43°C covering upper part of the body. Central temperature was monitored using zero heat flux monitor (Spot-on 3M) through a frontal cutaneous sensor. Intravenous infused fluids were limited to 5ml/kg/h. Eleven measurements were recorded at different phases of the procedure. Wilcoxon test (paired samples) was used for statistical analysis.

**Results and Discussion**: Mean age was  $59.3\pm14$  years and BMI  $26.1\pm3.4$  kg.m². There was a significant decrease in temperature during positioning and anaesthesia induction until  $CO_2$  insufflation. This hypothermia was almost stable through the surgical procedure and failed to be corrected inspite of active warming.

n=32	Median (°C)	95% CI	<b>p</b> relative to preceding phase
Positioning	36.3	36.2-36.5	
Post induction	36.1	35.8-36.2	0.0105*
15mn after ind	35.8	35.6-36.0	0.0005*
Before insufflation	35.6	35.4-35.8	0.0049*
5mn after insuffl	35.5	35.4-35.7	0.057
15mn after insuffl	35.5	35.3-35.7	0.1173
30mn after insuffl	35.5	35.2-35.6	0.0759
60mn after insuffl	35.6	35.2-35.7	0.218
90mn after insuffl	35.7	35.4-35.8	0.0033*
120mn after insuffl	35.5	35.3-35.9	0.3529
10mn after exsufflation *p significant	36.0	35.6-36.2	0.02*

**Conclusion**: Robotic assisted surgery is associated with hypothermia. As intraoperative correction of hypothermia is difficult because of the limited body surface available for active warming, anaesthetists should prevent heat loss during positioning and warm patients preoperatively.

Acknowledgement: Dr JM Conil for statistical help.

## 14AP01-5

## Incidence and risk factors for subcutaneous emphysema during robot-assisted laparoscopic prostatectomy

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**Background and Goal of Study**: Subcutaneous emphysema (SE) is a complication of laparoscopic surgery that occasionally impairs ventilation and can cause a delay in postoperative recovery. In this study, we investigated the incidence and risk factors of SE in robot-assisted laparoscopic prostatectomy (RALP).

Materials and Methods: The subjects were 155 patients who underwent RALP between January 2015 and December 2016. The presence of SE was examined retrospectively in chest X-rays taken at the end of surgery. SE was classified into four grades based on emphysema limited to under the thoracic diaphragm (Grade I), reaching the lower half of the thorax (Grade II), limited to the thorax (Grade III), and extended to the neck (Grade IV). Age, height, body weight, BMI, ASA PS, preoperative albumin level, diabetes as a complication, and surgical duration were compared in patients who were and were not affected with SE, using a Mann-Whitney U test or chi-squared test. Data were analyzed by univariate analysis and then subjected to multivariate analysis using multiple logistic regression. P<0.05 was considered to be significant in all analyses. The study was approved by the ethics committee of our university (No. 2998).

Results and Discussion: SE occurred in 47 of 155 cases (30.3%) and was classified as Grades I, II, III and IV in 14 (9.0%), 18 (11.6%), 10 (6.5%), and 5 (3.2%) cases, respectively. This incidence of SE is higher than that in previous reports on laparoscopic surgery (0.3-3.9%); however, past reports have included only marked cases of SE and it is likely that the incidence would have been closer to that in other laparoscopic surgeries if mild cases had also been included. The SE-affected group had a significantly lower height (p=0.005), lower body weight (p<0.001), and lower BMI (p<0.001) compared to the unaffected group. Multivariate analysis yielded no factors that significantly influenced the occurrence of SE. Age, number of ports, and surgery duration have been proposed to affect SE, but these factors were not related to SE in our patients because the study included cases with a similar age and a single disease that were treated by one surgical team with a consistent number of ports and little variance in surgery duration.

consistent number of ports and little variance in surgery duration.

Conclusion:RALP may have a higher incidence of SE than that found in other laparoscopic surgeries.

## 14AP01-6

## Clinical pathway for the prevention of perioperative hypothermia in the candidate for major oncological surgery: effectiveness and areas of improvement

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**Background and Goal of Study**: This study intends to verify the effectiveness of an internal management program, dedicated to major oncological surgery, aimed at the prevention of perioperative hypothermia and planned according to the indications contained in the guidelines and the best practices that deal with the topic.

Materials and Methods: The care path has been applied to 200 patients. In all the perioperative phases, the central temperature of the patients was monitored with zero-heat-flux technology. Patients received an optional preoperative and mandatory intraoperative warm up a forced air system in association with underbody blankets. Influsion fluids were actively heated in all interventions. For each patient demographic and anamnestic parameters were recorded as well as quantitative and qualitative indicators useful for a correct evaluation of the patients outcome.

Results and Discussion: In operating room, at the end of surgery, 7,5% of patients showed T<36°C; 13 mild hypothermia, 1 moderate hypothermia, 1 deep hypothermia. 66% of patients were prewarmed, while 34% refused. 15 patients showed T<36°C (66% no-prewarming group). The difference in temperature found in patients between two groups Pr.A.C.U. and during the induction results statistically not significant. In all intraoperative phases and at the end of surgery, difference detected is statistically significant(p<.05). Only weak negative correlations between temperature(<36°C) recorded at the end of surgery and ASA, age, and duration of surgery. Postoperative shivering case was reported; 90% declared maximum comfort status; 93% no pain. In PACU after 5 minutes 60% of patients were completely awake and after 20 minute percentage rose 89%. In PACU and after 24 hours no complications. Average time in PACU was 49±21 min.

**Conclusion**: Prewarming plays an important role in reducing incidence of intraoperative heat loss and has a positive influence on patients anxiety and concern while waiting to enter in operating room. Analysis of data obtained show us that methods and treatments chosen for prevention of perioperative hypothermia should be evaluated positively and in line with the expected clinical standards.

### 14AP01-7

Lost guidewire entrapped into cava removed under echocardiography monitoring. Case report and review

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**Background:** Guidewires are routinely used in the Seldinger technique during central venous catheter placement. Among the multiple complications of central venous catheterization, some can occur with guidewire placement alone. Both diagnosis and treatment of late complications can represent a challenge.

Case Report: Delayed diagnosis of a lost guidewire retained in a patient -ASA II, nephrectomized eight months ago- as a late complication during central venous catheterization of the basilic vein. The patient had consulted several times with Emergency Department and GP for chest pain. Physicians from multiple services subsequently failed to detect the retained guidewire on several chest radiographs and CT scan during the eight months until the diagnosis. However, the unraveled guidewire was incidentally discovered after a coronary angiography was obtained. The guidewire was located from right auricular to popliteal vein. Interventional radiology failed to remove the metal. Finally, phlebotomy under echocardiography monitoring was required.

**Discussion:** Cases of wire entrapment and "lost" wires have been reported; also a systematic analysis of published case reports about missed guidewires had been done. Lost wires are often amenable to snaring under fluoroscopic guidance by interventional radiology. However, entangled wires may be removed with steady traction or require surgical intervention. Echography monitoring during phlebotomy for detecting pericardial effusion or right heart lesions is a basic requirement.

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- 2. Pokharel K, et al. Missed Central Venous Guide Wires: A Systematic Analysis of Published Case Reports. Crit Care Med. 2015 Aug;43(8):17.

Learning points: Guidewire retention is a rare complication of central venous catheter placement, which has been related to operator fatigue, inexperience and above all inattention; damaging the patient safety. The true incidence of guidewire loss after intraoperative placement of central venous catheters is unknown. Guidewire entrapment as a late complication of central venous catheterization requires removing the unraveled guidewire as soon as possible, in order to avoid serious complications, as cardiac perforation and tamponade. Due to this, echocardiography monitoring during phlebotomy becomes fundamental.

## 14AP01-8

## Continuous spinal anesthesia in patients with Severe Aortic Stenosis: could it be a safe option?

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**Background**: Aortic stenosis(AS) is a major risk factor for adverse outcomes during the perioperative period in patients undergoing non-cardiac surgery. Neuroaxial blockade is relatively contraindicated in this patients, that's why evidence about this subject is so sparse. We describe two cases of patients with severe AS that underwent orthopaedics surgery under continuous spinal anaesthesia (CSA).

Case Report: Patient 1:male.91years-old.ASA IV. proposed for an urgent fixation of a trochanteric femur fracture. History of severe aortic stenosis, congestive heart failure, ischemic cerebral stroke, dyslipidaemia and had a cardiac tamponade 2 years before. The standard ASA monitoring and invasive blood pressure measurement were used. A 18G Touhy epidural needle was inserted at the L4-5 interspace into the subarachnoid space. A 20-gauge catheter was inserted through the needle 3cm into the subarachnoid space and secured to the back. After aspiration, 2,5mg of levobupiyacaína 0.5% was injected intrathecally. Additional doses of 1.5mg and 2,5mg were given 30 and 45min after the initial dose. The patient remained hemodynamically stable during the procedure and in the post-operative period. Patient 2:female,77 years-old,ASA IV, proposed for elective total hip replacement after femoral neck fracture. Medical history of hypertension, chronic renal disease, dyslipidemia and hiperuricemia. A preoperative echocardiogram revealed a severe AS. The same monitoring was used and CSA was performed as described in patient 1. with the administration of 4 mg of 0.5% levobupivacaine and 0.003 mg of sufentanil. The patient remained hemodynamically stable and the procedure went uneventful. There was no report of cardiovascular complications postoperatively. Discussion: Classically, general anaesthesia (GA) is recommended over neuroaxial anaesthesia in cases of AS. Nonetheless, using a catheter-based neuroaxial anesthesia allowing individual drug dose titration, it is possible to achieve a favorable hemodynamic profile. Moreover, it may even offer advantages over GA In addition, an appropriate invasive BP monitoring offers early and more accurate recognition of hemodynamic changes, allowing prompt medical intervention.

References: S Johansson, MN Lind. Central regional anaesthesia in patients with aortic stenosis – a systematic review. Danish Medical Journal, Set 2017.

**Learning points:** Patients with severe AS can be safely managed with continuous spinal anaesthesia, with minimal hemodynamic disturbances.

### 14AP01-9

Perioperative complications after transoral endoscopic thyroidectomy vestibular approach: a retrospective audit study

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Background and Goal of Study: Transoral endoscopic thyroidectomy vestibular approach (TOETVA) has been reported to be safe with minimal trauma and superior cosmetic outcome. Our retrospective audit study primarily aimed at analyzing perioperative complications in patients undergoing TOETVA at an Asian tertiary referral center.

**Materials and Methods**: The demographic and anthropometric data as well as perioperative and postoperative complications of 124 patients undergoing TOETVA at Chi Mei medical center from October 2015 to March 2017 (i.e., 18 months) were retrospectively reviewed.

Results and Discussion: Totally 124 patients (110 females and 14 males) were studied. The median age was 46.5±12 years and body mass index was 23.5 ± 3.7 kg/m2. The incidence of major perioperative complications was in the order of massive subcutaneous emphysema (58.1%), difficult breathing with or without stridor (9.7%), tracheal tube cuff rupture (3.2%), and cervical hematoma (1.6%) (Table 1). All patients were discharged from hospital without long-term sequelae.

**Conclusion:** Although perioperative complications were not uncommon in patients undergoing TOETVA, most were minor without long-term sequelae.. Our findings may provide insights into the prevention of TOETVA-associated perioperative complications.

Total
n = 124
72 (58.1%)
12 (9.7%)
4 (3.2%)
2 (1.6%)
1 (0.8%)
0

## 14AP01-11

## The forgotten bridge – a case report

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**Background**: Aspiration or dislodgement of an odontogenic foreign material potentially may result in serious complications including laceration, perforation and haemorrhage of the esophagus and gastrointestinal tract or even airway obstruction¹. The aim of this case report is to show that even an apparently uneventful general anaesthesia. may ultimately lead to unpleasant surprises.

Case Report: We report a case of a 43-year-old-woman scheduled for elective hysteroscopy and polypectomy in an outpatient unit. No other comorbidity was noted apart from dyslipidemia and class II obesity, with no other signs of predictably difficult airway. When questioned, the patient said she did not have any loose teeth, crowns, or dentures, both on preanesthetic assessment and on operation room. General anaesthesia was performed, and a size 4 i-gel laryngeal mask airway was easily inserted, with no intercurrence.

At post-anaesthetic recovery unit, the patient complained that her fixed partial denture (bridge) was missing and that it was already loose before. She had no symptoms of airway or esophageal obstruction. A chest radiography showed her dental prosthesis in what appeared to be the esophagus. The patient underwent an endoscopy performed by a gastroenterologist and the denture was removed uneventfully.

**Discussion**: The presence of a dental prosthesis or loose tooth represents a threat to the patient's safety, especially if the airway is accessed<sup>2,3</sup>. Although most foreign bodies entering the oropharynx pass through the gastrointestinal tract without complications, it may be necessary to identify and remove it to avoid late complications<sup>1,3</sup>.

A preanesthetic evaluation, including oral examination, is essential to ensure patient safety<sup>1,2</sup>.

In our case, the assessment was performed but the patient omitted the presence of a bridge, putting herself into unnecessary risk.

## References:

- 1. Lau G, et al. "Where Are My Teeth?" A Case of Unnoticed Ingestion of a Dislodged Fixed Partial Denture. Anesth Analg 2009;109:836-8
- 2. Yasny J S. Perioperative Dental Considerations for the Anesthesiologist. Anesth Analg 2009;108:1564–73

3. Windsor J, Lockie J. Anaesthesia and dental trauma. Anaesth Intensive Care 2008:9:355-7

**Learning points**: Adoption of a more extensive intraoral examination on preanesthetic evaluation may be suggested to properly appreciate any vulnerable teeth or dental prosthetic.

## 14AP02-1

## Patient safety under sedation for Zygomatic implants

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**Background**: sedation safety when is administered by non-anaesthesiologists has traditionally raised controversy, usually disguised as scientificism when the real issue is mainly financial in nature.

Zygomatic implants have been documented as an alternative for the rehabilitation of the atrophic posterior maxillar. According to the original protocol, surgery was carried out under general anaesthesia with nasal intubation (1).

Case Report: we report 73 cases of Zygomatic implants under local anaesthesia and anaesthesiologists' sedation. All patients were ASA 2-3. Standard monitoring included Non-invasive Blood Pressure (NIBP), Heart Rate (HR) and arterial oxygen saturation by pulse oximetry (SpO2). Patient's level of sedation was assessed using the Ramsay Sedation Scale. We didn't have hypoxemia (SpO2 <90%), hypotension (SBP <90 mm Hg), significant respiratory or hemodynamic incidences, no regurgitation or required ventilation support, and any failure to complete the procedure.

**Discussion**: in a non-systematic review regarding sedation by non-anaesthesiologists, using databases, Google Scholar and expert opinions, we found a variable hypoxemia incidence (4-50%), although SpO2 <90% seems less than 10% and severe hypoxemia (SpO2 <85%) occurs in 0.25-0.62% of patients. Arrhythmia occurs in 4-72%, and 4-42 % present electrocardiograph alterations (usually ST changes) (2,3). Significant complications are reported in some studies in 50% of cases, including severe hypotension), significantly increased ETCO2, severe cough, and a need for ventilation support.

Complications were resolved properly, and no cardiorespiratory arrest or death was recorded, and authors concluded the deep sedation they performed was safe for patients and provided a wide margin of tolerance, comfort, and satisfaction. **References**:

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- 2. Julián Álvarez et al. Patient safety under deep sedation for digestive endoscopic procedures. RevEspEnfermDig.2017,Vol.109,N.2,pp.137-143.
- 3. Francisco Igea et al. Sedación en endoscopia digestiva. Guía de práctica clínica de la Sociedad Española de Endoscopia Digestiva. RevEspEnfermDig.2014,Vol.106,N.3,pp.195-211.

**Learning points**: the underestimation or relativization of the complications found in many non-anaesthesiologists publications demonstrates a lack of knowledge and/ or indifference towards the most elementary safe practices for patients.

## 14AP02-2

## Do technically efficient surgeons continue working at a university hospital?

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Background and Goal of Study: It may be difficult for university hospitals to recruit and retain technically efficient surgeons because their missions include not only clinical services but also teaching and research. We hypothesized that technically efficient surgeons do not continue to work in a university hospital.

Materials and Methods: The authors collected data from all the surgical procedures performed at Teikyo University Hospital from April 1 through September 30 in 2013-2017. The dependent variable was defined as a length of employment of each surgeon. Output-oriented Charnes-Cooper-Rhodes model of data envelopment analysis was employed to calculate each surgeon's technical efficiency score. Six control variables were selected; experience, medical school, surgical volume, gender, and academic ranks (professor, associate professor). Multiple regression analysis using ordinary least squares and ordered logit models was performed. Results and Discussion: Two hundred and eleven surgeons were analyzed. Results are shown in TABLE. Efficiency scores had significantly negative

association with length of employment (p = 0.011 and 0.020). Experience and

surgical volume had significantly positive association with length of employment (p = 0.000 and p = 0.000, respectively in both models). The other coefficients of control variables were insignificant

TABLE: Data are presented as mean ± standard error. \* indicates that the coefficient is significantly different from zero (p < 0.05).

	Ordinary least squares		Ordered logit	
	Coefficients	p-value	Coefficients	p-value
Efficiency Score *	- 1.418 ± 0.549	0.011	- 1.974 ± 0.847	0.020
Experience *	0.059 ± 0.014	0.000	0.086 ± 0.023	0.000
Medical School	- 0.181 ± 0.238	0.448	- 0.201 ± 0.367	0.584
Surgical Volume *	0.022 ± 0.006	0.000	0.036 ± 0.009	0.000
Gender	- 0.027 ± 0.300	0.928	0.047 ± 0.433	0.913
Rank (Professor)	- 0.345 ± 0.355	0.333	- 0.462 ± 0.530	0.348
Rank (Associate Professor)	0.310 ± 0.313	0.323	0.414 ± 0.472	0.380

Conclusion: A university hospital cannot retain technically efficient surgeons.

## 14AP02-3

## Effect of hospital and surgeon volume on mortality following major operations: umbrella review of metaanalyses of observational studies

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Background and Goal of Study: Much literature has suggested significant associations between healthcare provider volume and outcomes for many types of operations; however, the level of evidence, validity, and biases in such reviews are unclear. The goal of this study was to perform an umbrella review of systematic reviews and meta-analyses, to summarize the evidence, and to evaluate the validity and presence of biases in the relations between hospital/surgeon volume and mortality for a wide variety of major operations.

Materials and Methods: We searched the literature of systematic reviews and metaanalyses of observational studies that compared mortality in patients undergoing surgery in high-volume hospitals/surgeons versus in low-volume hospitals/surgeons in MEDLINE, SCOPUS, and the Cochrane databases from inception through June 2017. The primary outcome was short-term (30-day) mortality. Pooled odds ratio with 95% confidence interval was re-synthesized with DerSimonian and Laird random-effects models if no quantitative data were available in the original reviews. Summary effects sizes, heterogeneity, publication bias, excess significance, and 95% prediction intervals were recalculated.

Results and Discussion: Nineteen meta-analyses were identified for hospital-mortality associations, and 11 meta-analyses were identified for surgeon-mortality associations. For hospital-mortality associations, high hospital volume was significantly associated with lower mortality in 16 meta-analyses (84%) with summary random effect estimates. The presence of publication bias was identified in only 2 meta-analyses (11%), and 11 meta-analyses (58%) had substantial heterogeneity (I²>75%). For surgeon-mortality associations, high surgeon volume was significantly associated with lower mortality in 9 meta-analyses (82%). The presence of publication bias was identified in only 1 meta-analyses (18%), and 2 meta-analyses (%) had substantial heterogeneity (I²>75%). The 95% prediction intervals excluded the null value for 5 operations (pancreaticoduodenectomy, repair of ruptured and unruptured abdominal aortic aneurysm, and colorectal or esophageal cancer resection).

Conclusion: Although a large body of systematic reviews and meta-analyses suggested an association between hospital/surgeon volume and mortality, only a minority of associations had robust evidence without risk of bias, heterogeneity, or publication has

## 14AP02-4

## Cancellation of elective plastic surgery operations on the day of surgery and its financial implications: an observational study

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**Background and Goal of Study**: The financial and time costs of same-day cancellation of plastic surgery procedures are considered substantial. This is an initial look at an attempt to quantify the financial loss to the hospital from cancellation of surgery.

Materials and Methods: Hospital audit committee approval was sought and granted. Over the four-month summer period in 2017, all elective lists were perused for same-day cancellations and reasons for cancellation were noted. Costing was done by calculating hours attributed to the cases cancelled and consequent theatre-time cost.

Results and Discussion: There were 50 case cancellations in the study period. Reasons for cancellations were attributed to: a) anaesthetic reasons (four cases); b) surgical reasons (five cases); c) patient factors (17 cases); d) theatre factors (21 cases: start time delays, overrunning theatres); e) administrative error (one case) and f) uniquely, due to 'wannacry' ransomware (two cases).

The time lost was estimated at 76 hours (3% of total elective theatre time), with a financial cost of approximately 38 600 GBP. This is equivalent to 772 GBP per case, or a 508 GBP per hour cost to the Trust.

One study limitation was that it was done during the summer. Extrapolating this financial cost will result in a potential annual theatre cost of 115 800 GBP. Added to this are costs for surgical and anaesthetic clinic reappointments, pathological tests and valid patient expenses.

A similar-sized nearby hospital (gynaecology patients) had a case cancellation rate of 1% (personal communication). We consider 1% to be a reasonable cancellation rate to allow for unforeseen circumstances.

These large costs, taken in context of an annual hospital budget of 286 million GBP(1), represents a 'rounding' error in the hospital budget.

Conclusion: It is unacceptable that patients were inconvenienced by cancellations. Our recommendations are to develop and follow a robust protocol for same-day cancellation and improving recruitment and retention of staff to reduce financial loss

## References:

1. www.veredus.co.uk/File.ashx?path=Root/Documents/MEH\_COO...Pack...pdf

use of cognitive aids is very limited in hospitals in the Netherlands. Not only do we have to investigate the effectiveness of different patient safety tools, we also need to significantly improve strategies to implement these tools into our hospitals in the

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### References

Patient Safety

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- 2. Goldhaber-Fiebert et al., Anesth Analg 2016;123:641-9

### 14AP02-6

## The utilization of contrast products outside the operating room: clinical auditory

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Background and Goal of Study: The incidence of contrast related adverse events is about 5-15%. Previously known allergies increase 3 to 5-fold allergic reaction risk. Arterial hypertension, age ≥75 years, low haematocrit, diabetes, dehydration, aortic balloon pump and the use of nephrotoxic drugs are established risk factors (RF) for contrast induced nephropathy (CIN).Anaesthesia outside the operating room (OOR) has grown in the past few years, as the complexity of performed procedures. Our goal was to perform a clinical auditory in our population, identifying the prevalence of RF to adverse events related to contrast administration, allowing for their anticipation and prompt medical treatment.

Materials and Methods: Clinical auditory to the OOR anaesthetic records between 2014 and 2015. Descriptive analysis of sociodemographic variables, clinical and analytical status, ASA classification and use of contrast.

Results and Discussion: 2821 patients were submitted to OOR procedures with the following distribution: Gastroenterology, 45.9%; Cardiology 24.5%; Neuroradiology, 13.9%; MRI, 11.8%; Evoked Potentials, 0.8%; others, 3.8%; 60.2% of procedures were performed in ambulatory regimen and 6.7% were emergent. 10% of patients were under 15 years of age and 69% over 50. 92% of patients were ASA >1. Known comorbidities included: cardiovascular disease, 48%; metabolic/endocrine disease, 37%; hepatogastric in 21%; respiratory disease in 18%. Contrast was administered in 39.1% of patients (mean volume of 45.3ml). Risk factors for CIN included pre-existing renal disease, mean creatinine level over 1.45 mg/dL and haemoglobin under 10.6 g/dL. There was a previous allergic reaction history in 8% of the population.

**Conclusion:**RF identification allows for the implementation of prophylactic measures and therapeutic plans, in case of need. All OOR locations should be ready to handle critical events. Clinical auditory promotes continuous improvement, especially in unusual workplaces.

## 14AP02-5

## Reluctance to implement patient safety tools: it is time to improve our practice

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Background and Goal of Study: After publishing the Helsinki Declaration on patient safety, numerous tools have been published in order to improve patient safety during the perioperative period. Emergency manuals are care-bundles of cognitive aids (CA) that help care providers to perform and speed up all the critical steps to be taken in an emergency situation. In 2014 we developed and published (1) the AMC Emergency manual, which is based on the Stanford Emergency manual (2). The bundle was presented on the national congress of the Dutch Society of Anaesthesiologists. We made an editable version of our CA-bundle freely available to all hospitals in the Netherlands. Three years later, we now surveyed the implementation of this CA-bundle amongst the hospitals that received an editable version.

**Materials and Methods**: We registered hospitals asking for an editable version of our CA from October 2014 to November 2017. At 1st of December 2017, we requested information about the implementation process for CA in the respective hospitals.

**Results**: From 97 hospitals in the Netherlands with Anaesthesia Departments, 27 requested an editable version of our CA-bundle (3 University Hospitals, 24 community hospitals). Even 3 years after presenting the CA in the Netherlands, only 5 departments adopted and implemented the CA-bundle in their own hospital. Two departments answered that they started, but not yet finished adoption and implementation, while 20 departments not yet started to adopt the manual. One university hospital used the content of our manual but adopted the lay-out according to crisis cards of the Dutch Air Force.

**Discussion:** Although a Dutch version of a Cognitive Aid Bundle was freely available to all Dutch anaesthesia departments, only 5 departments produced and implemented a local CA in their hospital.

Conclusion: Like with other patient safety tools, production, implementation and

## 14AP02-7

# Evaluation of the impact of bulletins vía email as an improvement measure to increase patient's safety in a local SENSAR's Safety Group

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Background and Goal of Study: Anaesthesia Safety Working Group belongs to the Critical Incident (CI) notification Spanish System and Security in Anaesthesia (SENSAR), which seeks to improve patient's safety(PS) analysing CI, to set out improvement measures(IM). 7.232 CI have been reported in SENSAR during the last 8 years which represent a total of 12.782 IM. These IM are classified into three categories:1) Changes without economic cost (protocols development),2) Changes with economic cost (buying and renewal equipment),3) Awareness (alerts sent in bulletins via email to members of Anaesthesia Service, Service meetings). These alerts are the key to review relevant CI in order to warn the professionals to avoid repeating them. Goals of the study: 1)To evaluate the potential impact of alerts sent in bulletins via email as IM in PS.2)To assess the interest and usefulness of the Anaesthesiologists who receive them.

**Materials and Methods**:Transversal descriptive study by self-administered questionnaire, delivered to all professional members of Anaesthesia and Intensive Care Service of our hospital (80 associate octors 40 resident doctors).

**Results**: 77 members (64,1%) filled out the survey (57 associate) doctors and 20 residents). Majority of survey respondents (74% - n 57) affirmed reading the alerts sent, in contrast to 8%(n 6) who don't read them and 18%(n 8) that only occasionally read them(due to lack of interest -n 4; and due to the large amount of them -n 4). After subgroup analysis, 90% of residents confirmed high level of interest and they read them always. 84,4% of survey respondents (n 65) claim to have received information that was unknown for them and 70%(n 54) have changed their way of working. The most interesting alerts for the respondents were those related with medication (60%), equipment(31%) and communication errors(9%). 95% expressed their wish to continue receiving the alerts.

## Anaesthesiology and Intensive Care Anaesthesia Safety Working Group

Cross X:

Associate doctor Resident doctor

How many years have you been working at hospital? Do you receive the bulletins via email?

YES

Do you know how many alerts have been sent last year?

I don't know <5 5-10 >10

NO

Could you remember some of them and mention?

Do you read the alerts?

YES NO Sometimes

If you only read some of them, why?

I only read the one interesting for me

They are too many Other reason:

Does any alert have provide you information that you unknown?

YES NO I can't remember

Has any alert been used to modify your daily work?

YES NO I can't remember

Have you revised your mailing box?

YES NO I don't preserve them

Which alerts are you most interested in?

Medication Equipment Communication errors Other

Do you think alerts are:

Too large Too complex They are OK Others

Would you like to continue receiving them?
YES NO I don't mind

## SUGGESTIONS:

**Conclusions:** Alerts sent in bulletins have a potential impact on both, behaviour changes and the way of working of the anaesthesiologists, with the benefit of avoiding the repetition of the IC that have generated such alerts as a measure to improve Patient's Safety.

## 14AP02-8

# Obtaining informed consent for anaesthesia in elective surgery at a tertiary-care hospital: practices and ethical-legal context

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Background and Goal of Study: Currently there's a growing ethical and legal concern regarding the practice of informed consent (IC) for anaesthesia. This practice has not been adopted on a regular basis in all institutions, despite our general health institution recommending it. The anaesthetic practice has inherent risks, aside those from the surgery specific-ones, which makes the anaesthetic consent of great importance. Anaesthetic IC should never be neglected. The aim of this study was to evaluate the degree of implementation of specific informed consent for anaesthesia in the context of elective surgery at a tertiary hospital.

Materials and Methods: After approval by the Institutional Ethics Committee (ICE), an observational prospective study was conducted. Patients aged >60 years old, submitted to elective surgery, from May to July 2017 were included. Patients who were unable to give informed consent, and those admitted in the Intensive Care Unit after surgery were excluded. The informed consent form for anaesthesia procedures used during this study was previously created by the IEC, and is used by the anaesthetic department. Demographic and clinical data, the Charlson Comorbidity Score, and whether or not the informed consent form for anaesthesia procedures was signed, were registered pre-operatively. Post-operatively, the data

was obtained from the patients' clinical records. The patients were divided in two groups, those who had informed consent signed by the anaesthesiologist (IC) and those who had not (NIC). The Chi-square, Fischer's exact or Mann-Whitney U tests were used for comparison.

Results and Discussion: Of a total of 230 patients, 42% have signed IC for anaesthesia while 98% have signed the informed consent for surgery. There were no significant differences between the two groups, regarding gender (p=0.547), age (p=0.863), mortality (p=0.438), previous neurologic (p=0.64) or psychiatric disease (p=0.64). The group NIC was associated with a higher incidence of dementia (p=0.028), previous stroke (p=0.021) and a higher Charlson Score (p=0.017).

Conclusion: It was identified a low practice of informed consent for anaesthesia procedures. There seems to be an association between a worse mental or physical condition, in some situations, and the increased absence of informed consent.

## 14AP02-9

## Primum non nocere?

## Consent and Cultural ethics complicating decision making in massive obstetric hemorrhage

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**Background:** A 'grande multi' 35 year old  $G_{\rm g}$   $P_{\rm 5}$  from an ethnic minority background presented to our unit with a past Obstetric history of 3 previous Caesarean Sections (CS) and 2 normal deliveries. 2 of the CS's were elective, done under spinal blocks. In the course of that confinement, she developed Acute Renal Failure, needing a renal transplant. In next pregnancy, she had a CS under a General Anaesthetic (GA) as it was a Category 1 emergency for foetal distress and maternal eclampsia. Given the complicated nature of her medical background, she had been offered an elective CS at which time she wanted have a tubal ligation as well.

Case Report: She presented at 28 weeks of gestation for a Category 1 Caesarean Section (CS) for placental abruption. Antenatal ultrasound scan noted normal placentation (high, anterior). Prior to this admission, there had been no concerns regards either bleeding PV or foetal movements.

During the course of the CS (done under a GA), there was intractable bleeding. She developed acute disseminated intravascular coagulation (Clauss Fibrinogen 0.2 mmol/L; d d-dimer 17892) preoperatively. Intra-operatively the team discussed the potential for proceeding to hysterectomy to achieve control of the primary source of haemorrhage. The surgeon decided to talk to her husband who was available on the ward. The husband flatly refused to consider the idea of a hysterectomy, saying that he would divorce his wife a hysterectomy was contrary to his cultural beliefs. As a result the lady was treated with a Bakri balloon uterine tamponade and transferred to ITU, intubated and ventilated while her coagulation failure and Acute on Chronic Renal failure were corrected. The plan was to explore the uterus again

Level 2 care for a week.

Conclusion: Massive obstetric haemorrhage is a common cause of morbidity and mortality. Delays significantly worsen outcomes. Ethical principles in the management of life threatening situation though covered by UK and European guidelines still produce challenges when treating life threatening emergencies.

We suggest a systematic approach of determining patient health care beliefs

in case bleeding continued. She was extubated after 24 hours and remained on

## 14AP02-10

## Transfer to postanaesthetic care: Team handover performed in the operating room

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antenatally to help with an informed consent.

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Background and Goal of Study: Handover from surgery to postanaesthetic care represents a transfer situation with potential loss of information and risk of errors. Usually, one anaesthetic nurse will take the patient to the postanaesthetic care unit (PACU) for the handover to a PACU nurse. We aimed to improve handover between the whole surgical team and PACU. Others have described handover with the whole team coming to PACU, but we decided to let the PACU nurse come to the operating room (OR) for a handover from the whole team (1). We aimed to study if the team handover was applicable to our clinical setting, and to assess the opinion of the involved staff

Materials and Methods: A new handover protocol was designed for handover in the operating room. Just after surgery, before awakening of the patient, the PACU nurse is called to the OR. All team-members give a structured report and the PACU nurse receives the patient in PACU shortly after. We planned a pilot study with inclusion of 20 handovers from major abdominal surgery with expected 24-hour postoperative stay in the PACU. Staff satisfaction with the handover was assessed by a questionnaire e-mailed to all participants. Questions included information about quality of handover, disturbances and potential benefits/free comments.

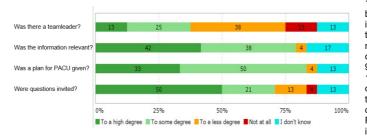
Results and Discussion: We conducted 20 handovers in the OR with participation from 5 surgeons, 1 anaesthesiologist, 4 anaesthesia nurses, 5 scrub nurses and 11 PACU nurses. Response rate was 81% (fig.1). Overall satisfaction with the handover was very good (48%), good (29%), neutral(24%), dissatisfied/very dissatisfied (0%), and 81% agreed we should continue in the future. Interruptions

were reported "not at all" (14%), "to a less degree" (48%), "to some degree" (19%) and "to a high degree" (14%). Free comments from all staff groups expressed that it highly improved the handover and teamwork. Implementation, structure and practical issues remain to be refined.

**Conclusion**: Handover in OR was applicable to our setting, and staff was overall satisfied with the handover.

### References:

1. Petrovic MA et al. J Clin Anesth 2015 Mar;27(2):111-119.



## 14AP02-11

## Adherence of Patients to Multimodal Prehabilitation in Radical Cystectomy

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Background and Goal of Study: Enhanced recovery after surgery (ERAS) programs implement a series of interventions to optimize medical conditions and improve functional capacity in the preoperative setting to increase recovery and reduce postoperative complications. The primary objective of this study was to assess the adherence to the multimodal prehabilitation program and the influence of age as a factor (<70 vs ≥ 70 yrs). Secondary objective was to evaluate the correlation between a 6-minute walking test (6MWT) < 350m and complications in patients undergoing open or laparoscopic/robotic radical cystectomy (RC).

Materials and Methods: This study included 47 consecutive patients enrolled in an ERAS protocol, each of whom underwent RC from December 2016 to November 2017. A prospective evaluation of the adherence to the preoperative program was performed on these items: correction of anemia, psychological support, stomatherapy education, smoking and alcohol cessation, nutrition supplementation, stretching exercises and aerobic training (evaluated by 6MWT). To compare means and percentages we used Mann Whitney U test and χ2 test respectively. Statistical analysis was performed by SPSS software.

Results and Discussion: Overall compliance to the preoperative items was 93.8%. No differences were found between patients <70yrs and ≥70yrs (91.8% and 95.3% respectively, p=0.212). The highest compliance was alcohol abstinence (100%), the lowest was smoking cessation (28.6%). Adherence to psychologist and stomatherapy visits were 97.9%. Preoperative nutritional support adherence was 91.5%. There were 16 patients with a Hb <130mg/dl, 8 of them (50%) were treated with intravenous iron. Forty five patients (95.7%) did the stretching exercises and 44 (93.6%) the aerobic training at home. Three of them (6.4%) walked a distance <350m before surgery. There was no association between the distance walked and postoperative complications (p=0.239).

**Conclusion**: Our results showed a high adherence to the preoperative components of ERAS protocol regardless of age, probably due to highly committed multidisciplinary team.

The effectiveness of aerobic training to reduce postsurgical complications in RC should be investigated in future research with a large number of patients. **References**:

- 1. Jeong O et al. World J. Surg. 2017;41:1040-1047
- 2. Cerantola Y et al. Clinical Nutrition. 2013;32:879-887

## 14AP03-1

# Pilot Implantation of preloaded ephedrine syringes in a tertiary university hospital: Audit on satisfaction and cost-effectiveness

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**Background:** The latest European guidelines about medication safety recommend the use of preloaded medication. This audit assessed users' satisfaction and cost effectiveness of the implantation of preloaded ephedrine syringes in a tertiary university hospital in Spain.

Material and methods: Ephedrine ampules (30mg/ml – 1mL) were substituted with preloaded ephedrine syringes (3ml/ml - 10ml) in the maternal area of our hospital (6 gynecological operating rooms (OR), 2 obstetric OR, 10 labor rooms

and 13 intensive care beds). Three months after implementation, we assessed users' satisfaction, and cost-effectiveness of the change. We collected data about: satisfaction with the information and the pharmacological presentation, knowledge on storage, perceived benefits of the change, and recommendations for other preloaded medication. We assessed the cost-effectiveness of the intervention, comparing the expense for the purchase of the ephedrine during the pilot period, with the same period the year before.

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Results: 35/35 distributed questionnaires were collected among 18 anesthesiologists, 11 nurses and 6 nurse assistants. 100% of professionals considered the change beneficial, with a mean satisfaction of 8.5/10. 74% considered themselves very well informed on the change. 94% and 71% knew where the medication was stored in the anesthetic trolley and in the storeroom respectively. The main benefits were: readiness of drug in case of emergency (81%), safety (43%), ease of use (24%) and drug sparing (24%). 97% recommended to extend the use of preloaded syringes: 90% for atropine, 45% for phenylephrine, 40% for epinephrine, 20% for opioids, 15% for rocuronium, 15% for propofol and 15% for other medications. The total cost of the implementation was inferior to 400 Eur, including the first supply. During the 3 months period of implantation, we observed a 61% decrease in ephedrine consumption, due to a decrease of loaded and unused discarded medication. Finally, we calculated that after the implementation, 20 Eur/week should be saved in our unit on this medication.

**Discussion and conclusion:** The implantation of preloaded syringes of ephedrine was very well perceived by all professionals implicated in its manipulation and use, who asked for an extension to other medications. The over cost of the implementation is more than acceptable considering the benefits to patient safety: decrease in medication and dilution errors and readiness to use in case of emergency.

## 14AP03-2

## Successful Naloxone Administration During Cardiac Arrest in Course of Remifentanil Labor Analgesia: Case Report

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**Background**: Remifentanil for pain relief during labour is alternative to epidural analgesia. The aim is to highlight rare serious complication of labour analgesia with remifentanil and describe its solution in the hospital, where the use of remifentanil in childbirth is analgesic method of choice.

Case Report: 26-years old primigravida nullipara in the 39th week of pregnancy, height 160 cm, weight 70 kg (BMI 29 kg/m²). History of three acute meningitis. two herpes infections and polyvalent allergy. During her adolescence, she abused marijuana followed by 6 hours of unconsciousness. One year before pregnancy, she underwent short-term general anaesthesia as part of donating oocytes without complications. The pregnancy was uncomplicated. She asked for labour analgesia after 7 hours from labour initiation. Blood pressure at the time of indication was 130/90 mmHg, pulse 116/min, SpO, 95%, and pain intensity according to VAS 8. Remifentanil administration was initiated at a rate of 3.2 mL/hr IV (80 µg/hr) without PCA boluses. After ten minutes of infusion, blood pressure was 115/75 mmHg, pulse 105/min, SpO<sub>2</sub> 94%, and VAS decreased to 6-7. After 13 minutes of the infusion the obstetrician was called for her loss of consciousness by her partner. Physician called the anaesthetic team. The parturient was cyanotic (SpO, not detected), GCS 3, and the pulse was not palpable on the carotid arteries, and masseteric muscles rigidity was present. Remifentanil infusion was immediately stopped. Cardiopulmonary resuscitation was started and naloxone 0.4 mg IV was administered. Parturient awakened in ten seconds after administration of naloxone to full lucidity (GCS 15). Return of spontaneous circulation was achieved in 3 minutes. Acute caesarean section was performed in general anaesthesia without complications. The newborn was male, 2730g, 49cm with Apgar score 10-10-10. Discussion: We computed plasmatic level of remifentanil during administration with maximum level of 0.6 ng/mL (TIVA trainer, Minto model). This level is far from the level that, according to available literature, causes 50% depression of minute ventilation in healthy volunteers 1.17 μg/mL (0.85-1.49 ng/mL)<sup>1</sup>

**Conclusion**: Case report pointed out the need for availability of remifentanil antidote in the delivery room and the importance of rapid availability of anaesthetic team. **References**:

Glass et al. Anesthesiology, 1999

Learning points: naloxone availability; rapid response emergency team

## 14AP03-3

## Severe reaction to inadvertent intravenous administration of norepinephrine

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**Background**: NE is an a1 and b1 agonist, used for its arterial, venous vasoconstrictor and positive inotropic properties.[1] However, accidental IV NE is known to result in serious cardiovascular side effects which may include hypertension, angina, arrhythmia, acute myocardial infarction (AMI) and ventricular fibrillation with cardiac arrest.[2,3]

Case Report: A 52-year-old male patient was proposed for elective excision of a hemangiopericytoma. Previous medical history included an appendectomy. Preoperative anesthetic evaluation revealed no prediction of a difficult airway. ASA class II. The patient induction was started using fentanyl, propofol and rocuronium. Maintenance was accomplished with sevoflurane + 02 + air and perfusions of rocuronium, remifentanil and norepinephrine. Upon final stages of surgery, as perfusions were stopped an accidental administration of 1 mg of NE occurred. Shortly thereafter, he developed supraventricular tachycardia up to 190 bpm and arterial hypertension (205/110 mmHg). ECG showed signs of myocardial ischemia with ST-segment elevation in the D2 and V5 leads. Afterwards, arterial pressure dropped abruptly to 80/40 mmHg. The surgery was finished and the patient was then admitted in the ICU. ECG showed no signs compatible with neither ischemia nor AMI. Cardiac biomarkers were within normal range and no signs of congestion were identified in chest X-ray. Patient was then extubated uneventfully. Discharge with the patient in stable condition occurred past 6 days.

**Discussion:**This clinical pattern was similar to cases of NE overdose previously described.[1] Despite uncommon, it highlights the importance of independent double-checking and strict signing of all medications before administration. Early recognition and support treatment are crucial to avoid fatal outcomes. **References:** 

1. Ibbey AA,et al. Inadvertent overinfusion of norepinephrine using infusion pump loading dose.Int Crit Care Nurs 2015 Dec;31(6):375-9

2. Arfi AA, et al. Acute myocardial ischemia following accidental intravenous administration of epinephrine in high concentration. Ind Heart J 2005; 57:261–64

3. Ahmed DB, et al.Intraoperative Ventricular Fibrillation Arrest Caused by Accidental Intravenous Injection of Epinephrine.lbn J Med BS 2014;6(5):223-226. Learning points: Despite all the anesthesiology evolution in the past decades, it is vital to always assure the patient safety in order to diminish the occurrence of avoidable errors.

## 14AP03-4

## Ampicilin inadvertent epidural administration in a pregnant women

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**Introduction:** Inadvertent epidural catheter drug administration is associated with morbidity and mortality risk. The incidence of this error is underestimated. Several drugs have been administered accidentally through epidural catheter and most of our knowledge is based on case reports.

Case report: A 33 years old pregnant woman presented for delivery. Normal labor evolution and placement of epidural catheter was requested for analgesia. The technique was uneventful. Priming 10mL of ropivacaine 0.2% and 10µg sufentanil were administered by the anesthesiologist. Five minutes later, 1g ampicillin was given through the catheter inadvertently. There were no hemodynamic or neurological changes. The administration of 20mg of 2% ropivacaine was repeated when the parturient requested it, in a total of 3 administrations, always with symptomatic relief. Eutocic delivery occurred 8 hours later.

A visit was made 24 and 48 hours later, without neurological or hemodynamic alterations. At the time of hospital discharge, the patient was informed of the alarm signals. She remained symptom free 8 months later.

**Discussion:** The majority of errors are due to syringe exchanges, drug ampoule errors and inadvertent epidural/intravenous administration. Erroneous drug administration into the epidural space can have immediate and/or late effects. Immediate neurological symptoms usually occur with drugs with neurotoxic additives or due to pH effects or osmolality.

After inadvertent drug administration there is no definitive and effective treatment. There are several indications based on other case reports in order to reduce the potential complications. Some opt for an expectant attitude; others administer saline solution or other drugs in an attempt to decrease the drug concentration.

According to the pH of the drugs used, ampicillin pH ranges from 8-10, ropivacaine 4-6 and sufentanil 3.5-5, we can consider that ampicillin may have alkalized the medium. It is known that ropivacaine has low solubility at pH> 6.0 and therefore ropivacaine may have precipitated.

Despite these considerations, epidural analgesia has been effective since the first administration.

**Conclusion:** Pharmacological errors have been increasingly seen as part of medical practice. The absence of clinical trials about the injection of this type of drugs into the epidural space makes the attitude to adopt in these situations difficult. Thus, in addition to prevention, sharing cases and the attitude assumed is essential.

## 14AP03-5

## Evaluation of safe medication practice in our Hospital. SUMA project

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<sup>2</sup>Medical Doctor of General Hospital of Albacete - Albacete (Spain),

<sup>3</sup>Pharmaceutic of General Hospital of Albacete - Albacete (Spain)

Background and Goal of Study: Evidence from critical incidence reporting systems continues to show that medication errors remain a major safety issue in Anaesthesia and intensive care. In surgical and intensive care area, it's estimated that in one of every twenty pharmacological administrations occurs an adverse event. The goal of this study is evaluate the start point about safe medication practice in our hospital, specifically in surgical and critical care areas. We are developing a Project, called SUMA (Safety Use Medication in Anaesthesia) that works about minimize medication errors in perioperative period through applying the recommended actions proposed by scientific societies.

Materials and Methods: We have handed a survey about safe practice medication to one hundred nurses and anaesthesiologists from the surgical and critical care area. The survey consists in thirteen questions, and is a traduction of the European Board of Anaesthesiology survey. The survey has been answered by 44 people (26 nurses, 18 anaesthesiologists).

Results and Discussion: Of the workers who have answered the survey, we have seen that most of our respondents think that we have an adequate policy of drug labelling and drug-containing labelling, in addition to measures for minimizing the transmission of infections between patients and the adequate storage of drugs.

On the other hand, our respondents think that we have to improve in other fields such as the use of prefilled syringes, the use of color-coded syringe labels, the storage of intravenous potassium, the policy of flushing cannulae to reduce the risk of inadvertent administration of drugs and a policy of report medication incidents system. We think that the workers who didn't answered the survey; it is due to a bad custom in terms of safe medication practice. SUMA Project Works in these fields, using a correct policy of colour-coded drug labelling, a correct storage of all anaesthetic drugs, the use of prefilled syringes (like Epinephrine, or Ephedrine), the standardization of the use of a correct system of report of adverse events ant the later learning of them.

**Conclusion:** SUMA is a Project designed to see the start point in the correct safe medication practice and analyze the points, making protocols and guides to improve the negative aspects.

### References:

1. Whitaker DI, Et Al. The European Board of Anaesthesiology recommendations for safe medication practice: first update. Eur J Anaesthesiol. 2017;34:4-7.

## 14AP03-6

## Time to stop being relaxed about Neuromuscular blockers?

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<sup>1</sup>Hampshire Hospitals NHS Foundation trust - Winchester (United Kingdom), <sup>2</sup>Portsmouth Hospitals NHS Trust - Portsmouth (United Kingdom), <sup>3</sup>Starship Children Hospital - Auckland (New Zealand)

**Background and Goal of Study**: Medication safety is the World Health Organisations (WHO) Third Global Patient Safety Challenge. (1) In Anaesthesia we are a high-risk specialty for medication errors, in particular relating to neuromuscular blockers. Ongoing reports, (2, 3) and errors at our institutions with neuromuscular blockers led us to investigate 'wrong drug' errors nationally.

## **Materials and Methods**

Incidents of 'wrong drug' errors relating to neuromuscular blockers were requested from the National Reporting and Learning System for the period 1st January 2012-31st December 2016. Data was reviewed by all three authors and classified by category of incident and process error.

Results and Discussion:

Overall 141 incidents were identified from the se

Overall 141 incidents were identified from the search criteria, 57 of which were excluded, leaving 84 events. Of these 65 occurred in the operating theatre.

There were 40 awake paralysis events, 26 involved the unintended administration of Suxamethonium. Twenty five of 40 events (18 suxamethonium) were drawing up errors, and 7/40 syringe swaps (3 suxamethonium)

Excluding storage errors, (n=10), 43/74 incidents were judged to have resulted in no harm to the patient, sixteen in the awake paralysis group.

Conclusion: Despite numerous publications highlighting strategies to reduce drug errors in Anaesthesia, (2, 3) we have shown these are still occurring. This likely represents the tip of the iceberg. Similar to a previous review, (2) these errors are largely preventable, with human error the commonest theme identified. (2) As a specialty with a strong history of patient safety, we should be promoting the WHO's Third Global Patient Safety Initiative (1) through rigorous implementation of recommendations, and the introduction of standardised 5ml, prefilled, colour coded (ISO syringe label standard) syringes. This would help reduce the vast majority of errors identified in our study.

 Medication Without Harm - Global Patient Safety Challenge on Medication Safety. Geneva: World Health Organization, 2017.

 Amot-Smith J, Smith AF. Patient safety incidents involving neuromuscular blockade: analysis of the UK National Reporting and Learning System data from 2006 to 2008. Anaesthesia. 2010;65:1106-113 3. Wahr JA, Abernathy JH, Lazarra EH, Keebler JR, Wall MH, Lynch I, Wolfe R, Cooper RL. Medication safety in the operating room: literature and expert-based recommendations. British Journal of Anaesthesia. 2017;118(1):32-43

## 14AP03-7

## Overdose By Sodium Phosphate Dexamethasone

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**Background and Goal of Study:** A 51-year-old woman (75,600 Kg - 1,57 M) ASA II (centrolobular breast cancer, tamoxifen treatment) posted for right postmastectomy free flap . Induction with fentanyl (2mcg / Kg), propofol (2.5 mg / kg), rocuronium (0.6 mg / Kg), maintenance remifentanil (0.14  $\mu g$  / Kg / ml) sevoflurane 2% and BRC 0.06 mg / kg / h. Right jugular central line guided by ultrasound. Thirty minutes after beginning 200 mgs of dexamethasone phosphate (Fortecortin® ) were accidentally administered, being notified 5 minutes after. Arterial and venous hourly gasometry only showed mild hypocalcemia. Crystalloids and furosemide (20mg) were administered. Total surgical time: 6 hours.

Materials and Methods: 90 minutes postsurgery the patient was stuporous (responding only to painful stimuli), Glasgow 4 points, without airway reflexes. She was extubated in UCPA two hours later, at that moment responding to both verbal and tactile stimuli but was very drowsy and bradypsychic. Brain CT scan was normal. For the next 48 hours she remained in UCPA, sleep, normal cortisol and ACTH levels. Persistent nystagmus was observed for 3 days. Seven days after surgery, she presented loss of consciousness and rigidity when removing the central line; myoclonus and alternating hemiplegia appeared but CT and EEG showed any patological findings. MRI showed diffuse alteration of the cortical signal. A diagnosis of reversible posterior encephalopathy was considered. 5 days after this episode mioclonus and alternating hemiplegias persisted without any injuries to justify them so the patient was discharged and sent for psychiatric evaluation with a final diagnosis of conversive disorder.

**Results and Discussion:** Meta searchers (Tripdatabase, Epistemonikos, UpToDate) confirm that there are few or no reported cases of accidental acute overdose of dexamethasone in patients undergoing long-time surgeries.

Dexamethasone is a glucocorticoid with great anti-inflammatory properties, equivalent to 25 or 30 times that obtained with cortisone. It is mainly based on the inhibition of fibrin deposits, capillary dilation and inhibition of the migration of leukocytes to the inflamed area.

**Conclusion:** In our case, the patient presented hydroelectrolytic alterations (hypocalcemia), as well as disorders in the CNS reflected in the delay in awakening and subsequent development of clinical picture compatible with a conversion disorder vs a reversible posterior encephalopathy.

## 14AP03-8

## Perioperative administration of 6% HES in laparoscopic living-donor nephrectomy: is it safe?

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Background and Goal of Study: The association between hydroxyethyl starch (HES) solutions and the risk of acute renal failure is uncertain. There may be a differential effect of HES on glomerular filtration rate (GFR) depending on the study population and the clinical context. HES has been used as a strategy to avoid hemodynamic compromise during laparoscopic living-donor nephrectomy.

The aim of the study is to evaluate the evolution of renal function over time in a subgroup of patients (kidney donors) with an acute loss of nephron mass of approximately 50% and who have received HES during the perioperative period.

Materials and Methods: We retrospectively (January 2010-December 2014) collected and analysed all patients who underwent living donor nephrectomy receiving perioperative 6% HES 130/0.4. The primary outcome analysed was the renal function recovery. We considered correct recovery when estimated GFR (eGFR) in the remaining kidney is superior to 60% of the predonation value (preoperative eGFR). Other variables analysed were: demographic data, variations of eGFR by using CKD-EPI equation (from preoperative to one year after discharge) and total amount of HES administered (mL/kg of weight).

**Results and Discussion**: We included 45 donors (69.1% females; mean age 47.91  $\pm$  10.8 years old). The mean preoperative eGFR was 97.44  $\pm$  13 mL/min/1.73m². It decreased to 68.50  $\pm$  13 mL/min/1.73m² one year after donation. All patients received <30 mL/kg (18.2  $\pm$  4.6 mL/kg) of HES during the perioperative period. Renal function recovery in the remaining kidney was achieved in 89% of patients after one year. The other 11% of patients had a mean renal function recovery of 57.8%. Results obtained in this retrospective study show that HES administration during nephrectomy in kidney donors doesn't seem to affect renal function recovery after one year.

**Conclusion:** The administration of low doses of 6% HES in kidney donors could be safe during laparoscopic nephrectomy. More studies are needed to confirm these results.

### References:

1.Mertens zur Borg IR, Di Biase M et al. Comparison of three perioperative fluid regimes for laparoscopic donor nephrectomy: A prospective randomized dose-finding study. Surg Endosc 2008; 22: 146-50.

 Mueller TF, Luyckx VA. The natural history of residual renal function in transplant donors. J Am Soc Nephrol 2012; 23: 1462-6.

### 14AP03-9

## Negative pressure pulmonary edema due to residual neuromuscular blockade

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**Background**: Negative pressure pulmonary edema (NPPE) is a well described object but with few reported cases. Its recognition is important to initiate appropriate treatment. Related to the anesthetic act, it may occur after extubation, due to causes that lead to airflow supraglottic obstruction through inspiratory effort. Reversing the neuromuscular blockade is an important step during the anesthetic procedure, because if it is inadequate, can cause respiratory complications generating intrathoracic negative pressure and resultant alveolar transudation.

Case Report: Female patient, 26 years old, 60 kg, accepted for open appendicectomy surgery. No comorbidities, ASA IE, normal physical examination of cardiovascular and respiratory system. Rapid sequence of anesthetic induction was performed (Fentanyl 150mcg, Propofol 150mg and Succinylcholine 60mg IV); maintenance of the anesthesia with Rocuronium 40mg IV and inhalatory Sevoflurane 2%. Observed with TOF WATCH SX to evaluate the amount of neuromuscular blockade, After surgery, the patient had a 15% TOF with spontaneous ventilation, then Neostigmine 2mg and Atropine 1mg IV were added. Extubation was done immediately after the injection of these drugs. At this time, the patient indicated low tidal volume, dyspnea, tachypnea, significant ventilatory effort, and agitation. Her condition got worse, due to increase of dyspnea pink secretion expelled through oral cavity, and bilaterally diffuse crackling eruptions. Oxygen therapy was introduced at 12L / min and Furosemide 80mg IV (diuresis of 2.5L) but yet no progress on her condition. The patient was transferred to the ICU.

**Discussion:**The NPPE is defined as alveolar and interstitial transudation after intense inspiratory effort against glottic or supraglottic obstruction. In residual neuromuscular blockade situations, the pathophysiology of NPPE occurs due to the reduction of retropharyngeal diameter and large respiratory obstruction, along with great inspiratory effort and alteration of the transpleural pressure gradient.

## References:

1. Barbosa, FT et al"NPPE after tracheal extubation: case report."RBTI 2007; 123-127

2. Bhattacharya M, Kallet, RH et al. "NPPE"CHEST Journal.150.4;2016;927-933. Learning points: reversal of neuromuscular blockade is important for the acceleration of patient recovery and prevention of postoperative residual neuromuscular blockade and reduces the incidence of severe morbidity and mortality associated with anesthesia management.

## 14AP03-10

## Ideal body weight versus lean body mass in bariatric surgical patients. Far from ideal?

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Background and Goal of Study: In morbidly obese populations the use of Total Body Weight (TBW), is rarely the correct scalar when calculating doses of drugs. Most drugs are correctly dosed based upon some variation of Lean Body Mass (LBM) in this demographic, but there is a concern that the use of IBW is underestimating drug dosage in obese patients and the implications this may hold e.g. increasing the risk of awareness.

LBM can be calculated using the Janmahasation formula [1], and the Robinson modification of the Devine formula is a popular equation used for estimating Ideal Body Weight (IBW) [2].

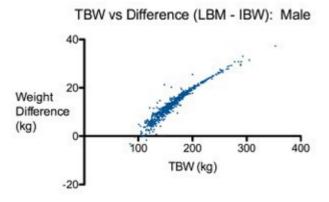
We used the above formulae for LBM and IBW to ascertain whether a significant difference exists in a patient population who underwent primary gastric bypass surgery and its implications on drug dosing.

Materials and Methods: An anaesthetic database of bariatric surgical patients operated on at our institution for the past ten years was analysed, using the Janmahasatian and Robinson formulae to calculate LBM and IBW respectively. We then utilised GraphPad Prism to create a series of graphics to help visualize the difference in calculated IBWs versus LBMs for this population.

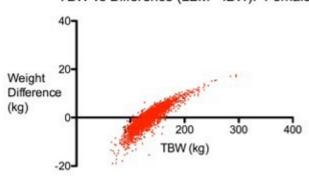
Results and Discussion: We found significant differences between calculated IBWs versus LBMs in this group. The mean difference was 1.833 kg in females and 13.71 kg in males, with the maximum weight difference between scalars being

20.50kg and 37.3kg in females and males respectively.

Plotting the weight differences calculated from LBM-IBW against the TBW of our population, demonstrated that at extreme ends of TBW, the difference in calculated LBM and IBW can be significant.



TBW vs Difference (LBM - IBW): Female



**Conclusion**: The wider implications in using IBW compared to LBM, are a significant danger in the under dosing of patients, resulting in an increased risk of awareness.

## 14AP04-1

## Possibility of errors in application of colorless disinfectants at the surgical site

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Background and Goal of Study: The Centers for Disease Control and Prevention recommend that surgical field sterilization should be performed concentrically, beginning from the center. However, when colourless disinfectants, such as chlorhexidine alcohol, are used, it is difficult to recognize errors in their application. We examined application errors with colourless disinfectants applied concentrically. Materials and Methods: We used a fluorescent paint containing lotion as a substitute for a colourless disinfectant and visualized its application under black light. Subjects and applicants were 30 consenting resident doctors at our institution. For the examination, subjects were placed in the prone position, and a square with a side length of 20 cm placed on a flat portion of the back was regarded as the surgical field. Application was performed using a cotton ball with a diameter of 30 mm. The test lotion was applied once in concentric circles, beginning from the center. The application field was photographed under black light, and the number of error sites was counted.

Results and Discussion: Application errors occurred in 18 of 30 cases (60%). In 17 of the cases, errors were outside of the circle, and in 10 of the cases, errors were inside of the circle. In cases with application errors, the number of error sites was 0.89 sites/case near the center and 2.06 sites/case at the periphery. The following reasons were considered causes of application errors: 1. It is difficult to confirm the coating field with colourless paint; 2. When the application covers a wide area, the locus of application is likely to be disappear in the case of instant-drying formulations, such as alcohol; 3. The tracing of the concentric circle becomes a fine curve as the radius increases, making it difficult to trace accurately; 4. In the concentric circular disinfection method, circular movement around the shoulder requires complex movements of the muscles and the joints of the upper arm and forearm, which is a difficult movement due to the structure of the arm.

Conclusion: Annually, approximately 187 million to 281 million surgeries are performed globally. Therefore, it is desirable that the disinfectant application method be sufficiently simple for everyone. In order to ensure the accuracy of the disinfection method, the following countermeasures are considered necessary: 1. Use of coloured disinfectant; and 2. Improvement of disinfection method according to ergonomics.

### 14AP04-2

# Sleep, stress pattern and physical activity in anaesthesiology and intensive care residents: a connected pilot study

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**Background**: Intensive care and anaesthesiology residency is challenging with long hours, night calls and a high level of stress. The authors aimed to evaluate the consequences of anaesthesiology and intensive care residency on sleep, physical activity and stress using connected wristbands in real life conditions.

**Methods**: Twenty French anaesthesiology and intensive care residents wore a connected wristband during 2 consecutive months allowing real time monitoring of sleep (duration), physical activity (steps, floors climbed, metabolic equivalent of task (MET)) and heart rate 24 hours a day. Residents also responded to the Perceived Stress Scale 10 (PSS-10) questionnaire and self-evaluation questionnaire on sleep duration needs allowing to calculate and sleep debt defined as the difference between sleep needs and actual sleep duration measured. Collected data were compared between working days (regular and call days) and holidays.

Results: One thousand and eighteen working days (189 on call days and 829 regular working days) and 302 free days were analysed. Median sleep time was 392 minutes [320-455] on working days compared to 225 minutes [159-316] on call days (p<0.0001) and 452 minutes [375-516] on holidays (p<0.0001). Cumulated sleep debt was 65 hours [28,7-82,5] per resident during the 2 months period. Daily walking distance per resident was 8,3 [6,3-10,8] km corresponding to 11888 [9109-15755] steps. Physical activity >3MET was significantly longer during call days compared to regular days, 385 minutes [328-437] versus 322 minutes [251-392] respectively (p<0.0001) and longer during working days than during holidays (301 minutes [234-362], p<0,0001). Heart rate did not vary significantly between regular, call days and holidays. [J1] Median PSS-10 score was 21 points [19,75 - 25,75]. Conclusion: Using connected wristbands, an innovative method to quantify sleen.

call days and holidays. [J1] Median PSS-10 score was 21 points [19,75 - 25,75]. **Conclusion**: Using connected wristbands, an innovative method to quantify sleep and physical activity, we observe that anaesthesiology and intensive care residents exhibit significant sleep debt and physical activity during night calls compared to regular days and holidays.

## 14AP04-4

## Burnout prevalence among Spanish anesthesiologist

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Backgroung and Goal of Study: Burnout syndrome is characterized by emotional exhaustion, depersonalization and sense of low professional accomplishment. It is a result of chronical stress and demanding works as anaesthesiologists. Evaluate the prevalence of burnout syndrome and the intensity of its components among Spanish anesthesiologist.

Materials and Methods: Cross-sectional study among 165 anaesthesiologists working in Spain at recruitment time. An on-line questionnaires including Maslach Burnout Inventory (MBI), demographic and professional data was used. The time to answer was 15 days with one invitation at day 0 and a remainder 7days after

Results: 60 questionnaires were completed (31,25%), 55% were woman and 45% male. 95% worked at public hospitals and 83% had a fixed work station. We found high job satisfaction (4,55 over 6) on the other hand, depersonalization (1,52 over 6) and emotional exhaustion scales (2,45 over 6) were low. No differences were found between sex, age, hospital dimension, duty days or type of contract.

**Conclusion**: The high level of job satisfaction with low levels of depersonalization and emotional exhaustion give us a low prevalence of burnout syndrome in our sample. More studies should be done to find out the causes and keep these low levels.

## References:

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## 14AP04-6

## Fear as anxiety generator in ambulatory surgery patients

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Background and Goal of Study: Analyse if fear and anxiety on the day of surgery are connected.

Materials and Methods: Prospective study, 135 ophthalmic surgical patients, between august 2016 and February 2017. Approved by hospital's Ethics Committee. Work instruments: Verbal Anxiety Scale (VAS), Hospital Anxiety and Depression Scale (HADS), Fear Verbal Scale, constituted by 6 domains: General fear (GF), Fear of insufficient anaesthesia (FIA); Fear of pain (FP); Fear of dyspnoea (FD); Fear of unable to stand still (FUSS); Fear of nausea/vomit (FNV). ASA (American Society of Anesthesia). Demographic variables: gender, age, family, domestic and professional status, schooling, residence. Patients excluded: urgent, unable to communicate, with cognitive deficit and major psychiatry disease. Answers were taken after patient's formal consent. Statistical analysis with SPSS, significant value with p<0,05.

Results and Discussion: Average age 67,8 years; Men 54,1%; Married 71,9%; Middle School 75,6%; Retired 66,7%; Rural residence 75,6%; Lives together 82,2%; FIA 45,9%; FP 56,3%; FD 32,6%; FUSS 39,3%; FNV 33%; Calm 30,4%; Not Anxious (HADS) 51,1% ASA II 76,3%. Fear domains with higher scores were GF, FP and FIA. VAS score showed a significant association with every domain of fear and also a positive correlation with them. The same did not happen with HADS. Age and fear also showed significant association (p=0,003), younger patients had higher scores at FUSS. Other significant association was between gender and all domain of fear, women had higher ranks of fears, and between VAS and gender, where women were more anxious (p=0,009) than men.

Conclusion: Most patients did not recognize the presence of any kind of fears. However, for those who did, that fear was associated with level of anxiety they were felling in that moment, minutes before surgery. Women had higher degrees of fears and consequently higher VAS scores. This agrees with available literature and may be due to lower propensity of men to express their feelings. It seems indeed that fear can induce an acute state of anxiety on surgery day, even in people who don't have anxiety history. This should be taken into consideration to implement measures to further improve doctor-patient communication prior to surgery.

## 14AP04-7

## Second victims: the forgotten ones

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Background: Health professionals involved in a complication which results in an adverse patient outcome may get emotionally and professionally affected, becoming second victims. This phenomenon, although frequent (up to 72% of incidence), is barely known by health workers. Therefore, in line with the growing culture of safety and opening disclosure of adverse events, it is paramount to develop an educational plan to promote awareness on second victims. Thus, implementing a second victim culture is essential to prevent terrible consequences for both second victims and health system. This study aims to assess the awareness of this concept among anaesthesiologists from different hospitals in Spain.

Materials and Methods: An anonymous survey was conducted among a group of anaesthesiologists from Spain as a part of continuing education course. The survey was completed before a second victim simulation module.

Results: The survey was filled by 34 anaesthesiologists (73% females/27% males). When it comes to types of hospital, most of them were working at tertiary referral hospitals (77%) and at university hospitals (88%). In terms of professional experience, 44% had 5-10 years, 32% > 10 years and 24% < 5 years. Regarding the second victim phenomenon, the vast majority (91%) admitted had felt responsible for medical errors, with 26% of cases resulting in severe patient injuries. The most common symptoms experienced by the second victims were sense of guilt (84%), lack of self-confidence at work (42%) and anger (39%). On the other hand, irritability (13%), insomnia (13%) and easy crying (10%) were less frequent. Moreover, among second victims, 60% looked for help, mainly from other colleagues (67%). However, up to 3% of them needed professional help. As second victim helpers, 80% of the participants had faced a second victim situation. However, only 50% claimed to have enough tools to manage them.

**Conclusions**: In our environment most of anaesthesiologists have been involved in a second victim situation, both as victims and as helpers (91%/80%).

Only 50% of the surveyed anaesthesiologists believe they have enough tools to handle this situation by themselves. The high prevalence of the problem makes essential to train health professionals to recognise second victims, know how to approach this situation and determine when to request professional help.

It is crucial for hospitals to have a second victim culture alongside with quality and safety programmes.

### 14AP04-8

## To reduce the barrier in the OR - a qualitative intervention study

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Background and Goal of Study: Increasing complexity regarding technical equipment and patients with comorbidities is a challenge for multi professional operating room (OR) teams. Studies have pointed at non-proficient non-technical skills as a cause of adverse events and simulation based teamwork training as a possibility for improvement. The aim of this study was to find out how OR staff perceives collaboration in the OR and explore possibilities for learning from a simulation based teamwork training course to the OR.

**Materials and Methods**: In a prospective qualitative intervention study 32 experienced OR staff including 5 professions took part in a novel full day simulation based teamwork training course with non-technical skills training goals. Written informed consent was obtained and the regional ethics committee approved the study. Data was collected during 5 focus group interviews that were audio and video recorded. Transcripts were first analyzed with thematic analysis. In the transcripts the barrier in the OR was often mentioned which led us to perform content analysis using the context units: sides, barrier and screen.

**Results and Discussion**: Participants described the screen between the sterile field and anaesthesia as barrier in the OR.

"It is routine to have a time-out and I feel that I know how things are on the other side...but now I realize that I should pay more attention" (surgeon). Non-technical skills were mentioned as a possibility to reduce this barrier. "It seems like a time-out is a very good method to reduce the barrier between anaesthesia and surgery" (nurse anaesthetist). The teamwork training was percieved as a possibility to reduce the barrier. "The screen between anaesthesia and operation was brought down a bit (by the training)" (anaesthetist). The results indicate that OR staff perceive OR teams as divided into sub-teams which is in line with Makary's findings of diverse views on quality of collaboration by OR staff. A divided team can imply inferior conditions for good teamwork and apart from training improvements of OR design (transparent screens, reduced noise) should be considered in order to enhance teamwork.

**Conclusion:** Experienced OR staff describe the screen between anaesthesia and the sterilie field as a communication barrier indicating a possible risk to patient safety. Simulation based teamwork training is a possibility to reduce the barrier.

## 14AP04-9

## The feedback to operating theatre staff of perioperative patient experience - the why and the how

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Background and Goal of Study: Safety climate assessment in a 900+ bed university hospital in the UK has demonstrated only 30% of theatre teams get adequate feedback form their local leadership. Subsequent debriefing of these results identified that theatre staff do not get feedback on patient experience, outcomes or team functioning. An understanding and appreciation of the high quality care that perioperative teams deliver is crucial to provide meaning in work, job satisfaction and to help prevent burnout amongst theatre staff. We hypothesised that improving feedback on patient experience to perioperative teams would improve staff morale, job satisfaction and reduce burnout, and with the potential to improve patient outcomes.

Materials and Methods: Building on pilot work in one theatre, 4 medical students will lead the development and spread of feedback to theatre staff of perioperative patient experience. The pilot started with paper feedback with a plan to develop a computer system that could be used by a patient volunteer to collect the feedback. This will be fed back to the theatre staff. The frequency and the exact method of feedback needs to be determined through iterative tests of change.

Results and Discussion: At baseline theatre staff reported that 67% of them believed that morale impacted on patient care, 75% wished to know more about patient experience, 100% that getting feedback on patient experience would influence their practice and the effectiveness of the team, 83% that knowing more about patient outcomes would improve job satisfaction.

25% of staff wished to receive the feedback weekly and 75% of staff wished to receive it monthly. No staff wished to receive it on a daily basis. The frequency and best method of feedback will be tested by iterative tests of change.

We anticipate that this will be complete in the two pilot theatres and spread to other theatres before the conference.

**Conclusion**: Feedback to operating theatre staff on perioperative patient experience has the potential to improve staff morale, job satisfaction and decrease burnout and

to improve patient experience and outcomes. We will test the process of feedback to design a sustainable system of feedback to operating theatre staff. The process will also be used to teach quality improvement methodology to undergraduate medical students.

### 14AP04-10

## Detection of barriers to implementation of a handover protocol

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Introduction: Transfer of patient information (handover) is a moment of special vulnerability for patient safety. It is an important cause of critical incidents. Multiple barriers to effective communication have been described. A handover protocol is considered a "good clinical practice". In our environment, a standardized handover practice did not exist until now. For 2 years, the Anaesthesia Safety Working Group has been working at the Gregorio Marañón General University Hospital developing a strategy to improve handover of surgical patients. That included the creation of a working group for handover standardization and the development and diffusion of an electronic handover form and a verbal protocol with a SBAR structure (Situation, Background, Assessment, and Recommendation). Objectives:

Evaluation of the completion of the standardized handover for surgical patients Detection of barriers to its implementation.

## Material and Methods:

Retrospective observational study to determine the degree of fulfilment of electronic handover. Qualitative survey with 13 items and free text, to detect barriers to the standardized handover.

Results and Discussion: We have reviewed 105 surgical interventions. Twenty-seven (25.71%) of them had the electronic handover form fulfilled. One hundred and twenty-seven members of the Anaesthesia Department were surveyed. We found a contradiction between the results of the completion of the standardized written handover (25.71%) and the survey which shows a general agreement about the importance of the adequate handover as a safety practice. SBAR tool is used in 50% of cases. The principal barrier found was the repeated information. Free text answers reflect a poor coexistence between paper and electronic anaesthesia records. Many respondents think that intraoperative anaesthetic registry is enough as handover information. Although there is a general agreement with the importance of handover between professionals, there are multiple barriers to its adequate completion. Coexistence of paper and electronic systems can be a cause of poor completion. More education is needed to increase awareness of the situation and improve fulfilment. As we move to a computerized world without paper it is mandatory to improve computer tools and reinforce of type SBAR verbal tools.

## 14AP05-1

## Peer review to prevent, manage and learn from catastrophic complications in perioperative medicine

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Background and Goal of Study: Audits, checklists, guidelines, and practice advisories considerably improved safety in the perioperative setting. Yet, given the reality of multi-generational and multi-cultural workforces and discoveries in management sciences, the community is only just about to recognise the importance of peer review in perioperative medicine. While the concept of feedback has been institutionalized across various settings over the past decades, peer reviews take place on a different level in organizational hierarchy and depends heavily on individual and departmental culture. We aimed to shed light on this crucial activity to prevent, manage, and learn from catastrophic complications.

Materials and Methods: We searched PubMed, Embase and EBSCO, Web of Science, JSTOR and WISO and reviewed current evidence considering peer review, i.e. the performance assessment by someone of the same status and ability, from both management science and medicine to define, build, and adjust a department's mission, vision, and culture.

Results and Discussion: While respective evidence is sparse in medicine, such deriving from management sciences is overwhelming. The latter suggests peer review being integrated in every department's mission and vision to evolve from a peer review-adverse culture towards an open and supportive peer review environment since not only the fear of performance review, but also the lack of it generate dysfunctional work environments. Further, professional performance, compliance with departmental strategy, and personality traits can be addressed preventively, retrospectively, and acutely, and can be benchmarked with the departmental mission, vision, and values, defined in the strategy.

**Conclusions:** Aiming at reducing perioperative morbidity and mortality, peer review provides a valuable leadership tool to improve in the face of ever increasing complex workplace settings and a key element towards preventing, managing, and learning from catastrophic perioperative complications. Both leadership and peers in perioperative medicine have to be aware that change is not an event but rather a process that requires time, has to follow specific steps, and has to be planned strategically.

### 14AP05-2

## Lost & Found: the importance of good practices in security matters

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Background: Patient safety is one of the most pressing challenges in health care. One estimate says that one case of a retained item occurs at least once a year in a major hospital where 8000 to 18,000 major cases are carried out each year (1). Case Report: 77 year-old women, with a biologic aortic valve substitution by ministernotomy approach. No incidents during surgery and after it, she is admitted in the Post Cardiac Surgery ICU. Our reception protocol in these patients includes a complete blood test and a Chest X ray (Fig. 1).



Due to the findings in the X ray, we naked and move the patient, reviewed the bed, and repeated the Chest X ray, with the same result. We warned the cardiac surgery team who, after looking at the image, thought they had left one forceps inside the patient's Chest. They asked for a CT previous surgery to confirm diagnosis and decide the surgical approach (sternotomy vs toracotomy). But surprisingly no forceps where found in the Chest CT, but they still appear in the X ray. We decided to remove the wound dressing, finding that the forceps where a false image caused by "x ray detectable swabs".

**Discussion**: In our Hospital, we have a surgery check list to avoid safety mistakes. One of the items is the swab counting before the wound closure. All the swabs used during surgery must be x ray detectable. Also, all the surgical instruments must be counted before the closure. But, nurses are allowed to use any kind of swabs for the wound dressing, except in orthopaedic surgery. Due to this lack of rules, we almost re-open a patient for looking for inexistent retained forceps. Since this incident, the Hospital changed the wound dressing normative, so now is forbidden to use swab x ray detectable for all the dressings.

## References:

1. Mahran MA et al. The recurring problem of retained swabs and instruments. Best Pract Res Clin Obstet Gynaecol. 2013 Aug;27(4):489-95

**Learning points**: Importance of having security good practices. If you detected a weak point in your safety procedures do all in your hand to try to change it.

## 14AP05-3

## Malignant Hyperpyrexia: A Quality Improvement Project

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**Background and Goal of Study**: MH is a rare condition but represents a medical emergency when it happens. There are national recommendations regarding different aspects related to MH published by AAGBI and considered to be the standard of care.

Aims: To explore staff knowledge of national standards and of methods of preparation of anaesthetic machines against the manufacturers' recommendations.

-To audit the availability of the Guidelines and availability of kit to treat MH against national standards

Materials and Methods: We carried a survey for different members of the anaesthetic team exploring their knowledge of different aspects of dealing with MH according to AAGBI standards including the regime for preparation of anaesthetic machines for an MH susceptible patient and awareness of the activated charcoal filter as an alternative to minimize time and cost of making the machine ready. We visited all areas across the trust to review what is stocked to treat MH, where

it is kept and how readily accessible it is, and **audited** whether up to date AAGBI treatment guidance is readily available as a laminated card attached to the side of the anaesthetic machines

### **Results and Discussion**

Survey: We surveyed 57 participants;22 consultants,19 Trainees,16 ODPs.

	Diagnosis	Finding guidlines	Finding treatment kit	Contents of kit	National guidance	Makeup of team	National guidance on makeup of team	Volatile free machine and its location	Preparing machine and its duration	Knowledge about awilliary equipment	Recommendation for its use
Consultant	91%	100%	82%	4%	36%	18%	23%	23%	0%	27%	59%
Trainee	89%	58%	58%	0%	58%	11%	32%	21%	5%	32%	89%
ODP	50%	50%	75%	0%	25%	6%	6%	81%	0%	13%	88%

<u>Audit:</u> 1-0% of the areas stocked the treatment kit as recommended by AAGBI. All areas stocked Dantrolene in a locked drug cupboard usually easy to get to it. The rest of required equipment for management was pooled for all other emergencies which are more common than MH.2-Cath lab showed deviation in terms of having an updated laminated AAGBI guidance on management of MH attached to anaethetic machines.

Conclusion: There is huge gaps in knowledge; some of the areas explored showing worrying results. There is deviation from the national AAGBI guidance on best practice. Activated charcoal filters can be a valuable addition to our management kit for MH to massively reduce the time to get the machine ready but not necessarily the cost. We came up with a number of recommendations to improve quality of care.

## 14AP05-4

# Safety of a powder-free latex allergy protocol in the operating theatre: a prospective, observational cohort study

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Background and Goal of Study: Since powdered latex gloves induce airborne latex particles with risk of airborne anaphylactic shock, the American Association of Anesthesiologists recommends that latex allergic patients must be the first undergoing treatment on the day of surgery in an operating room (OR) left unused for 3 to 6 hours. Obviously, surgery has to be postponed in the case of improper scheduling which causes patient discomfort and financial losses. The Australasian Society of Clinical Immunology and Allergy suggested that this specific scheduling is not necessary if all powdered latex gloves are removed from the OR. Since there is currently no evidence confirming the safety of this practice in a clinical setting, we investigated if latex allergic patients could be treated safely without special scheduling requirements when all powdered latex gloves were removed from the OR

Materials and Methods: We first removed all powered gloves from the OR in our hospital and informed all involved healthcare workers about the new protocol. Afterwards we changed our policy for scheduling latex allergic patients, which from now on could be scheduled throughout the day without special requirements. All patients with (a high risk for) latex allergy scheduled for surgery in our hospital were prospectively enrolled from 10/2015 to 11/2016. A baseline questionnaire prior to surgery assessed the patient's history of latex allergy. Any allergic perioperative reactions were recorded by the anesthesiologist. Delayed or late-phase allergic reactions were assessed by telephone call 72 hours post-surgery.

Results and Discussion: In total, 229 patients were enrolled. No patients showed a type 1 allergic reaction. Only 1 patient suffered from an irritant contact dermatitis directly after surgery. Eight patients (3.5%) reported a type IV latex allergic reaction 72h post-surgery, of which 3 (1.3%) reported local pruritis, 4 (1.7%) reported local rash and 1 (0.4%) reported local rash with blisters. General symptoms included cough (n=1 (0.4%)), asthma (n=1 (0.4%)), problems with the eyes (n=1 (0.4%)), gastro-intestinal problems (n=6 (2.6%)), headache (n=2 (0.9%)) and general pruritis (n=2 (0.9%)).

**Conclusion**: The new protocol, that allows scheduling latex allergic patients throughout the day in an OR that is totally free of powdered latex gloves is considered safe in our pilot study. However, large epidemiologic trials are necessary to confirm this findings.

## 14AP05-5

## Can we reduce the risk of intraoperative pressure ulcers?

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**Background:** Pressure ulcers are associated with prolonged hospitalization, additional medical care, and mortality. The prevention of intraoperative pressures ulcers is important. However, it is sometimes challenging because of difficult surgical positions and long operating times. We used a new pressure mapping system during surgery and evaluated its efficacy for prevention of pressure ulcers.

Materials and Methods: Our IRB approved this study. We used the SR Soft Vision (Sumitomo Riko, Japan 2017), a sheet-like radiolucent

continuous body pressure mapping system designed for the operating room. A total of 40 patients scheduled for surgery lasting >2 hours in the lithotomy or lateral positions under general anesthesia were enrolled. High-specification foam mattresses were used on the operating table. After induction of anesthesia, patients were moved to the planned position. Body pressure data were captured continuously during surgery and another mattress was added if the pressure exceeded 100 mmHg. Pressure-related skin changes and neurological disorders were assessed for 2 days postoperatively.

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Results and Discussion: The mean body mass index (BMI) was 24.9 (range: 16.9-37 kg/m2). The average mean pressure was 27.0 mmHg and the average maximum pressure was 63.1 mmHg. No pressure-related skin changes or neurological disorders were detected. However, the maximum pressure exceeded 100 mmHg in 2 patients. Case 1: When VATS was performed in the left lateral position, the pressure exceeded 120 mmHg at the ilium, but an additional mattress could not be positioned because of the maneuvers required for this operation. Case 2: When the patient was placed in the high lithotomy position for vaginal hysterectomy, the pressure on her upper thoracic spine increased to 102 mmHg. Another mattress was added and the pressure decreased. Prolonged, unrelieved high pressure is a major risk factor for pressure ulcers. In this study, body pressure mapping enabled us to determine the site of pressure overload.

**Conclusion:** Using the SR Soft Vision (a sheet-like radiolucent continuous body pressure mapping system) during surgery could possibly lead to a lower incidence of intraoperative pressure ulcers.

### 14AP05-6

## Feasibility of continuous wireless monitoring of respiratory rate on the postoperative ward

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**Background and Goal of Study**: Of all vital parameters, change of respiratory rate (RespR) is the most powerful predictor of clinical deterioration. Brady- (RespR  $\leq$  8 breaths/min) and tachypnea (RespR  $\geq$  31/min) are associated with serious adverse events. Simultaneously, respiratory rate is the least accurately measured vital parameter on the ward. We investigated the feasibility of continuously measuring RespR up to 5 days post-operatively on the ward using wireless monitoring equipment, allowing patients to normally mobilize.

Materials and Methods: Continuous monitoring of vital parameters (heart rate, RespR, temperature) using a wireless SensiumVitals patch (Sensium Healthcare, London, UK) was installed on two surgical wards. Adult patients undergoing general surgery (June - August 2017) and staying at least 1 postoperative night who gave informed consent were monitored. RespR was measured every 2 minutes. The monitoring system first automatically analyses the vital signals on technical accuracy before submitting data to a database.

Results: In 126 patients enrolled in this observational study, the system defined 176.686 of 233.866 measurements (76%) as accurate. The RespR most frequently measured was 13-14-15-16/min (fig 1). Day- (8:00-20:00) vs. nighttime distribution (20:00-8:00) showed a small but significantly higher RespR during daytime (16,9 vs. 15,8/min (p<0.001)). Both, brady- or tachypnea were significantly more often measured during day- than during night-time (fig 2, bradypnea, 5,6% vs. 4,5% times measured; tachypnea, 1,2% vs. 0,5% (both p<0.01)). The number of patients experiencing bradypnea for more than 1 hour declined from 17% in the first postoperative night to 2 % in night 4. Tachypnea was observed in 2-7% of all measurements.

Discussion & conclusion: We successfully measured RespR on a postsurgical ward continuously for up to 5 days using a wireless monitoring system, with the advantage of not disabling patients to mobilize. While previous studies mentioned a digit preference of 18-22/min for RespR measured by ward staff, the most frequently measured RespR were 13-16 bpm. A significant amount of patients experienced bradypnea during post-operative night 1. Because brady- and tachypnea are associated with serious adverse events, the wireless monitoring system might increase postoperative patient safety without leading to immobilisation by the monitoring system itself.

## 14AP05-7

## Patient-Safety Protocols in Anesthesiology: The greek State of Play

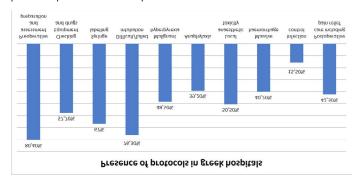
Korakis A.<sup>1</sup>, <u>Koufopoulou C.</u><sup>2</sup>, Laou E.<sup>3</sup>, Stamoulis K.<sup>3</sup>, Flossos A.<sup>3</sup>, Arnaoutoglou E.<sup>4</sup>

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Background and Goal of Study: Even though it comprises every physician's priority, patient safety is an anesthesiologist's most substantial duty. Since the launch of the Helsinki Declaration (HD) on Patient Safety, Societies of Anesthesia across Europe have been making efforts to establish protocols in everyday practice. The Hellenic Society of Anesthesiology (HSA) has issued guidelines that could serve as a basis for the protocols, whose presence is deemed mandatory in the anesthesiologists' workplace by the HD. We aimed to determine to what extent are anesthesiology protocols present in the hospital environment in Greece and their application in routine anesthesiology procedures.

Materials and Methods: Questionnaires were distributed via email to all physicians occupied as anesthesiologists, registered in the HSA network. In an attempt to estimate the influence of additional factors on the adherence to protocols, the participants had to provide information concerning their age, years of practice, whether they work in the public or private domain, in a secondary or tertiary care facility. They were also requested to declare their commitment to the use of protocols along with their opinion on its functionality, as well as accompanying drawbacks and advantages.

Results and Discussion: 102 anesthesiologists answered our questionnaires. The vast majority of responders were positively disposed towards the adoption of protocols and admitted to applying them in everyday clinical practice; however only few among the protocols on the list were widely available at their workspace. No statistically significant correlations were noted neither between age, years of practice and protocol utilization, nor among secondary or tertiary care, public or private hospitals and access to protocols.



**Conclusion:** Throughout the years that followed the HD, the implementation of patient safety anesthesia protocols in Greek hospitals has noted a rudimental emergence; however, progress remains to be made in terms of compliance to protocols in a routine basis.

As is more, this subject ought to be better addressed in the education of the forthcoming generations of anesthesiologists.

## 14AP05-8

# Radiologic assessment of gastric emptying of water soluble contrast media: new data security from a cohort study

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Background and Goal of Study: Practice Guidelines for preoperative fasting have not clearly established the fasting time needed after oral administration of water soluble contrast media (WSCM). Our goal was to determine the time needed for the stomach to completely empty WSCM in patients with acute abdominal pain.

Materials and Methods: This prospective longitudinal cohort study included sixty-eight patients with acute abdominal pain requiring a WSCM enhanced abdominal CT (computed tomography) study. Plain radiographs were obtained hourly until complete gastric emptying of WSCM was achieved. Patients with probable bowel obstruction were excluded from the study.

Results and Discussion: 31 (45.6%), 54 (79.4%), and 64 (94.1%) patients achieved complete gastric clearance of barium in 1, 2 and 3 hours, respectively. All patients achieved complete gastric emptying of WSCM within 6 hours. Gastric emptying time was not associated with gender (p=0.44), body mass index (p=0.35), fasting time prior to WSCM intake (p=0.12), administration of opioids in the emergency room (p=0.70), or presence of comorbidities (p=0.36).

**Conclusion**: 94% of the patients with acute abdominal pain and no bowel obstruction achieved complete gastric emptying within 3 hours of the administration of WSCM. All of them achieved complete gastric emptying within 6 hours. We consider clinically relevant to wait 6 hours after oral intake of the contrast media to ensure the complete transit of WSCM through the stomach and avoid unnecessary risks.

Patients with complete gastric emptying a	t each hour	
Time to emptying (hours)	n = 68	%
1	31	45,6
2	54	79,4
3	64	94,1
4	66	97,1
5	67	98,5

### 14AP05-10

## Quantification of flow-volume loops using a non-invasive respiratory volume monitor

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Background: Pulmonary function tests utilize flow-volume loops (FVLs) to help detect, diagnose, and monitor the long-term progression of lung disorders such as COPD and asthma. Spirometry is the gold standard for generating FVLs; however, it requires patient cooperation, which is not always feasible. Respiratory inductance plethysmography bands have also been used to analyze tidal breathing FVLs. Monitoring tidal breathing FVLs has been proposed as a means of monitoring disease progression, responsiveness to therapy, reaction to broncho-constrictive agents, and changes in breathing during exercise, but has not been widely adopted due to technology limitations. The objective here was to demonstrate the utility of a non-invasive respiratory volume monitor (RVM) in measuring continuous tidal FVLs. Methods: Volume traces were collected using an RVM (ExSpiron 1Xi, Respiratory Motion, Inc., Waltham, MA) for 6 breathing trials. In trials 1 and 6, subjects were instructed to breathe normally. In trials 2-5, subjects alternated between fast (25 bpm) and slow (5 bpm) breathing. Flow traces were generated by taking the first derivative of the volume. We assessed the characteristics of the shape of FVLs for different trials.

Results: 48 subjects (33 males, age: 46.1±14.3 yrs; BMI: 27.6±6.2 kg/m2, mean ± SD) completed the study. Respiratory rates for the normal, fast, and slow breathing trials were 12.6±0.6, 24.6±0.1, and 6.9±0.3 bpm (mean ± SEM), respectively. Fig 1 depicts representative volume (top row), flow (middle row), and FVLs (bottom row) for normal, fast, and slow breathing trials. During normal breathing the FVL has a convex shape with a steady flow during the second half of the expiratory limb. The FVLs during fast breathing appear elliptical. During slow breathing a concave expiratory limb is observed near the end of expiration indicating an expiratory flow limitation

**Conclusion**: We demonstrated the capability of the non-invasive RVM to generate continuous tidal FVLs in healthy volunteers. We observed distinctive shapes of the FVLs when the subjects varied their respiratory rate. The RVM vastly expands the potential applications in which FVLs can be measured.

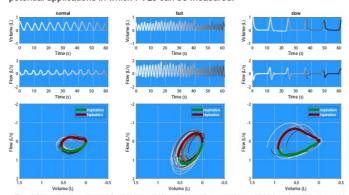


Figure 1. Representative volume (top row), flow (middle row), and flow-volume loops (bottom row) for normal (left column), fast (middle column), and slow (right column) breathing trials as well as the average inspiratory (green) and expiratory (cold cause). Note that both one appropriate of the column is a constant of the column in the column is a constant of the column in the column is a column in the column in the column is a column in the column in the column is a column in the column in the column is a column in the column is a column in the column in the column is a column in the column in the column is a column in the column in the column in the column is a column in the column in the column in the column is a column in the column in the column in the column is a column in the column in the column in the column in the column is a column in the column i

## 14AP05-11

Assessment of the variability of electromyography- and acceleromyography-derived train-of-four ratios and the discomfort associated with neurostimulation in unmedicated volunteers: an international observational study

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Background and Goal of Study: TetraGraph (Senzime B.V., Uppsala, Sweden) is a new electromyography-based neuromuscular monitor. The aim of this international, two-centre, prospective, unblinded study was to compare the subjective discomfort associated with TetraGraph neurostimulation with that evoked by acceleromyography-based TOF-Watch S neuromuscular monitor (Organon, Dublin, Ireland), and examine the consistency of evoked Train-of-Four (TOF) ratios (%) in unmedicated healthy volunteers.

Materials and Methods: After ethical approval by Mayo Clinic Florida and University of Debrecen and gaining written informed consent, the study enrolled 56 volunteers {age 36.5 ± 11 years (mean ± SD); Male : Female ratio = 25 : 31; BMI 24.91 ± 3.4}. The left or right arms were stimulated in random order three times at each stimulating current intensity (20-50 mA) in TOF mode. Standard electrocardiography electrodes (Red Dot™, 3M Health Care, St. Paul, MN) were used for ulnar nerve stimulation with acceleromyography. The piezoelectric probe was attached to the thumb, and a Hand Adapter (Organon, Dublin, Ireland) was used to ensure consistency of measurements. The TetraGraph uses specially-designed proprietary surface strip electrodes (TetraSens, Senzime B.V., Uppsala, Sweden) for nerve stimulation and muscle action potential recording. The recording electrodes were placed above the thenar eminence and the first interphalangeal joint of the thumb. The volunteers were asked to rate the discomfort associated with neurostimulation on a 0-10 visual analogue scale (VAS) anchored with 0 (no pain) and 10 (worst pain ever experienced).

**Results and Discussion**: Neurostimulation with the TOF-Watch S device resulted in moderately lower VAS scores at 20 mA, 30 mA and 50 mA current intensity than with TetraGraph {2 (1-2) vs 2 (1-3), p<0.001; 3 (2-5) vs 3 (2-5), p=0.035; 5 (3-8) vs 5 (3-8), p<0.001; median (IQR), respectively}. The intracurrent variability of evoked TOF ratios was significantly lower with TetraGraph than with TOF-Watch S device {3 (1-7) vs 5 (2-10), median (IQR), p<0.001, respectively}. The bias between the intracurrent TOF ratio variability of the two devices was 2.88 (95% CI: -40.22 to +45.98).

**Conclusion**: The electromyography-based TetraGraph had higher precision and caused clinically similar level of discomfort in unmedicated volunteers than the acceleromyography-based TOF-Watch S neuromuscular monitor.

## 14AP06-1

## Qualitative analysis of medical records of preanesthetic evaluations

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**Background:** performance and quality indicators are essential tools in management and quality of medical units. Preanesthetic evaluation is a central component of clinical anaesthesia; however, anaesthetic records are not always sufficient or satisfactory. The goal of this study is to evaluate the technical-scientific care in anaesthesiology consultation, based on standard 029/2013 (updated 24/04/2015) of Direção Geral de Saúde (DGS).<sup>1</sup>

Materials and Methods: descriptive retrospective analytical study. Assessment of preanesthetic evaluations records of adult patients proposed for elective surgery, from November 2016 to November 2017, taking into account the following indicators (based on DGS 029/2013 standard¹ and the unit's protocol): registration rates in a specific anaesthetic form, complete clinical evaluation, complete objective examination, complete airway evaluation, calculated clinical risks and defined anaesthetic plan. Data was analysed using SPSS 24.0.

Results and Discussion: 653 consultations were evaluated (93% first consultations). 52.8% of the records were registered in a consultation diary and 46.2% in a specific attached anaesthetic assessment form. Given the evaluation criteria, 32.8% of registries presented complete clinical evaluation, 82.5% complete objective examination, 55.6% complete airway evaluation and 76% defined anaesthetic plan; only 16.4% presented the calculated clinical risks (82.4% of consultations without records of cardiac risk). Records in the specific form achieved better completion rates in clinical evaluation, physical examination, calculated clinical risks and defined anaesthetic plan (p < 0.001).

**Conclusion**: Specific anaesthetic assessment forms are useful tools to allow a systematic consultation process. They provide clear, concise and accessible data, improve the quality of information and minimize errors/record failures.

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## Patient Safety

## 14AP06-2

## Anaesthesia record keeping in an Australian metropolitan tertiary public teaching hospital

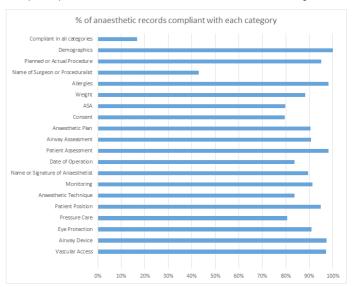
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Background and Goal of Study: The anaesthetic record is the only anaesthetic related record that documents the patient's perioperative journey. The Australian and New Zealand College of Anaesthetists (ANZCA) has published a professional document detailing what should be recorded in an episode of anaesthetic care¹. The aim of this project is to determine documentation compliance to college recommendations in an Australian tertiary hospital.

Materials and Methods: Austin Health is a metropolitan tertiary public teaching hospital in Melbourne, Australia; it provides 980 beds across three campuses. Patients having surgery at Austin Health over a 7 day period were included in this audit. Austin Health's anaesthetic records are paper based and require the anaesthetist to manually record all data. The patient's anaesthetic records were retrospectively analysed. The primary outcome was the incidence of inadequately documented anaesthetic records according to the ANZCA recommendations. This project received ethical approval from the Austin Health Human Research Ethics Committee prior to data collection.

Results and Discussion: During the period of 20th to 26th March 2017 inclusive, 588 patients underwent a procedure and 381 were included for this project. Overall, 17% (64/381) of the included charts followed the ANZCA recommended guidelines.



Conclusion: Overall, the number of charts compliant in all ANZCA recommendations was poor. Particularly important areas that were not completed include: planned or actual procedure, name or signature of anaesthetist, consent, airway assessment and airway device. Lack of adequate documentation in these areas could lead to patient morbidity and medico-legal issues; the completion rate should be 100%. This project should raise awareness for all hospital staff that anaesthetic documentation is important and can be improved on.

References:

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## 14AP06-3

## Safety in anesthesia: quasi-experimental study for the evaluation of the impact of a mutimodal strategy on the registy of critical incidents

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Background and Goal of Study: A Critical Incident Reporting System (CIRS) improves Patient Safety (PS) by using the systematic analysis of the latent factors (LF), proposing and executing improvement measures (IM) that prevent the repetition of the CIs. Several initiatives have been launched to increase its use but there are not any conclusive studies so far that enable drawing conclusions to the clinical practice. The Spanish Anesthesia and Recovery Safety Notification System (SENSAR) is a CIRS created in 2009. Five years after, a multimodal strategy (MMS) was implemented to improve its performance. Goal: To evaluate the impact of a

MMS developed by SENSAR in the evolution of CI reporting in anesthesiology by comparing two periods (2009-2013 and 2014-2016).

Materials and Methods: Data from the SENSAR database "ANESTIC" of communication and analysis. A quasi-experimental analytic study was designed on the activity data gathered in a prospective manner and analyzed in a retrospective manner. The MMS intervention was defined as the set of actions taken five years after its establishment. Both periods were compared.

Results and Discussion: At the end of the research period, 92 hospitals had joined, 84 had reported, 75 had conducted analysis. 497 local analyzers were identified 7,232 reported CI were registered, 6,446 of which (89.1%) were analyzed. The cases were mainly of CIs with no damage (77.3%). Specialist anesthesiologists were the main reporters (87.3%) opposite to nurses (4%). A total of 12,782 IM proposals were identified. The comparative analysis offered statistically significant differences in favor of the second period with an increase in the number of hospitals that account for 75% of the reports and the analysis ( $\triangle$  20.7% and 5.4%, respectively), with a decrease in inactivated hospitals ( $\Delta$  -72.45%), and with an increase of hospitals outside the national territory (4 hospitals). There was an increase in the reported CIs per year ( $\Delta$  67.96%), shared with other hospitals ( $\Delta$ 4.49%) and presented in session (Δ 23.12%). The delay times of the CI analysis and the execution of measures were reduced to 40.43 and 54.48 days, respectively Conclusion: The positive impact of the developed MMS by SENSAR has meant an improvement of the PS in the field of anesthesiology and related areas, of the CS of professionals and institutions and an improvement of the general and specific performance of the SENSAR organisation to lead institutions in learning from errors

## 14AP06-4

## Incident reports from anesthesia in morbid obesity according to PAAd Thai Study

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Background and Goal of Study: The Perianesthetic Adverse events in Thailand (PAAd Thai) study aimed to determine the current frequency distribution of incidents related to anesthetic complications, factors contributing and corrective strategies. Materials and Methods: The Royal College of Anesthesiologists of Thailand initiated registry and reports from January-December 2015. A multicenter prospective descriptive study was conducted in 22 hospitals across Thailand. Different levels and types of hospitals were anonymous reported. The reports of patients with BMI 35 kg/m2 and over were reviewed with three reviewers.

Results and Discussion: There were 58 cases of morbid obesity from 333,219 cases which 78 incidents were reports. The incidents commonly occurred in female patients (63.79%), age between 46-60 years (32.76%), and BMI 39.68  $\pm$  4.6. Oxygen desaturation was the most common occurred in 38.46%. The other critical incidents were severe arrhythmia (10.26%), difficult intubation (8.97%), cardiac arrest in 24 hours (8.97%) and death in 24 hours (6.42%). General, obstetrics, orthopedics and otolaryngology surgical specialties were noted a high risk of incidents. Operating theater and post anesthesia care unit were common locations for incidents occurred.

**Conclusion**: As another countries, Thailand is now facing a problem of increasing number of morbidly obese population. For anesthetists, management of obese patients usually requires a challenge. Critical incidents analysis of each report is helpful to improve quality of anesthesia services. Common factors related to critical incidents were inexperience and inappropriate judgement. The suggested corrective strategies were additional training, experienced assistance and much more vigilance. The quality assurance and improve supervision will help.

## 14AP06-5

## Reporting of conflicts of interest in clinical practice guidelines in anaesthesiology. A cross-sectional analysis

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Background and Goal of Study: Guidelines assist clinical decision-making. Since conflicts of interest (COIs) of those producing the guidelines may bias the recommendations, they should be avoided or correctly managed. Moreover, the potential impact of COIs on the recommendations, and their management, should be transparently reported. We examined how COIs are reported in anaesthesia quidelines.

Materials and Methods: We performed a cross sectional analysis of guidelines published in five major anaesthesia journals (2007-16). We report on the number (%) of guidelines that 1. Reported COIs in the published report; 2. Did so in a clearly identified paragraph; 3. Reported and described COIs of panel members; 4. Reported and described COI of the Chairperson; 5. Reported and described the impact of the guideline sponsor on the recommendations; 6. Described procedures taken to minimise the risk of biases due to panel members' COI or the sponsor.

Results and Discussion: We included 65 guidelines. COIs were reported in the published report of 31 (48%) guidelines, and in a distinct paragraph of 14 (22%) of the latter. Of those 31 guidelines, panel members reported having no COI in 7 (23%), disclosed COIs without describing their potential impact on the recommendations

in 23 (74%), and disclosed COIs and described their potential impact on the recommendations in 1 (3%). Of those 31 guidelines, 16 (52%) chairpersons could be identified, of which 7 (44%) reported having no COIs, 8 (50%) disclosed having COIs without describing their potential impact on the recommendations, and 1 (6%) failed to declare absence or presence of COIs. In 48/65 (74%) guidelines, presence or absence of a sponsor was not reported, 5 (8%) declared having no sponsor, 11 (17%) reported sponsoring without explanation of the potential impact on the recommendations, and 1 (2%) reported sponsoring and described its influence on the development of the guideline. Finally, in 30/65 (46%) guidelines, measures were required to minimise the risk of bias due to COIs or the presence of a sponsor. Of those, 2/30 (7%) described convincing measures.

**Conclusion:** COIs of panel members are reported in only about 50% of published anaesthesia guidelines. Most guidelines do not identify a chairperson, and half of those that can be identified, have COIs. The potential influence of COIs on the guidelines' recommendations is poorly documented and should be improved.

### 14AP06-6

## Adverse events involved in liability claims of alleged Anaesthesiology malpractice between 2000-2013 in a Spanish series

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Background and Goal of Study: Patient safety and Medical Professional Liability (MPL) are top priorities in everyday medical practice. High rates of claims for alleged malpractice in the surgical medical field have been reported and it also affects Anaesthesiology and Pain Management speciality, which is responsible for the sixth highest number of claims in Catalonia.

Materials and Methods: We analysed the claims database of the Professional Liability Department of the Catalonian Council of Physicians' Official Colleges (PLD). We performed a descriptive analysis of the most common events leading to a claim

Results and Discussion: From all the specialties registered in Professional Liability Department (PLD) of the Council of Medical Colleges of Catalonia database, from 2000 to 2013, 154 belonged to Anaesthesiology, which represents the 3.4% and has a claim frequency of 11 cases/per year. The MPL rate is 35.7%. The patient involved in a claim is middle aged, previously healthy with no predominant sex. The type of anaesthetic act with higher MPL is General Anaesthesia (39.5 %). Regional Anaesthesia, in particular, Epidural Anaesthesia, has a high MPL rate (39.1%). Patient information procedure is poorly documented in 51.3% of cases, which correlates positively and significantly (p=0.000) with the concurrence of MPL According to the NPSA scale, adverse events categorised as 'severe' and 'exitus', represent 49.3 % of total claims. Most frequently claims reported are: dental injuries (27,3 %), central nervous system damage and anoxia (22,7%). Exitus (14.9 %) is mainly caused by haemorrhage and cardiac etiologies (39.4 %). Claims are filed in average one year after the adverse event occurred and require an average period of almost three years until it reaches its final resolution (2.75 years). The majority of claims were settled out of court with statistical significance.

**Conclusion:** Anaesthesiology typically involve both severe damage (fatalities and severe impairment) and minimum damage (dental damage). 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.

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## 14AP06-7

## Complications after regional anaesthesia (RA): a closed claims analysis (SHAM insurance)

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**Background and Goal of Study**: The development of the practice of RA exposes anaesthetists to a greater number of critical incidents. Data from the literature are reassuring and show a very low incidence of complications [1].

Materials and Methods: The aim of this study was to analyze the claim rate related to a complication that occurred after RA. For this purpose, we did a retrospective study of the closed claims reported to SHAM insurance over a period of 6 years (2011 to 2016). SHAM is a health insurance company and the first medical liability insurer in France.

Results and Discussion: 73 cases (80 complications) were reported for this type of complications between 2011 and 2016, involving 58 women (mean 37 years old) and 15 men (mean 60 years old), of which 15% had an anxiety-depressive situation. The complication occurred in a general care hospital (n=41), a university hospital

(21), a private institution (9) or during private practice of health professionals (2). 40 cases (54%) were settled amicably, 21 (29%) by an ICC (Conciliation and Compensation Commission) and 12 (16%) by judicial procedure. The relevant specialties were obstetrics (n=34) and orthopaedic surgery (23). The RA performed was as an epidural analgesia (n = 36), spinal anaesthesia (13), femoral (5), axillary (5), sciatic (6) or interscalenic block (1), peri-bulbar (4), infiltration (2) or topical (1). Complications were neurological injury (37), post-lumbar puncture (8), chronic pain (5), bleeding (5). In the neurological injuries, neuropathic pain is reported in 60% of the cases at the time of the puncture, a deficit persists in 67% of cases during the assessment and no fault from the anaesthetist is retained in 90% of cases. In 80% of cases, chronic pain is associated with neuraxial anaesthesia. In 7 cases, the patients complain a lack of information (rarely retained) while correctly given and plotted in files (85% of cases). The tables reports the types of complications according to the type of RA.

Conclusions: The analysis of this series shows that claims related to RA practice remain infrequent over the period and occur more in young women with an anxiety-depressive. It is the neuraxial anaesthesia that generated most claims. The technical fault is generally not retained. The practice of ultrasound-guided is seldom sought after by the expert. The failure of RA is also a common cause of claims. References:

1. Anesth Analg. 2017;124:645-660.

## 14AP06-8

## Kounis syndrome: myth or reality?

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**Background:** Kounis syndrome (KS) is an infrequently diagnosed entity that has been established as a hypersensitivity coronary disorder induced by various conditions such as drugs, environmental exposures, foods and coronary stents (1). Its presence is a life-threatening pathology that may make the anesthetic management difficult.

Case report: A 49-year-old man with no cardiovascular risk factors was scheduled for left perthrocanteric hip fracture osteosynthesis. Once in the PACU and five minutes after metamizol administration, he experienced nauseas, itching in the mouth, burning face, sudden shortness of breath and decreased level of consciousness. On the monitor, we could see an ST-segment elevation followed by a high degree AV block. He required CPR, intubation and administration of corticoids. On admission at ICU, the first ECG revealed ventricular tachycardia, ST elevation in leads II, III, aVF and non-ST-segment elevation in aVL and V2-V4 (fig.1). Echocardiogram, CT angiogram and Troponin T were normals. After 2 hours, ECG revealed an atrial fibrillation, which requires electrical and medical cardioversion (fig.2). The patient became hemodynamically stable with a normal ECG (fig.3). Coronary angiogram did not reveal any abnormalities and blood tests showed high levels of IgE, tryptase and urine metilhistamine. After 12 hours, the patient was extubated and discharged from the ICU.

**Discussion:** In our case, the patient described to take metamizol several times before without any adverse event, and that is why we did not expect it at all. Management could be difficult because some drugs used in acute coronary syndrome (ACS) such as acetylsalicylic acid or nitroglycerin can exacerbate anaphylaxis. Even in non-expected cases, KS should be suspected and it is important to adequately balance the risks and benefits individually to establish the most appropriate treatment.

**Learning points:** KS is not a rare disease but an infrequently diagnosed condition. We should keep in mind when diagnosing patients with no cardiovascular risk factors who experience ACS accompanied by symptoms of anaphylaxis.

Faced with a patient with KS, we recommend: Treat simultaneously anaphylaxis and ACS

Diagnose the type of KS

Avoid possible triggers (drugs, ...)

The anesthesiologist must know the algorithm for action in anaphylaxis and in ACS.

## 14AP06-9

## Evolution of malignant hyperthermia in Japan

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Background and Goal of Study: Malignant hyperthermia (MH) is a hereditary muscle disorder induced by volatile inhalation anaesthetics and depolarising muscle relaxants. Since the first report of MH in 1960, its mortality rates and symptoms have changed, as have the use of anaesthetics and dantrolene. Our department, an MH center in Japan, has been registering MH cases in a database. Here we analysed the data, focusing on year of onset.

Matérials and Methods: We enrolled 411 patients registered between 1960 and 2017 whose likelihood of having MH susceptibility was rank 5, 6 based on the MH clinical grading scale, or rank 4 with gene mutation. We grouped patients according to year of MH onset: Group A, 1960–74; Group B, 1975–84; Group C, 1985–94; Group D, 1995–2004; and Group E, 2005–17. We used the Kruskal-Wallis test to analyse number of cases, mortality rate, gender, age, intraoperative drugs, clinical

findings, initial symptoms and onset time, maximum body temperature and peak time, muscle symptoms, and blood test findings. P<0.05 was considered significant. Results and Discussion: Mortality rates were generally lower with later MH diagnoses: 47.1%, 24.1%, 9.5%, 14.3%, and 7.4%, in Groups A, B, C, D, and E, respectively. The rate fell after dantrolene became commercially available in 1985. The most commonly used inhalation anaesthetics were sevoflurane (92.5%) in group E and halothane (86.1%) in group A. Use of suxamethonium was least frequent in groups C (69.4%) and E (15.7%), and corresponded to a lower rate of muscle symptoms. In groups C and E, trismus occurred in 48.6% and 17.4% of cases, respectively, and dark urine in 63.6% and 30.8% of cases, respectively. The most common initial symptom was trismus (38.2%), followed by muscle ankyloses in group A, and increased EtCO2 (68.3%), followed by hyperthermia (9.8%) and trismus (9.8%) in group E. The median initial time of symptom onset was lowest in group A, at 10.0 min, and highest in group E, at 110 min (P<0.0001). The highest median body temperatures were 41.6 °C in group A and 39.6 °C in group E (P<0.0001). Base excess (median) (mEq/L) was -13.0 in group A and -4.1 in group E (P<0.0001).

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**Conclusion:** MH findings were associated with year of diagnosis, anaesthetic type, and suxamethonium and dantrolene use. After 2005, the induction agent was almost always sevoflurane and the initial symptom was increased EtCO2.

## 14AP06-10

### Transarterial femoral vein cannulation

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Background: Central line insertion related complications could be minimised by the use of Ultrasound (US)¹: to locate the vein, visualise needle tip and confirm guide wire position prior to vessel dilation. However, there is an inter-operator variability in using the US to confirm guide wire position, which can lead to serious complications. Case Report: US-guided left femoral vein 12 Fr catheter was inserted to facilitate renal replacement therapy. There was no documentation of guide wire visualisation as part of an aseptic insertion technique. The patient received uneventful dialysis sessions. On removal of the catheter, the patient was bleeding heavily from his left groin. Surgical dissection of femoral artery and vein revealed a through hole in the femoral artery and a hole in the anterior wall of the femoral vein behind it. All holes were repaired by primary suturing and haemodynamic instability due to haemorrhage was corrected with blood transfusion.

**Discussion**: The catheter shaft was positioned in the artery and the tip in the vein, which explains the uneventful dialysis. Visualisation of the guide wire during insertion could have confirmed transarterial puncture and prevented serious complications. **References**:

1. Bodenham Chair et al., (2017). Association of Anaesthetists of Great Britain and Ireland: Safe vascular access 2016.

**Learning points:** The routine use of US to confirm guide wire position could prevent unwanted serious complications related to central venous cannulation.

## 14AP06-1

## An Analysis of Perioperative Anesthetic Adverse Events in Thailand (PAAd THAI): allergic reaction/ anaphylaxis

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**Background and Goal of Study**: Perioperative anaphylaxis is an uncommon events and difficult to diagnose. Clinical symptoms range from mild with skin lesion only to serious life threatening condition.

Materials and Methods: A retrospective descriptive study was conducted by using data from first 2,000 incident reports of Perioperative and Anesthetic Adverse Events in Thailand (PAAd Thai) study. Patient characteristic and detail of anaphylaxis including signs, symptoms, probable causes, treatment and immediate outcome were recorded. All data were reviewed by three experienced anesthesiologists. Descriptive statistics was used.

Results and Discussion: After reviewed, 70 incidents were identified as perioperative anaphylaxis. Anaphylaxis occurred more common in female. 98.5% were ASA I-III with mean age 42.64±2.46 years. 72.9% of events occurred during general anesthesia. By using clinical severity, patients were classified as grade I, II, III in 38, 4 and 28 patients respectively. Suspected causes were identified in 41 cases. The most common causes were antibiotic, blood component and colloid in 13, 9 and 6 cases respectively. Clinical manifestation of grade III were hypotension, rash or urticaria, bronchospasm, tachycardia and angioedema in 21, 18, 15, 11, 5 patients respectively. Only 19 from 28 patients in grade III got adrenaline treatment. All patients in grade I and II got complete recovery. In grade III Surgery was postponed 5 cases. 2 cases were admitted to ICU. After events only one patient received serologic test and skin test.

**Conclusion**: To improve outcome, guidelines for perioperative anaphylaxis management should be followed. After anaphylaxis event, proper investigation to identify definite cause should be done at proper time.

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## 15AP01-1

Results of a satisfaction survey after an Enhanced Recovery After Surgery (ERAS) protocol in colorectal elective surgery in patients over 70 years old in the University Hospital of Guadalajara, Spain: an observational study

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**Background and Goal of Study**: ERAS programs have been shown to reduce hospital stay, without increasing the rate of complications or readmissions 30 days after discharge, but there are few articles about the degree of patients' satisfaction. The aim of this study was to know the degree of satisfaction with an ERAS protocol in elective colorectal surgery in the elderly.

Materials and Methods: It is a cross sectional analytical study. The inclusion criteria were: elective colorectal surgery, 70 years or more, appropiate cognitive state and ASA I-II-III. The exclusion criteria were: urgent surgery and the existence of higher concomitant surgical processes. Our first 55 consecutive patients operated between May 2016 and January 2017 with these inclusion criteria were interviewed through telephone four days after discharge. The questionnaire survey used was validated and performed by the Workgroup of Guidelines of Enhanced Recovery for Abdominal Surgery of Spain (RICA guide) and it was published in 2014 by the Ministry of Health, Social Services and Equality of Spain. SPSS software (version 20.0 SPSS inc.) was used for statistical analysis. The results are presented as number of patients (%) and mean±standard deviation.

Results and Discussion: 26 (45.6%) patients were women and 31 (54.5%) were men. The average age was 80.1±5.4. 36 (63.2%) had no complications, according to Clavien Dindo classisification. The hospital length of stay was 10.1±3.9 (includes the day before surgery and the day of the surgery itself). 53 (96.4%) patients were very satisfied and 2 (3.6%) satisfied with the care and the treatment received by the health staff during their hospital admission. 55 (100%) would be reoperated following this protocol. 48 (87.3%) rated the level of competence and coordination of the medical team as very high. 44 (80%) considered that the information received in the preanesthesia and surgery consultation was very good, and they valued this consultation as one of the most positive aspect of the protocol. 36 (63.2%) did not have nausea of vomiting after the surgery and 48 (84.2%) rated their pain as VAS≤3 (minimun 0 and maximun 10).

Conclusion: Elderly patient operated on elective colorectal surgery according to an ERAS protocol are very satisfied with the assitance provided. Standarized surveys are needed to compare these results.

## 15AP01-2

## Hip fracture surgery for geriatric population-one year Bosnian university center expiriance

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Background and Goal of Study: Hip fractures is one of the most common injury in geriatric population. These elderly population often have many other medical problems associated with ageing, which places them at high risk of mortality after anesthesia. Annualy in Europe, hip fracture affects about 628000 patients, accounting for 200000 deaths (1). More than tree-quarters of the patients are older than 65 years (1). Goals of our retrospective analysis is to evaluate current perioperative outcome for hip surgery patients 65 years or older, in our tertiary hospital center

Materials and Methods: Retrospective data were colected from electronical medical records of ours patients with hip fractures treated in our hospital in period from december 2016 to december 2017. In these period it was 431 patient for hip surgery. Analisis included 303 patients, age 65 years or older. Results and statistics was performed by SOFA statistic(1.4.6)

**Results and Discussion**: Of 303 patients, mean age 78. GA recived n=99(32,71%) patients and n=204(67,3%) recived RA (spinal anesthesia). Surgery was performed after admission to hospital in first 24h n=77; 48h n=95; 72h n=42; over 72h n=87. According to ANOVA statistics there were statistical significances(p<0,01) that early surgery means less hospital stay, earlier transfer in rehabilitation center. The mean length of stay was 7,67 days, in GA group 8,49 vs. 7,36 in RA group (p=0,02).

30 day mortality were n=31(10,3%) totaly, but there is no statistical significances by anaesthesia type(p=0,25). Mean age among dead patients was 82 years. According to anaesthesia group less mortality were in RA group (n=18, 8,9%) vs. (n=12, 12,5%) in GA group. Average doses of transfused red blood cells in GA group were 2,62 vs. 2,22 in RA group.

**Conclusion**: Our analysis show that we use more RA for geriatric patients, older than 65 years for hip fracture surgery. In geriatric populations in our center with hip fracture, the use of RA compared with GA was not associated with lower mortality, but was assotiated with a shorter length of stay. Early surgery lead to early rehabilitation.

### References:

1. M.Coburn, R.Sanders, M.Neuman et al. We may have improved but must get better still, The never-ending story of the eldery with fractured neck of femur. Eur J Anaesthesiol 2017; 34:115-117

## 15AP01-3

Femoral and femoral cutaneous ultrasound guided nerve block as an anesthesic technique for hip fracture, intertrochanteric and non-displaced subcapital fractures: review of 10 cases

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Background: Hip fractures are typically seen in elder patients with high-risk surgery and multiple co-morbilities as coagulopaty, head and brain trauma or respiratory infections. Those patients would benefit from alternative anesthetic techniques like femoral with femoral cutaneous ultrasound (US)-guided nerve block in intertrochanteric femoral fractures and non-displaced subcapital fractures, where cannulated nail are used, not being as beneficial in other types of fractures such as displaced subcapital ones where a hip replacement is needed.

Materials and Methods: The records of 10 patients who had undergone surgery due to an intertrochanteric femoral fracture or a non-displaced subcapital fracture performed with a femoral and femoral cutaneous US-guided nerve block were evaluated. We reviewed the main demographic characteristics, indications, cogulation, and outcomes of this anesthesic technique.

Results: Among the ten patients the average age was 87 years old, there where no difference between male and female, 5 patients each. Eight patients had a intertochanteric femoral fracture and two a non-displaced subcapital fracture, all of them treated with cannulated nail. Six of them were classified in the ASA physical status classification system as ASA II and three of them as ASA IV, only one was ASA II. Coagulopaty was seen in 3 of them with an INR above 1.4, and two patients were anticoagulated with new anticoagulants that couldn't be suspended before the surgery because of the lack of time. Seven patients undergone sedation during the procedure and there were no conversion into general anesthesia nor technical complications after the US quided nerve block.

**Conclusion**: We conclude that US-guided femoral and femoral cutaneous nerve block is a safe and easy procedure than can be performed in patients with high-risk surgery were neuroaxial or general anesthesia have more associated co-morbilities.

## 15AP01-4

## Femoral neck fracture urgent surgery - Prevalence of delirium and risk factors in our population

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Background: Delirium is a frequent complication in patients hospitalized with femoral neck fracture, with a prevalence of 13-70%. Its occurrence is associated with increased morbidity and mortality. Several risk factors have been associated with the occurrence of delirium in patients hospitalized for femoral neck fracture, some of these considered modifiable. The aim of this study is to assess the prevalence of delirium in patients with femoral neck fracture (FNF) undergoing reduction and osteosynthesis (RO), and to identify risk factors.

**Methods**: Observational, retrospective study of patients with FNF undergoing RO surgery alone, during the year 2016, in a tertiary university hospital. The presence of delirium was considered whenever documented at clinical process: acute cognitive dysfunction and/or psychomotor agitation. Demographic variables, autonomy, institutionalization and previous dementia, treatment with psychoactive drugs, creatinine and pre-operative albumin, and days of hospitalization until surgery were assessed as factors associated with the occurrence of delirium. Univariate analysis with chi-square test was performed to identify risk factors. Subsequently, a multivariate analysis was performed using binary logistic regression. Statistical significance was assumed for p < 0.05

**Results and discussion:** We included 134 patients, mean age 83.46 ( $\pm$ ) years, 97 (72%) female. 72 (53.5%) of the patients presented delirium in the perioperative period. Age (OR: 1.08, 95% CI 1.03-1.12, p=0.001), presence of previous dependence (OR: 11.73; 95% CI: 5.12-26.87; p <0.001); (OR: 3.18, 95% CI, 1.17-

 $8.64,\,p=0.002),$  dementia (OR:  $40.50,\,95\%$  CI:  $5.30\text{-}309.57,\,p<0.001)$  and use of psychoactive drugs (OR:  $4.02,\,95\%$  CI  $1.88\text{-}8.60,\,p<0.001)$  were associated with a higher probability of delirium. In the multivariate analysis, prior dependence (OR:  $7.33,\,95\%$  CI:  $2.41\text{-}2.27,\,p<0.001)$  and dementia (OR:  $29.59,\,95\%$  CI,  $3.36\text{-}260.45,\,p<0.001)$  are independently associated with the occurrence of delirium.

Conclusion: In our cohort 53.5% of the patients with FNF undergoing RO developed delirium. The presence of previous dependence and dementia appear to be independently associated with the occurrence of delirium in this subgroup of patients. The identification of these risk factors may lead to preventive attitudes.

## 15AP01-5

## Early mortality in hip fracture: what does it matters?

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Background and Goal of Study: The effect of preoperative wait time on mortality is a long-standing subject of debate. The main purpose of this study was to determine whether a delay in surgery for hip fracture, as for other clinical factors, affects inhosoital mortality.

**Materials and Methods**: We conducted a retrospective, observational study of all patients who underwent surgical treatment of a hip fracture during one year. Data was acquired from hospital records. Logistic analyses were runned using SPSS version 23.00 for a p <0,05 to statistically significant differences.

Results and Discussion: A total of 372 patients were included in this study. The majority was female (n=289; 78%), and the median age was 81 years old [21;99]. Most were classified as ASA III (51%) and ASA II (40%). The type of fracture was classified as intracapsular fracture (n=137; 37%) or extracapsular fracture (n=235; 63%), and type of surgery was classified as internal fixation (n=303; 82%) or hip replacement (n=69; 18%). The mean wait time for surgery was 49 hours. Half of patients waited more than 48 hours for surgery, and 80% waited for more than 24hours for surgery within 24 hours had an in-hospital mortality rate of 5,4%, against a rate of 5,0% in those patients who experience a delay of more than 24 hours. This was not a statistically significant difference (p=0,869), as well as for those who were operated on within 12 hours (5,0%) against those who experience a delay of more than 12 hours (6,9%, p=0,649). In multivariate analysis, only increased ASA score (p=0,018) and having a fracture treated with an arthroplasty procedure (p=0,028) were statistically significant predictors of postoperative mortality.

Conclusion: Despite we don't found any correlation between time for surgery and in-hospital mortality, our results demonstrate that more invasive surgery (hip replacement) was a strong independent factor for in-hospital mortality. Therefore, surgical approach should be a multidisciplinary decision, involving the anesthesiology and the orthopedic teams, and be grounded on patient's clinical state, not only the type of fracture.

## 15AP01-6

## Risk factors affecting hospital length of stay after hip fracture

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Background and Goal of Study: Hip fractures are associated with a profound impairment of independence and quality of life. As the elderly population increases, the number of hip fractures, globally, is expected to exceed 7-21 million annually over the next 40-50 years. Prolonged length of stay (LOS) is an important outcome as a marker of resource consumption and delivery care. The main purpose of this study was to identify factors associated with increased hospital length of stay (LOS) in patients with hip fractures

Materials and Methods: We conducted a retrospective, observational study of all patients who underwent surgical treatment of a hip fracture during one year. The outcome, prolonged LOS, was defined as a LOS greater than or equal to the 75th percentile (in days). Data was acquired from hospital records, namely demographic data, American Society of Anesthesiologists (ASA) physical status classification, type of fracture, time for surgery, type of surgery and length of stay. We ran a logistic regression analysis with SPSS version 23.0Å' for a p <0,05 to statistically significant differences.

Results and Discussion: A total of 372 patients with the diagnosis of hip fracture submitted to surgery were included in this study. The majority was female (n=289; 78%), and the median age was 81 years old [21;99]. Most were classified as ASA III (51%) and ASA II (40%). The type of fracture was classified as intracapsular fracture (n=137; 37%) or extracapsular fracture (n=235; 63%), and type of surgery was classified as internal fixation (n=303; 82%) or hip replacement (n=69; 18%). The mean wait time for surgery was 49 hours. The median LOS was 8 days. One fourth of patients (n=93) had a prolonged LOS. After logistic regression analysis, only age was associated with increasing LOS (Odds ratio =1.037; 95% confidence interval = 1.010-10.064; p=0.006). Å Gender, ASA score, type of fracture, type of surgery and waiting time for surgery were not associated to an increased LOS.

Conclusion: After hip fracture surgery, age was the only factor associated to an increased hospital length of stay. This strong correlation might indicate a special need in elderly orthopedic trauma patients. Therefore, an interdisciplinary approach, including geriatric expertise, might be essential to help hip fracture patients recover faster and regain their mobility earlier.

## 15AP01-7

Does dementia contribute significantly to the mortality rate of patients with fracture neck of femurs?—A retrospective study

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Background and Goal of Study: Patients with pre-existing dementia are more susceptible to hip fracture due to various risk factors such as age, decreased activity leading to sarcopenia and osteoporosis, Vitamin D deficiency and presence of Apolipoprotein gene. Accoding to the latest National Hip Fracture Dabase (NHFD,UK),the mortality associated with neck of femur fractures is thought to be 6.7% and at one year is 27 to 40%.

The aim of this study is to asssess the mortality of patients with dementia and neck of femur fracture (NOF) at 28 days.4 months and one year after surgery.

Materials and Methods: A retrospective study of 184 patients admitted with NOF and had dementia from April 2014 to August 2016 were carried out. The patient demographics, AMT score, pre-operative co-morbidities, ASA grade, mortality at 28 days,4 months nad one year were analysed.

Results and Discussion: Out of 1007 admitted 184 patients wer found to have pre fracture dementis. The mean age was 87 years (Range 64-101). There were 42 males and 142 females.99 patients(53.8%) had Alzheimers disease, 50 patients (27%) had vascular dementia and 36 patients (19.2%) had other types of dementia. The average AMT score was 0.066(normal range 0-10).The total no. of patients died was 114(62%).The overall mortality at 28 days was 24%(P=0.001),at 4 months was 46% and on eyear was 62%(p=0.001).In 90 patients(49%) who had only dementia and no other co-morbidities(ASA grade1-2)the mortality at 28 days was 20%(p=0.0051),4 months was 40% and at one year 61%(p=0.0001).

Conclusion: Our study shows that whether the patient has a lower ASA grade (ASA≤2) or a higher grade (ASA≤3) the mortality rate in patients with NOF and dementis is significantly higher than predicted. Hence dementia has to be a principal predictive factor in mortality of NOF and should be a key determinant in all frality scores

## 15AP01-8

Postoperative delirium as a predictor of 90-day hospital readmission in elderly patients undergoing femoral neck fracture reduction and osteosynthesis

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Background and Goal of Study: Femoral neck fractures (FNF) are an important cause of hospitalization in elderly population. Delirium is a major complication in this subgroup and its occurrence has been associated with poorer outcomes. We aim to study if postoperative delirium is associated with 90-day hospital readmission after FNF reduction and osteosynthesis (RO).

Materials and Methods: Observational retrospective study of patient with FNF

undergoing RO surgery, during the year 2016, in a tertiary university hospital. The presence of delirium was defined by description of acute cognitive dysfunction and/ or psychomotor agitation in patients' medical records. Demographic variables, nursing home prior to admission, dementia and other comorbidities were collected. 90-day hospital readmission was considered for any cause of hospitalization. After univariate analysis, logistic regression was used, adjusted for multiple confounders. **Results**: 134 patients were included with a mean age 83.46 (± 9.73) years of age, 97 (72.4%) were women. 72 (53.5%) of the patients presented delirium in the perioperative period and 35 (26.1%) were readmitted at 90 days. In a univariate analyses postoperative delirium was associated with 90-day hospital readmission (OR 3.17; 95% CI 1.33–7.57; p=0.009). In a logistic regression adjusted for age, sex, nursing home prior to admission, diabetes and heart failure we found the same association (OR: 3.39; 95% CI 1.26 –9.08; p=0.015).

**Conclusion**: In our cohort of patients undergoing femoral neck fracture reduction and osteosynthesis postoperative delirium is associated with 90-day hospital readmission.

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### 15AP01-9

## Tachycardia-bradycardia syndrome in a patient undergoing pertrochanteric fracture repair under spinal anesthesia

Naumovski F.¹, Kartalov A.², Kuzmanovska B.³, Shosholcheva M.⁴, Dimitrovski A.¹, Toleska M.⁵. <sup>Case report</sup>

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**Background**: Sick sinus syndrome (SSS) is an abnormality of a cardiac impulse formation as a result of sinus node dysfunction that could be presented as a diverse heart rate and rhythm abnormalities. SSS is most common in the elderly. In most of the cases the etiology of the SSS remains unknown but the majority of the patients are experiencing some stage of coronary artery disease (1).

Case Report: We present a 89 years old female patient undergoing pertrochanteric fracture repair under spinal anesthesia. Her preoperative evaluation did not reveal any pathologic findings. All vital signs were stable prior to surgery. The patient received 2.4 ml of Bupivacaine 0.5% and 10 mcg of Fentanyl. Dural puncture was done in an aseptic technicque at the L3-L4 level and clear liquor was seen prior to anesthetic application. The first hour of surgery went uneventful after what abrupt onset of tachycardia of 109 bpm followed by bradycardia of 48 bpm were seen. The episodes of tachycardia followed with bradycardia were repeating till the patient entered a bigeminy rythm with the lowest hearth rate of 45 after what 0.5mg of atropine was given and restoration of normal sinus rhythm was seen. The patient was monitored postoperatively in PACU and followed up at the Traumatology ward while there were not seen any vital signs deterioration.

**Discussion**: We've researched PubMed from 1994-2017 and we've found 8 case reports of patients undergoing general anesthesia, one undergoing general and epidural anesthesia and one under spinal anesthesia. Eight of 10 patients were previously healthy without known cardiac disease and one with peripheral artery disease. Different types of conduction and heart rate abnormalities, including asystole, were seen in all of the cases after induction of the patients under anesthesia. In our case during the surgery the patient developed multiple episodes of tachycardia followed with bradycardia without subjective discomfort. The resolution of the tachycardia-bradycardia syndrome after giving the 0.5mg of atropine shows a possible relationship between the local anesthetic application and the onset of the SSS manifestation.

## References:

1. Brignole M1.; Sick sinus syndrome.; Clin Geriatr Med. 2002 May;18(2):211-27 **Learning points**: SSS can be precipitated perioperatively because of increased vagal tone caused by anesthesia or surgical intervention. As general anesthetics, local anesthetics also could trigger intraoperative manifestation of SSS.

## 15AP01-10

## Morbidity and mortality after urgent hip fracture surgery – analysis of our environment

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Background and Goal of Study: Hip fractures represent one of the most important causes of morbidity and mortality in elderly people. It is estimated that there were 1.66 million hip fractures worldwide in 1990, projected to be more than 6 million by the year 2050. Understanding the incidence of morbidity and mortality following hip fracture is essential to measuring elderly health and the value of improvements in health care. The aim of this study was to analyze the risk factors for morbidity and mortality.

**Materials and Methods**: We retrospectively analyzed 134 femoral neck fracture patients, admitted from January and December of 2016, who underwent urgent primary surgery. The primary outcome was mortality at 30-day and 90-day and the secondary outcomes were complications during admission.

Results and Discussion: 30-day mortality was 7,5% (10 patients) and 90-day mortality was 9,2% (12 patients). Postoperative morbidity was seen in 61 patients (45.5%). The factors associated with mortality were determined as preoperative serum albumin level, the presence of chronic obstructive lung disease, a high American Society of Anesthesiologist (ASA) score, postoperative hospital length of stay, postoperative gastrointestinal morbidity and immobilization (p < 0.05). Factors associated with increased postoperative morbidity included nursing home patients (OR 2.8), preoperative creatinine clearance (OR 8.55) and hemoglobin, intraoperative complications (OR 2.93) and minimum heart rate, postoperative creatinine clearance and hemoglobin, immobilization (OR 0.303), postoperative hospital length of stay and pre- and postoperative creatinine clearance variation (p < 0.05). In addition, the timing of surgery did not have a significant effect on 30-day mortality, 90-day mortality or complications arising during hospitalization (p > 0.05).

Conclusion: Early preoperative optimization of medical condition of patients with hip fracture before undergoing surgery is recommended. Identification of patient and perioperative factors can guide changes in best practice to decrease morbidity and mortality following a femoral neck fracture. There is a need for further studies concerning survival analysis to understand mortality rates in these patients.

## 15AP02-1

# Preoperative cognitive assessment: development of a self-administered screening tool and normative data for an elderly population

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**Background:** Postoperative delirium (POD) is a considerable complication of surgery, especially in elderly patients, and preventive measures are best targeted at high-risk populations. Clinical risk stratification tools are not routinely used in the preoperative setting, as their implication in anesthesiologic practice is time- and resource-intensive. We developed a self-administered screening tool to evaluate the individual risk for POD using a tablet computer application. The present study was aimed to provide normative data for this application.

Design: Prospective cohort study.

Setting: University hospital.

Participants: Healthy nonsurgical volunteers aged ≥65 years.

Methods: After providing written informed consent and completing a medical questionnaire, each participant was assessed by the tablet computer application, Mini-Mental State Examination (MMSE), Geriatric Depression Scale (GDS), and the Consortium to Establish a Registry for Alzheimer's Disease-Neuropsychological Assessment Battery (CERAD-NAB). Primary outcome was the performance in the studied tablet computer application. The application comprises 15 question items and 7 cognitive tasks. Regression models were built for each endpoint with the covariates age, gender, and education. Demographically-corrected standard scores were computed for each endpoint.

**Results:** Three hundred and thirty-four participants were included in the study from December 2016 to April 2017; 283 subjects were included in the final analysis. Mean participant age was  $73.8 \pm 5.2$  years (range: 65–91 years), gender ratio was 128/155 (male/female), and the average level of education was  $13.6 \pm 2.9$  years (range: 7–20 years). Mean MMSE score was  $29.2 \pm 0.9$  points, mean GDS score was  $0.4 \pm 0.7$  points, and the mean CERAD-NAB total score was  $98.7 \pm 5.7$  points. The average time necessary to complete the test application was 22 minutes.

**Conclusions:** Our study provides normative data for the tablet computer application designed to preoperatively evaluate the individual risk for POD. Subsequently, the tool will be validated for use in clinical practice.

## 15AP02-2

## Comparison of neostigmine and sugammadex following desflurane and total intravenous anesthesia in the elderly

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**Background and Goal of Study**: The aim of this study is to compare the effects of neostigmine and sugammadex on recovery from anesthesia and reversal of neuromuscular blockage following desflurane and TIVA anesthesia applied to patients older than 65 years of age.

Materials and Methods: Eigthy ASA I-II patients older than 65 years of age, undergoing elective surgery with general anesthesia were included in this study. Patients were randomly divided into four groups. Anesthesia maintenance was provided with total intravenous anesthesia (TIVA) in group I and II, and desflurane in group III and IV. Neuromuscular monitorisation was provided with acceleromyography displaying train-of-four (TOF) count. Reversal of neuromuscular blockage was achieved with sugammadex (2mg/kg) in group I and III, and neostigmine in group II and IV at the reappearance of T2. All patients are also monitorized with bispectral index (BIS). The concentrations of anesthetic agents were adjusted to be BIS value between 40-60. At the end of the surgery, duration of TOF ratio from 2 to 90, spontaneous respiration time, extubation time, duration of modified alderete score (MAS) ≥9 was recorded for all patients. BIS values after the extubation were also recorded.

Results and Discussion: The time of T2 to T90 was obviously short in groups using sugammadex (159sec), regardless of the type of anesthesia. There was no difference between the groups at the time of return of spontaneous respiration and also extubation time except for between the TIVA+neostigmine and desflurane+neostigmine groups. In TIVA groups, the time to evaluate the MAS ≥9 was found to be shorter than the other groups. Similarly, BIS values were higher at the spontaneous respiration and extubation time in TIVA groups.

**Conclusion**: It is concluded that the time to reverse neuromuscular blockade with 2mg/kg sugammadex was significantly faster than neostigmine when they were used for decurarisation after general anesthesia with desflurane or TIVA in elderly, independent of the type of anesthesia. Additionally, postanesthetic recovery was more rapid in TIVA anesthesia compared with desflurane regardless of the type of recurarisation.

### 15AP02-3

## Preoperative disability and outcome of elderly patients after elective surgery

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Background and Goal of Study: Disability is defined by the World Health Organization (WHO) as difficulties in any area of functioning as they relate to environmental and personal factors. The aim of this study was to evaluate the influence of preoperative disability on the recovery of elderly patients after elective surgery.

Materials and Methods: After approval by the institutional ethics committee, an observational prospective study was conducted. Patients aged > 60 years, submitted to elective surgery were included. The WHO Disability Assessment Schedule (WHODAS) was evaluated before surgery (T0), 30 days (T30) and 3 months (T90) after surgery to assess disability considered to be present (DP) when the score was 3 25%. Clinical Fraitly Scale evaluated vulnerability at T0 and T30. Quality of Recovery was evaluated with QoR-15 before (T0) and 24h (T1) after surgery. The Health-related Quality of Life (EQ-5D) was used to measure health-related quality of life (QOL) at T0 and T90. Poor Quality of Life (PQL) was defined as having problems in any of the 5 dimensions of EQ-5D. Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) was also evaluated. The Chi-square, Fischer's exact or Mann-Whitney U tests were used for comparisons.

**Results and Discussion**: Of a total of 235 patients, 82 (35%) were DP. They had more frequently frailty at T0 (84% vs 16%, p<0.001) and T90 (65%vs 11%, p<0.001). They reported more problems at EQ-5D dimensions: mobility (89% vs 32%, p<0.001), self-care (71%vs. 14%, p<0.001), usual activities (85% vs. 22%, p<0.001), pain (84% vs. 37%, p<0.001), and anxiety (89%vs. 65%, p<0.001). DP had lower total median QoR-15 at T0 (107 vs. 135, p<0.001) and T1 (100 vs. 116, p<0.001). Median hospital length of stay was higher in DP (8 vs 4, p<0.001). DP had higher risk of morbidity (37% vs 28%, p=0.022) and higher risk of mortality (7%vs 5%, p=0.026) according to POSSUM. PD presented higher rates of re-intervention at T30 and T90 (p=0.001 and p=0.013, respectively). Moreover, they had higher in-hospital mortality (6% vs. 1%, p=0.018) and overall mortality at T90 (9% vs 1%, p=0.008).

**Conclusion**: The incidence of disability was considerably high and more frequent among frail patients and in patients with problems in quality of life. They were at higher risk of mortality and morbidity. PD were also associated with poorer quality of recover, higher postoperative mortality and more surgical reinterventions.

## 15AP02-4

# Vasoplegic effects of general anesthetics (xenon, sevoflurane and isoflurane) in elderly patients during ophthalmic surgery

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**Background and Goal of Study:** In the conduct of general anesthesia cardiodepressant effects of anesthetics often have a critical effect on this contingent. We have considerable experience in conducting xenon anesthesia in ophthalmic operations. The aim of the study was to compare the course of anesthesia in patients older than 50 years with concomitant pathology under conditions of general anesthesia

**Materials and methods:** There was carried out a prospective comparative study during laryngeal mask combined anesthesia using xenon (group 1), n=27, sevoflurane (2), n=24 and isoflurane (3), n=23 in ophthalmic surgery. There were investigated: the indications of hemodynamics and oxygenation (the initial data, in 20, 40, 60 min), infusion volume and recovery time. Statistic study: descriptive analysis, U criterion Mann-Whitney.

**Results and discussion:** An average age of patients in Xe group was 65 (8), Sev - 58 (9), Iso - 59 (9) years, accompanying pathology, duration and character of the operations in the groups were comparable.

Researched clinical indicators, Mean (standard deviation)

	Stages	1 (Xe)	2 (Sev)	p <sub>(1-2)</sub> value	3 (Iso)	p <sub>(1-3)</sub> value
Mean arterial pressure (MAP), mm Hg	Initial data	106 (12)	104 (13)		99 (10)	
	20 min	103 (21)	73 (15)	0.001	61 (8)	0.0004
	40 min	100 (13)	67 (8)	0.001	64 (10)	0.001
	60 min	102 (14)	67 (9)	0.001	73 (6)	0.001
Total peripheral vascular resistance (TPR), dyn·s·cm <sup>-5</sup>	Initial data	1776 (476)	1988 (522)		1822 (584)	
	20 min	1735 (463)	1158 (501)	0.007	941 (360)	0.002
	40 min	1826 (723)	1230 (238)	0.01	932 (329)	0.01
	60 min	2014 (706)	1311 (175)	0.003	1188 (492)	0.03
IV infusion NaCl 0.9%, I		1.0 (0.4)	1.4 (0.5)	0.08	1.6 (0.4)	0.04

The initial data between the groups differed insignificantly. In 20 minutes of anesthesia, TPR does not change in the group 1 with xenon and significantly decreases in groups 2 and 3 - by 27 and 48%, respectively (p <0.05). To stabilize hemodynamics in groups of halogenated anesthetics, a relatively larger amount of infusion was required than in the xenon group, which is unsafe in elderly patients with cardiac pathology. The recovery time of consciousness in the group 1 was 5(1) min, in the group 2 - 17(2) min, group 3 - 18(3) min (p <0.01).

**Conclusion:** Xenon is an anesthetic of choice for general anesthesia in elderly patients with concomitant pathology in ophthalmic surgery. The course of anesthesia is characterized by stable hemodynamics, the recovery from anesthesia is quick and comfortable.

References:

1. Gupta A, Stierer T, Zukerman R et al. Anesth. Analg. 2004; 98:632-641

## 15AP02-6

## Ophthalmic surgical elderly patient access to health care

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**Background and Goal of Study**: Aging is an omnipresent reality in surgical population. Elderly's access to health care demands specific strategies towards their autonomy. Objective: Identify difficulties in access to health care of ophthalmic surgical elderly patients.

Materials and Methods: Prospective, descriptive/analytic study between July to October 2017. Sample: ophthalmic surgical patients with ≥65 years. Telephone interview. Work instruments: Six Item Cognitive Impairment Test (CIT), Geriatric Depression Scale (GDS), Hospital access questionnaire. Demographic variables: age, sex, residence, scholarship and family and domestic profile. Statistical analysis with SPSS, significant value with p<0,05.Excluded: urgencies, cognitive and communicative deficits.

Results and Discussion: From the initial 1195 patients, 773 did not answer the phone/wrong number. 24 were excluded for dementia/cognitive deficit (CIT>10). Final sample n=307, majority women 51,1%, average age 75 years, with basic scholarship, married, living together in rural residence. Clinical profile: 80,5% without GDS score suggestive of depression; 76,2% are happy, 86,3% glad with their life, 92,5% do not fell forsaken neither useless in 85,7%. 87,9% are autonomous in their roam. Regarding access there is an difficult (52,8%) and far (52,4%) parking lot, one small waiting room (61,9%) with few chairs (62,9%). Positively stands out the easiness in lift use (90,9%), the good route signalling (90,2%), health professional availability (84,7%) and quality and understanding of information given by those professionals (89,3%). Significant association between GDS and gender (p=0,009) and family profile (p<0,001); women said more often they had greater score of GDS and unhappiness with life. Patients with high DGS score had worse statistical significant answers relatively to health care professionals availability (p=0,022) and understanding of received information (p<0,001).

Conclusion: We identified limitative factors to health care access, mainly in proximity and installations. Generally, patients are pleased with availability and suitability of health services and information.

## 15AP02-7

## Postoperative Delirium in elderly patients

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**Background and Goal of Study**: Postoperative delirium (POD) is an unfortunately common complication seen during the postoperative course. The etiology of delirium is not yet fully understood and is probably multifactorial. Our study aimed to determine the incidence of POD and identify perioperative risk factors and related outcome.

Materials and Methods: After approval by the institutional ethics committee, we conducted an observational prospective study. Patients aged>60 submitted to elective surgery and admitted to Post Anaesthetic Care Unit (PACU) during May from July 2017 were included. Postoperative delirium was detected with the Nursing Delirium Screening Scale (NuDESC). Richmond Agitation Scale (RASS) was used at admission at PACU (T0) and 15 minutes later (T15). The burden of comorbidity was quantified using the Charlson Comorbidity Index. Quality of Recovery was evaluated using Quality of Recovery-15 (QoR-15) before (T0) and 24 hours (T24) after surgery. Data collection include comorbidities, patient's demographics, respiratory events at the PACU and other perioperative variables were recorded. The Chi-square, Fischer's exact or Mann-Whitney U tests were used for comparisons.

**Results and Discussion**: Of a total of 235 patients, 12.3% developed POD at PACU. POD had more frequently in older than 80 years old (p=0.017), patients with neurological disease (p=0.026), dementia (p=0.026), peripheral vascular disease

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(p=0.016) and diabetic disease (p=0.037). POD patients had higher Charlson Comorbidity Index Scores (p=0.004). The type of anesthesia was similar in POD patients when compared to others. At T0, there were no differences at median total QoR-15 while at T24 patients POD scored lower in ten items (including "severe pain" with p=0.001 and "nausea or vomiting" with p=0.009) of QoR-15 and in total median lower scores (p=0.001). Patients with POD had lower scores for RASS at T0 and T15 (p<0.001). The rate of respiratory complications at PACU was higher for POD patients (p=0.008). POD patients stayed longer at PACU (p=0.017) and they stayed longer at hospital (p=0.002) and at the longer stay hospital (p=0.002). Conclusion: Delirium was frequent in postoperative period. POD patients were older and had more comorbidities. POD patients had lower Qor scores at T24 suggesting an adverse impact in postoperative recovery and influencing a longer stay at the PACU and in the Hospital.

## 15AP02-8

## Efficacy of frailty to predict postoperative outcomes in geriatric patients: A meta-analysis

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Background and Goal of Study: Frailty is gaining more and more attention in this aging society. Many studies have investigated the correlation between frailty and post-operative (post-op) outcomes. Though most of these studies suggest that frailty is a risk factor of having poor post-op outcomes in geriatric patients, meta-analysis data in this regard remain lacking. We thus conducted this meta-analysis to elucidate further.

Materials and Methods: We searched Medline/PubMed and Embase (from inception until October, 2017) for studies comparing the post-op outcomes of frail and non-frail geriatric patients (denoted as the Frailty and the Non-frailty groups, respectively). We included both prospective and retrospective cohort studies using modified frailty index as the sole frailty measurement tool. The outcomes included post-op mortality, major complication (Clavien classification III/IV), discharge to a skilled or assisted-care facility and length of hospital stay (LOS).

Results and Discussion: A total of 141 titles were obtained from our search. After removing duplicates, screening the eligibility and full text, a total of 19 studies were included for data analysis. For post-op mortality, the meta-analysis showed that the risk of having post-op mortality of the Frailty group was significantly higher than the Non-frailty group (Odd's ratio [OR]=3.26, 95% confidence interval [95%CI]=2.41~4.41; P<0.001). For major complications, the meta-analysis revealed that the Frailty group also had a higher risk of having post-op major complications than the Non-frailty group (OR=2.73, 95%CI=2.19-3.41; P<0.001). The risk of discharge to a skilled or assisted-care facility of the Frailty group was significantly higher than the Non-frailty group, too (OR=2.82, 95%CI=1.70~4.69; P<0.001). Of note, LOS of these two groups were comparable (P=0.72).

**Conclusion**: This meta-analysis study confirmed that frailty, identified by modified frailty index, can predict post-op outcomes in geriatric patients.

## 15AP02-9

## Mild cognitive impairment in elderly surgical patients

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Background and Goal of Study: Cognitive impairment predominates in the older population and can have a negative impact on postoperative outcomes. The Montreal Cognitive Assessment (MoCA) has been well validated in the identification of vascular cognitive impairment, dementia, and mild cognitive impairment (MCI). Our study aimed to evaluate the incidence of in elderly surgical patients and its related outcome.

Materials and Methods: We conducted an observational prospective study after approval by the Institutional ethics committee. Patients aged >60 years, submitted to elective surgery from May to July 2017 were included. Data collection included comorbidities and medication. The physiological and operative severity score for the enumeration of mortality and morbidity score (POSSUM) was used to determine operative morbidity and mortality risk. The Quality of Recovery 15-item (QoR-15) was calculated before surgery (T0) and 24 hours after surgery (T1). WHODAS score was used to assess disability T0 and 1month after surgery (M1). The Lawton Instrumental Activities of Daily Living scale (IADL) was used to assess independent living skills. The Health-related Quality of Life (EQ-5D) measure health-related quality of life at 3months follow-up (M3). MoCa was applied before surgery, patients who scored <26 were considered to have MCI. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparison.

**Results and Discussion:** A total of 235 patients were included. The incidence of

MCI was 75%. These patients were older (median age 72 vs. 65, p<0.001) had more frequently history of hypertension(p=0.037), diabetes(p=0.005), peripheral vascular disease(p=0.019), cerebrovascular disease (p=0.006), congestive heart failure(p=0.033) and ischaemic heart disease(p=0.026). MCI patients had a higher median total QoR-15 at T0 (p=0.009) but at T1 the total score was similar. MIC patients had higher median scores of Charlson Comorbidity Index(p=0,006), WHODAS at T0 (p<0,001) and at M1(p<0,001), Lawton at T0(p<0,001) and M1(p<0,001). MCI patients had more problems at all EQ-5D dimensions at T1 and M3(p<0,001). According to POSSUM, these patients had similar risks of morbidity and mortality.

**Conclusions:** MCI was common among old patients scheduled for surgery. Patients with MCI were older, had worst health status prior surgery, more comorbidities, more disability, worse quality of life and more dependency before and after surgery.

## 15AP03-1

Inspection - Guadalajara (Spain)

Enhanced Recovery After Surgery (ERAS) care after elective colorectal surgery in elderly patients. Outcomes of a study in the University Hospital of Guadalajara, Spain

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**Goal of Study**: ERAS programs have proven to reduce morbidity and hospital length of stay (LOS) in colorectal surgery. However, the feasibility of these programs in elderly patients has been questioned. The aim of this study is to assess the implementation of an ERAS program in elderly patients based on LOS, readmission rates and postoperative Clavien-Dindo complications.

Materials: A total of 123 patients were included. We compared the first 57 consecutive patients that participated in the ERAS group (from May 2016 to January 2017) with 66 consecutive patients (preERAS group) that were operated prior to implementation of the program (from January to December 2015). The inclusion criteria were: elective colorectal surgery, ≥70 years old, appropiate cognitive state and ASA I-II-III. The exclusion criteria were: urgent surgery and existence of higher concomitant surgical processes. All variable data were descriptively analyzed via SPSS version 20.0. The results are presented as number of patients (%) (ERAS group versus preERAS group) or mean±standard deviation. Chi-square, Fisher exact test and t Student test were applied as appropiate. Results were considered statistically significant when p value 0.05.

Results: The two groups were homogeneous. No statistically significant differences were found in terms of age, sex, ASA, diagnosis, TNM stage in colorectal cancer, preoperative hemoglobin, length of surgery... The average compliance with the ERAS protocol was 74.7%. The ERAS program decreased LOS (10.1±3.9 in the ERAS group versus 12.2±4.6, p 0.009 in the preERAS group), but not the 30-days readmission rates (5 (8.8%) in the ERAS group versus 6 (9.1%) in the preERAS group, p 0.951) or the number of postoperative complications (21 (36.8%) vs 29 (43.9%), p 0.42) or the rate or reinterventions (4 (7%) vs 8 (12.1%), p 0.341). ERAS improved secondary variables in a statistically significant way: more laparoscopic surgery (20 (35.1%) vs 10 (15.2%), p 0.010); lower admnistration of fluid therapy (cristalloids and colloids) during the intraoperative period (p<0.001); greater use of regional analgesia in the intraoperative period (p<0.001); more rapid adherence to ambulation (p<0.001), a faster onset of oral liquid diet (p<0.001) and lower requeriments of opioids in the postoperative period (p<0.001).

**Conclusion**: ERAS after elective colorectal surgery in elderly patients present as safe as feasible. It shortened LOS without increasing 30-days readmission rates.

## 15AP03-2

## Elderly empowerment in ophthalmic surgery: Informed consent and shared decision

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Background and Goal of Study: Ignorance, illiteracy, high age are obstacles for a proper decision based in principles that respect individual values and independence. The purpose of the study is analyse elderly empowerment in their decision making process and find if the informed consent was applied in a participatory manner.

Materials and Methods: Prospective study, between July and November 2017, of surgical ophthalmic patients with ≥65 years. Telephone interview. Work instruments: Six Item Cognitive Impairment Test (CIT), Geriatric Depression Scale (GDS), Degner Scale, Questionnaire about decision making involvement. Demographic variables: age, sex, residence, scholarship and family and domestic profile. Statistical analysis with SPSS, significant value with p<0,05. Excluded: urgencies, cognitive and communicative deficits.

Results and Discussion: From the initial 1195 patients, 773 didn't answer the phone/wrong number. 24 were excluded for dementia/cognitive deficit (CIT>10). Final sample 307. Most were women 51%, with average age of 75 years, basic education 70,4%, married 78,8%, rural residence 63,2%. Clinical profile: Chronic disease 80,5%, GDS<5 80,5%.

Participation profile: Likes to participate 45,9%; feels that participating improves motivation 34,2% and therapeutic success 19,5%; never had motivation to participate from his doctor 23,8% and family show support in 45,6%.

Regarding decision making 53,1% prefers leave all decisions for doctor. Depressed patients were the ones who most answered that they would never like to participate in decision making process (p<0,001) and were who lesser understand the information received (p<0,001).

Patients with low scholarship (p<0,001), widowers (p=0,006) and rural residence (p<0,001) prefer leave all decisions to doctor. Depressed patients have a tendency to like that doctors decide after hearing their opinion (p=0,09; AR 3,1).

There were no significant association between decision making, gender and previous disease.

Conclusion: High age, prevalent chronic disease, few patients with cognitive deficit and depression. Most of them would like to participate in their treatment decision due to improved satisfaction, motivation and better chance of a successful treatment. Unlike expected, these same patients rather like to leave all decisions to health professionals.

## 15AP03-3

## Surgical Morbidity and Quality of Life

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Background and Goal of Study: POSSUM score is a validated instrument, based on Physiological and Operative Severity characteristics, used to predict morbidity. We aim to study the influence of POSSUM score in quality of life in elderly surgical patients.

Materials and Methods: After study approval by ethics committee, an observational prospective study was conducted. Patients submitted to elective orthopedic, gynecologic, urologic, vascular, plastic, and general surgery, from May to July 2017 were included. Exclusion criteria: age <60 years old; inability to give informed consent; emergency/urgency surgery, inability to understand Portuguese; patients admitted in the ICU after surgery. Patients' demographics and perioperative data were collected. The physiological and operative severity score for the enumeration of mortality and morbidity score (POSSUM) was used to determine operative morbidity risk and to consider patients having a Possum score ≥26 as patients with a high POSSUM (PHP). Quality of life was accessed by EuroQOL 5 dimensions (EQ-5D) preoperatively (T0) and at 3 months (M3) after surgery. Charlson score was used to assess comorbidities. Patients were classified frail if they have a score ≥5 in Clinical Frailty Scale. Chi-square, Fisher's exact or Mann-Whitney tests were used for comparisons.

**Results and Discussion**: We included 229 patients. Median age was 69 years old, 58% were ASA I/ II and 42% ASA III/IV. Frailty was present in 53 patients (23%). Median Charlson score was 6. Median POSSUM score was 26. Patients PHP were older (median age 71 vs. 68, p=0.008), more frequently were ASA III/IV (p=0.001) and had higher median Charlson scores (7 vs. 5, p=0.006). PHP presented more problems in EQ-5D dimensions at T0 (mobility: 59% vs 41%, p=0.008; care: 41% vs. 25%, p=0.013; activity: 52% vs. 32%, p=0.002; pain: 59% vs. 45%, p=0.041) but not anxiety (p=0.137). At M3, PHP patients presented more problems in mobility: 63% vs. 38%, p<0.001; care: 48% vs. 31%, p=0.009; activity: 58% vs. 44%, p=0.036; pain 59% vs. 37%, p=0.001 and anxiety: 54% vs. 50%, p=0.025.

**Conclusion**: Patients PHP had poor quality of life before and after surgery. PHP patients presented to surgery with more comorbidities and more risk of morbidity and mortality.

## 15AP03-4

## Clinical characteristics and outcomes of the oldest old surgical critical patient

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Background and Goal of Study: According to some studies, the elderly population might be subclassified in three classes: young elderly 65-75 years, older elderly 75-85 years, very elderly >85 years. The percentage of very elderly patients has been rising in the last years, as well as the number of surgeries performed in this population. Therefore, there's also been an increase of the mean age of patients admitted in the Surgical Intensive Care Unit (SICU). The primary goal of the study was to compare surgical outcomes evaluating the impact of age and functional status on SICU admitted patients.

Materials and Methods: After study approval by the institutional ethics committee

an observational retrospective study was conducted. Patients submitted to non-cardiac, non-neurologic elective and emergency surgery admitted at SICU (from Jan 2006 to July 2013) were included. Exclusion criteria: age <65 years old; length of stay <12h; patients readmitted in the context of initial admission in the study period. The patients were divided into two groups: the very elderly group, aged >85 years (VEG), and those between 65 and 85 (OEG). Patient's demographics, intraoperative and postoperative data were collected. Descriptive analysis was performed and the MannWhitney U test, Fisher's exact test or Chi-square were used.

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Results and Discussion: In our study, the VEG represents 5% of a total of 2205 patients included. The VEG was associated with a higher prevalence of women (p<0.001). This group was more likely admitted in the SICU from non-elective surgery (p<0.001), had a higher prevalence of congestive heart disease (36% vs 21%, p<0.001), organ failure (25% vs 18%, p=0.048) and higher hospital and SICU mortality (9% vs 5%, p=0.006 and 14% vs 5%, p=0.026 respectively). In the VEG, the scores APACHE and SAPS II were higher (both p<0.001). Although there were no differences regarding prevalence of chronic renal failure (p=0.162), acute renal failure (p=0.149) or creatinine levels (p=0.288) there was higher levels of urea (p=0.004)

Conclusion: The very elderly population represents an important group of patients admitted in the operating room and consequently in the SICU. It's important to understand how they may differ from the other patients, to prevent further complications. In our study, it was identified a higher mortality rate, and a higher prevalence of organ failure. This increased mortality was confirmed by higher severity of disease scores.

## 15AP03-5

## Severe pain 24 hours after surgery in elderly patients

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**Background and Goal of Study:** Postoperative pain occurs at a high incidence with many patients reporting moderate to severe pain. Our study aimed to determine the incidence of severe pain after surgery in an elderly population, and to characterize and evaluate its related outcome.

Materials and Methods: We conducted an observational prospective study after approval by the Institutional ethics committee. Patients aged >60 years, submitted to elective surgery from May to July 2017 were included. Data collection included comorbidities and the perioperative use of drugs. The burden of comorbidity was quantified using the Charlson Comorbidity Index. The physiological and operative severity score for the enumeration of mortality and morbidity score (POSSUM) was used to determine operative morbidity and mortality risk. The Quality of Recovery 15-item (QoR-15) was calculated before surgery (T0) and 24 hours after surgery (T1). Patients reporting to have severe pain in QoR-15 were considered Patients With Severe Pain (PWP). The Health-related Quality of Life (EQ-5D) measure health-related quality of life at 3 months follow-up (M3). The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparison.

Results and Discussion: Of a total of 235 patients, 24% were PWP. These patients were more frequently women (68% vs 50%, p=0.017), had more frequently history of psychiatric disorders (23% vs 11%, p=0.024) and previous surgery on the same incision site (29% vs 15%, p=0.023). Neither POSSUM score (p=0.826), operative risk of mortality (p=0.846), morbidity (0.981) or Charlson score were different (p=0.808). PWP more frequently had tramadol at the PACU and had a more often use of tramadol (p=0.005) and benzodiazepines (p=0.032), in the first day after surgery. Rates of opiods use during surgery and at PACU were comparable to other patients. PWP had a higher median total QoR-15 at T0 (p=0.002) and at T1 (p<0.001). PWP have longer duration of surgery (p=0.007) and longer lengths of stay at the hospital (p=0.014). PWP had similar rate of problems at all EQ-5D dimensions at M3 including problems with pain (p=0.724).

**Conclusions:** The incidence of severe pain was considerably high after surgery. PWP have no more comorbidities and have similar risk for mortality and comorbidities. The use of tramadol and benzodiazepines after surgery was more frequent in PWP. PWP experienced a worse quality of recovery after surgery with longer lengths of hospital stay.

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## 15AP03-6

## Effects of type of general anaesthesia on markers of inflammatory response in elderly

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Background and Goal of Study: General anaesthesia may influence the inflammatory responses during the perioperative period. Dysregulation of the inflammatory process may provoke postoperative complications. An additional serious problem for anesthetists is the elderly patients and concomitant cardiovascular diseases. The incidence of inflammation in elderly is 20 to 30% [Nearman H. et al., 2014]. In 40% of patients promotes postoperative multiple organ dysfunction. Patients with a preoperative left ventricular ejection fraction <50% or >70% demonstrated a high incidence of cardiopulmonary complications following anaesthesia (70%) [Pedersen T]. The goal of our study was to examine and evaluate markers of Inflammatory Response in elderly with concomitant cardiovascular diseases after general anaesthesia such as intravenous versus volative one.

Materials and Methods: We examined 40 patients aged 60 to 82 years for abdominal surgery with total intravenous or volative anesthesia. There were representative of the gender, age, ASA, BMI, Euroscore and managed in accordance with ESC Guidelines (2014). TNF, IL-6, IL-10 in EDTA-plasma determined in elderly preoperatively, after anesthesia and to 5 days postanesthesia by enzyme immunoassay (set Biomedica). Data are presented as M±m, statistically

Results and Discussion: Preoperatively in both groops we did not observe any differences: the level of proinflammatory IL 6 exceeded the norm by 64,2%, TNF  $\alpha$  - on 61,5%, the level of anti-inflammatory IL 10 exceeded the norm by 58,4% (p<0,01). After anesthesia, the level of IL6 in the group with intravenous anesthesia was significantly higher than in patients with the group of inhaled anesthetics and increased near to 2651% (p = 0.002). The concentration of IL 10 not statistically different from the norm and output levels in both groups and was not found significant changes in the levels of TNF  $\alpha$ .

Conclusion: Elderly patients preoperative showed a non-specific activation of the inflammatory response with high level in pro-inflammatory and anti-inflammatory cytokines. After total intravenous anesthesia in elderly we detected the more intensive inflammatory activation than usage of inhalation one.

## 15AP03-7

## HADS in ophthalmic chirurgical patients: a population characterization

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Background and Goal of Study: See if Hospital Anxiety and Depression Scale (HADS) results are intertwine with the demographic characteristics of a portuguese ophthalmic surgical population

Materials and Methods: Prospective study, 135 ophthalmic surgical patients, 18 to 88 years, between august 2016 and February 2017.

Approved by hospital's Ethics Committee

Answers were taken after patient's formal consent in the immediate pre-operatory trough demographic data collection, verbal anxiety scale (VAS) with scores from 0 to 10 and HADS which has 14 questions, of which 7 evaluate anxiety and 7 depression. The sum of each of those 7 has a maximum score of 21. Raw scores were then interpreted according a cut-off value of 8, with below 8 being no anxiety/ no depression and above 8 anxious/depressed. Sample profile: gender, age, family, domestic and professional status, schooling,

residence, medical history, anxiety history, ASA (American Society of Anesthesia) and waiting time until surgery.

Patients from the emergency room, unable to communicate, with cognitive deficit and major psychiatry disease were excluded.

Statistical analysis with SPSS, significant value with p<0,05

Results and Discussion: Average age 67,8; men 54,1%; married 71,9%; Middle School 75.6%: Retired 66.7%: Rural residence 75.6%: Live together 82.2%: Anxiety history 53.3%; ASA II 76.3%; under 60 minutes waiting time 54.1%.

From the variables mentioned and tested, only professional occupation showed a statistically significant association with both anxiety and depression arms from

Conclusion: Sample's average age is high, most married, with middle school education, rural residence and retired. In this ophthalmic ambulatory unit waiting time after entry until surgery is less than 60 min.

The results are clear by establishing a strong connection between professional occupation and both anxiety and depression. It's more likely a patient being anxious and depressed if he's working, and is more likely a patient being not depressed if

Thereby assumptions regarding the connection between patient's personal information and the probability of anxiety and/or depression should be carefully inferred, as there may be no connection at all.

## 15AP03-8

Medicine for Care of Older People and Emergency Laparotomy: The Lessons and How We Can Improve Care?

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Background and Goal of Study: Patients undergoing emergency bowel surgery (laparotomy) have approximately an 11% mortlaiyt rate in England and Wales, but has been reported higher in some centres across Europe. Elderly patients have an even higher mortality rate at approximately 20% in England. A quality improvement project was run in four hospitals in the South of England to deliver prospective care for patients over the age of 70 undergoing emergency laparotomy using a similar model to orthogeriatrics.

Materials and Methods: Baseline data was collected initially on patients who were over the age of 70 and undergoing an emergency laparotomy for 6 months. Then, prospective care was delivered by a geriatrician to patients who came in requiring similar emergency bowel surgery. Data was recorded in each group incuding frailty scores, pain scores, and post-operative morbidity scores. Length of stay and in hospital mortality was recorded.

Interestingly the patients were followed up up to 6 months after discharge to record an EQ-5D-5L, a health status questionnaire, and the use of community services. Results and Discussion: Mortality was reduced but was not statistically significant. Length of stay was reduced especially the astronomical length of stays.

There was an increased use of allied health care professionals and use of intermediate rehabiliation hospitals for patients who were seen by geriatricians prospectively.

Using prospective geriatricians in the care of elderly surgical patients gives more holistic care to the patient and allows the patient to be discharged quicker out of an acute hospital. There is less 'crisis' management with on-call medical physicians reviewing patients on an ad-hoc basis.

Conclusion: Proactive care of the elderly physicians should be employed to offer care to emergency elderly general surgical patients who have a high risk of mortality and morbidity.

Acknowledgements: ELC Collaborators Group for elderly care

## 15AP03-9

## Quality of life in elderly patients 3 months after elective

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Introduction: Health-related quality of life have become valid indicator of intervention outcomes. The aim of this study was to evaluate quality of life in elderly patients 3 months after elective surgery (T90).

Materials and Methods: After approval by the institutional ethics committee, an observational prospective study was conducted. Patients aged >60 years, submitted to elective surgery were included. EQ-5D was used to measure quality of life before surgery (T0) and at T90. Poor Quality of Life (PQL) was defined as having problems in any of 5 dimensions of EQ-5D. The Clinical Frailty Scale was used and frailty was defined for score ≥5. The World Health Organization Disability Assessment Schedule (WHODAS) was evaluated at T0, 30 days (T30) and (T90) to assess disability. The Lawton Instrumental Activities of Daily Living scale (IADL) was used to assess independent living skills. Comorbidities were quantified using Charlson Comorbidity Index. Quality of Recovery was evaluated with the Quality of Recovery 15-item (QoR-15) at T0 and 24h (T1) after surgery. The physiological and operative severity score for the enumeration of mortality and morbidity score (POSSUM) was used to determine operative morbidity and mortality risk. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparison.

Results: Of a total of 233 patients, 177 (76%) presented PQL at T90. PQL patients (PQLP) reported worse EQ-VAS median values at T90 (65 vs. 80, p<0.001) and more preoperative problems at all EQ-5D dimensions at T0: mobility (p<0.001), selfcare (p<0.001), usual activities (p<0.001), pain (p<0.001) and anxiety (p<0.001). PQLP presented a higher median age (p<0.001) and ASA physical status (ASA III/IV) (p<0.001). They had more frequently preoperative chronic kidney disease (p=0.003), history of stroke (p=0.014) and smoking habits (p=0.025). These patients presented more frequently preoperative frailty (p<0.001) and disability (p<0.001), median lower Lawton scores (p<0.001) and higher Charlson media values (p<0.001). They had lower median total QoR-15 scores at T0 (123 vs. 138, p=0.008), but not at T1. According to POSSUM, these patients had similar risks of morbidity and mortality. Hospital length of stay was higher in PQL (p=0.048).

Conclusion: Our study showed a high incidence of PQL at T90 in elderly patients PQL patients were more frail and disable and had worse health status before surgery. At 3 months follow-up they still have poor quality of life.

## Education

## 16AP01-1

Can the Cookie monster guide you to pedagogic stardom? The effect of chocolate cookies on students' evaluation of teaching

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Background and Goal of Study: Results from students' end-of-course evaluations of teaching (SETs) are taken seriously by faculties and form part of a decisionbase for the recruitment of academics, distribution of funds or changes to students' curricula. However, there is some doubt as to whether these evaluation instruments accurately measure the quality of course content and the quality of knowledge transfer. We investigated whether a simple intervention, the provision of chocolate cookies, influences SET results.

Materials and Methods: In this prospective randomized controlled trial 118 undergraduate third year medical students were randomly allocated to 20 groups. During the first of four sessions of a curricular emergency course 10 groups were provided with 500gr of chocolate cookies and 10 groups did not. Afterwards, all students completed a 38-question evaluation sheet concerning the teacher, course contents, materials and self-assessment.

Results and Discussion: The cookie-group evaluated teachers as significantly better than the no-cookie group (114.0 [111.0; 117.0] vs 111.0 [102.3; 115.8], p= 0.003\*). Course material was considered better (21.5 [19.0; 24.0] vs 20.0 [17.3; 22.0], p=0.027\*) and summation scores evaluating the course overall were significantly higher in the cookie-group (225 [216; 233] vs 216 [203; 231], p= 0.011\*). Effect size according to Cohen was calculated to be medium. These findings fit in with previously described factors that are associated with better evaluation results, such as grading leniency, environmental factors or teacher attractiveness. Consequently, a higher student satisfaction does not necessarily correlate with a higher quality of

Conclusion: Provision of chocolate cookies had a significant effect on course evaluation. These findings question the validity of SETs when used to make widespread decisions within the faculty. On the upside, our findings may stimulate new ideas for teachers who seek to improve and control their SETs by manipulating food-related interventions.

## 16AP01-2

## Preoperative assessment of patients proposed for follicular puncture economic impact pre and post implementation of a quideline

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**Background and Goal of Study**: Performing routine screening tests in patients who are otherwise healthy is invariably of limited value in detecting diseases, changing the anesthetic management or the patient outcome, especially in low risk surgery The basis of the preoperative evaluation is a comprehensive history, a detailed physical examination, and selected laboratory and other tests. The purpose of this study was to verify if preoperative testing for assessment of patients proposed for in vitro fertilization followed the guideline of the department and the evaluation of its financial repercussion.

Materials and Methods: Retrospective study carried out during 6 months, before and after the implementation of a guideline on preoperative testing for assessment of patients proposed for follicular puncture at Reproductive Medicine Department. Results and Discussion: 342 follicular puncture were performed, 179 before and 163 after implementation of the guideline. Prior to its implementation, 100% of the patients underwent preoperative screening tests, compared to 11% thereafter (p<0,001). Although 16% of patients had abnormal results, no procedure was postponed or canceled

Conclusion: The protocol implementation at the Department allowed an annual costs reduction of 91% related to preoperative investigations. This study pretended to emphasize the importance of adoption of guidelines for a rational prescription of tests, improving preanesthetic evaluation and preventing waste of resource and time, without compromising quality of care

## 16AP01-3

## Burnout or not? Is Sudoku really that stressful?

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Background and Goal of Study: Considering anesthesiologists among other medical specialties, it is well-known that they have an increased risk of suffering from burnout syndrome. Unfortunately, burnout syndrome is often related to lower work performance, coronary artery disease and deteriorating overall mental health, all of which may seriously affect the patient's treatment. The aim of this paper is to compare possible burnout syndrome among Croatian anesthesiologists

Materials and Methods: This research involved 2568 doctors working in different fields of medicine including 177 anaesthesiologists. The Maslach Burnout Inventory (MBI) was used to measure burnout. MBI defines burnout as a three-dimensional syndrome via 22 questions; 9 question relate to emotional exhaustion (EE), 5 question relate to depersonalization (DP) and 8 question relate to diminished personal accomplishment (PA). Possible answers on the main scale ranged from 0=never to 6=every day. We created 3 subscales for every MBI dimension; EE subscale with severity index (SI) ranging from ≥27 for high, 27-16 for moderate and ≤16 for low. DP subscale with SI ≥13 for high, 13-6 for moderate and ≤6 for low and PA subscale with SI ≥39 for high, 39-31 for average and ≤31 for low.

Results and Discussion: All 2568 doctors had EE of 30%, DP of 8,75% and PA of 29,9%. 63% of anesthesiologist showed high EE, 57% exibited high PA and 46% had low DP. Emotional exhaustion is lowest when their career begins or ends. Depersonalization deteriorates over time whereas diminished personal accomplishment is constant throughout the working years. We also found positive correlation between DP total score and years of experience (r=-0.320, p<0.0001). A total of 55 (33%) were resident, 72 (42%) consultants and 44 (25%) subspecialist and we found statistical significant differences of DP score (p=0,026).

Conclusion: Anestesiologists are not trained to fail, which is connected to a sense of increased responsibility and perfectionism. Those factors trigger the burnout syndrome which often emerges when there is insufficient staff. Thus, fewer anesthesiologists must compensate, often by working overtime, for the lack of anesthesiologist on duty. Results show that prevention of burnout is highly necessary among Croatian anesthesiologists and it involves a range of measures, from changing the working conditions to taking care of employee's overall mental

## 16AP01-4

## Ultrasonographic assessment of cross-sectional area of internal jugular vein and relationship of internal jugular vein and carotid artery

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Background and Goal of Study: The internal jugular vein (IJV) for central venous access has been associated with a 6-9% rate of carotid artery (CA) punctures. Ultrasound studies suggest that maneuvers such as Valsalva, abdominal binder or Trendelenburg position alone or in combination, increase the cross-sectional area of the LIV whereas extreme head rotation distort or collapse the vein. A higher rate of successful puncture may be more likely when the IJV is distended

Materials and Methods: 25 healthy volunteers were included. Exclusion being nistory of IJV cannulation and known allergy to ultrasound jelly. Patients were placed in supine position and triangles formed by two heads of sternocleidomastoid were marked on both sides. Cross-sectional area of IJV were measured at apex, middle and base of the triangles in supine and repeated in 15° Trendelenburg and after Valsalva in supine position. The relative anatomical position of IJV were assessed in 0°and 30°, 45° and 90° head rotation to the contralateral side.

Results and Discussion: Internal jugular vein diameter: Rightside

Statistically significant difference (p value: 0.001) between Supine vs. Trendelenburg at base of the triangle. Significant differences-

Supine position: Apex vs. Middle vs. Base (p value: 0.015) Trendelenburg: Apex vs. Middle vs. Base (p value: 0.001)

Valsalva maneuver in supine position: Apex vs. Middle vs. Base (p value: 0.005) Internal jugular vein diameter: Leftside

Significant difference-

Supine vs. Trendelenburgat Apex (p value: 0.004), supine vs. Trendelenburg at Middle (p value: 0.003) and supine vs. Trendelenburg at Base of the triangle (p value: 0.001).

There is also significant difference between supine vs Valsalva maneuver at Middle (p=0.011) and Base (p=0.014).

Position of the internal jugular vein is lateral or antero-lateral to carotid artery at 0° or 30° rotation to the opposite side on both left and right side of the neck.

In any position of the neck and at all positions of triangle internal jugular vein is placed more anteriorly on left side as compared to right side.

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**Conclusion**: Diameter of internal jugular vein is more at base of the triangle as compared to apex and middle, in both supine position and Trendelenburgposition and also Valsalva maneuver in supine position.

Position of the internal jugular vein is lateral or antero-lateral in relation to carotid artery at 0° or 30° rotation to the opposite side on both left and right side of the neck.

## 16AP01-5 Effect size in anaesthesia research

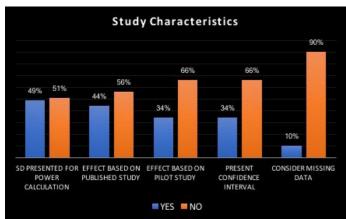
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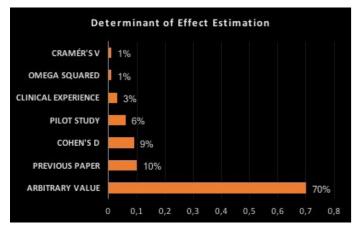
Background and Goal of Study: The definition of the Effect Size in clinical research is imperative because the required sample size to detect the effect of an intervention may vary. A compelling research must describe the Effect Size accurately.

Materials and Methods: We performed a search in the European Journal of Anaesthesiology (EJA), backward from December 2017 to August 2012, and we included 100 human randomized clinical trials. We searched information about critical elements, such as the estimated Standard Deviation, Effect Size, Missing Data and Confidence Interval.

Results and Discussion: EJA authors provided a Standard Deviation for power calculation in 49 papers and they described the Confidence Interval in 34 studies (fig.1). Forty-four studies relied on published papers to calculate their effects and the Sample Size, whereas thirty-four relied on pilot studies. Only ten percent considered strategies to deal with the Missing Data.



An arbitrary value mostly estimated the Effect Size, in 70 papers. Ten papers included a replication of a previously described effect, and six quoted the replication of a pilot experiment. The determinants are in table 2.



Type I and type II errors varied. Alpha was set 0.05 in 97 studies; whereas Beta varied from 0.8 to 0.95. Alpha 0.05 and Beta 0.8 was the most frequent combination, in 67 papers. The findings above show that EJA trials are still leaving out relevant information about the methodology concerning its content.

**Conclusion**: The effect size observed in previous reports could be used to calculate power and thereby estimate appropriate sample sizes. The Confidence Interval is essential to indicate the direction and the strength of the demonstrated effect. The missing data and the power of a study are necessary to give credibility to the final results.

#### 16AP01-6

## When a word worth thousand euros: waste management assessment in the operating rooms of a French hospital

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Background and Goal of Study: French hospitals activities produce 700 000 tons of waste per year (1), which has an environmentally and financial impact. The aim of the study was to promote sustainable development in the operating room by (i) assessing the effectiveness of the segregation between hazardous and non hazardous waste and (ii) determining the reasons for failure.

Materials and Methods: We realized an audit in a French teaching-hospital: we weighed hazardous and non-hazardous waste bags produced after each surgery for 24 hours, from Friday the 18th of March 2016 until the next day. Thereby, we estimated the costs of treatment and disposal of the biomedical waste produced by the operating rooms of this hospital per year of surgical activities (for 261 days, by excluding weekends), based on the waste treatment costs for this center. Then, we compare these amount to the potential cost expected, regarding the WHO's recommendations assessing that only 15% of biomedical waste should be considered as hazardous (2). Finally, our results were presented to nurse team to understand their behaviour about hazardous waste segregation.

Results and Discussion: The total production of waste in our center was 310 kilos during the 24 hours of our investigation for 34 surgeries with: 213 kilos in hazardous bags and 97 kilos in non-hazardous bags, which represents an hazardous waste rate of 68,7%. Based on this data and referring to the price of treatment and disposal of biomedical waste in our center, it could be a potential cost saving of 26 075 euros per year of surgical activities. For most of the nurse team, anything that touched the patient was considered as dirty, so as hazardous, because of what they have learnt during their initial formation. Their misbehaviour was justified by the lack of updated information about waste management.

**Conclusion**: Operating rooms are big waste producers. Improving healthcare providers' knowledge about its management impact can be one of the clues for a greener and cost saving operating room.

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#### 16AP01-7

## Evaluation of the quality of life of anaesthesiology residents and attendings in Portugal

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**Background**: In a highly competitive personal and work environment, with enormous daily pressure in Anaesthesiology, it is necessary to invest in practices that lead to a balance between individual challenges, expectations and satisfaction, in order to improve quality of life (QoL). The goal of this study is to evaluate the QoL of Anaesthesiology residents and attendings in Portugal and to identify the factors that influence it.

Materials and Methods: Observational descriptive analytical study carried out in October and November of 2017, in the population of Anaesthesiologists professionals in Portugal. They were invited to answer by e-mail demographic data, labour data and the WHOQOL-BREF¹ questionnaire (Portuguese version of the abbreviated instrument of the World Health Organization QoL). This instrument has 26 questions, five-point Likert scale, with 2 items of general evaluation of QoL and 24 organized in 4 domains: physical, psychological, social relationship and environment. Scores were transformed into percentage scale of 0-100%. The higher the score, better QoL in each domain. Alpha error of 0.05 was accepted. Data was analysed through SPSS 24.0.

**Results and Discussion**: 110 physicians answered the questionnaire (56 residents, 54 attendings). Median age was 31 years (minimum 26, maximum 62). 72.7% were women, 52.7% were married or similar, 62.7% without children, 60.9% worked in an university hospital, 80% in public hospital and 89.1% had a weekly workload more than 40 hours (89.1%). For the total sample, we obtained a mean of 71.4  $\pm$  19.0 in general QoL, 78.3  $\pm$  12.6 in physical domain, 77.0  $\pm$  13.5 in psychological domain, 73.8  $\pm$  17.1 in social domain and 71.2  $\pm$  13.2 in environment. There were no statistically significant differences between residents and attendings in all domains. Presence of chronic disease and medication consumption had a negative impact on general QoL and on the physical, psychological and social domains. The daily practice of leisure activities was the only factor which positively influenced not only overall QoL, but also all domains.

Conclusions: Professionals obtained a good score in the general QoL and in the 4 domains in WHOQOL-BREF questionnaire. Lack of leisure activities, illness and chronic medication in the Anaesthesiology physicians lead to lower general QoL and in different domains, although the weekly workload did not have differences statistically significant.

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#### 16AP01-8

## Evaluation of the professional motivation of anaesthesiology residents and attendings in Portugal

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Background: Professional motivation is fundamental for performance of good medical practices in all its aspects: human and social, technical and intellectual. The goal of this study is to evaluate the professional motivation of Anaesthesiology residents and attendings in Portugal and to identify factors that may influence it. Materials/Methods: Observational descriptive analytical study carried out in October and November of 2017, in the population of Anaesthesiology physicians in Portugal. Study sample was invited to answer by email to the questionnaire "Multi-Factor Scale of Working Motivation (Multi-Moti)" 1, as well as demographic data. Multi-Moti has 28 items, grouped into 4 dimensions: work organization (WO), performance motivation (PM), self-realization and professional progression (RP) and involvement (IE). All of the items are associated with a Likert type response scale with 5 alternatives (from "1 – completely disagree" to "5- completely agree"). Data were analysed through SPSS24.0.

**Results/Discussion**: 110 Anaesthesiology professionals answered the questionnaire. Most of them were women (72,7%), married or non-marital partnership (52,7%), without children (62,7%), worked in a university hospital (60,9%), in a public hospital (80,0%) and more than 40 hours a week (89,1%). For the total sample, a median of 4.0 was obtained in all domains, except in the OT domain (median 3.0). Only in the WO domain (p=0,027) a statistically significant difference was obtained between residents  $(3,23\pm0,85)$  and attendings  $(2,80\pm1,17)$ . In WO domain there were statistically significant difference between familiar status married/non-marital partnership and single (higher score in last group, p=0,027). Also, in WO domain difference between working in private hospital or both (public and private), higher in first group (p=0,039), and in RP domain higher in the second group (p=0,041). In addition, there was a disparity between working or not in a university hospital in the RP domain (p=0,034), higher in non-university hospitals).

**Conclusion**: Currently, Portuguese Anaesthesiologists physicians are professionally motivated and, in general, the degree of medical career does not influence the level of motivation. Single status, those who practice in non-university hospitals or those who work in the private sector have a higher degree of professional motivation. **References**:

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#### 16AP02-2

#### Value of difficult airway management courses for postgraduate education of anesthesiologists

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**Background and Goal of Study**: Education for the management of difficult airway (DAM) is recommended in NAP 4 report Everyday a new tool or device introduced into market for DAM. This study is undertaken to evaluate the quality of DA course performed to anesthesiologists with different education levels.

Materials and Methods: A course with 10 stations were planned with equipment, mannequins and high fidelity simulation: 1. airways and laryngoscopes, 2. supraglottic devices (SGD), 3.videolarygoscopes (VL), 4.fiberoptic bronchoscopic intubation (FOB), 5.one lung ventilation- endobronchial blockers 6.cricothyroidectomy-percutaneous tracheostomy-retrograde intubation 7. Jet ventilation, 8.DAM in pediatrics, 9.use of ultrasound (US) for DAM, 10. Simulation for decision making and team-work. A booklet was prepared by 22 instructors. Following a pretest consisted of 25 multiple choice questions a 20 minutes lecture on DA guidelines were given. Instructors explained each station in 5 min and skill performed, then each trainee repeated the skills hands on and step by step evaluation performed. At the end of the day trainees were given the same test as post-test.

Results and Discussion: Twenty-one of the attendees were anesthesia residences (18-30months) and 17 were anesthesia consultants (2-20years). Pre-test scores varied between 32-76 points. All trainees performed skills and evaluated as successful. The success rate about the questions DAM in pediatrics were highest (86% correct answer) in pretest and lowest success rate was 16% (correct answer) for the question related to FOB. Highest rate of achievement established in the station US guided intubation. Although all attendees performed hands on FOB intubation there was no increase regarding questions related to FOB intubation. Scores and increase in success rate are presented in Table1, there were no statistical difference between groups (t test).

	Consultant	Resident
Pretest	55.7±12.4	61.1±7.8
Posttest	70.5±8.6	71±5.2
Improvement rate	31.5%	18.5%

Conclusion: Although consultants started with lower pre-test scores at the end of one day course both the residents and consultants achieved equal knowlege and skills. Evolution in different techniques and apparatus necessitates updating

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#### 16AP02-3

for consultants in DAM.

Education

## Assessment of Non-Technical Skills after Life Support Courses – a prospective questionnaire study

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Background and Goal of Study: Cardiac arrest education includes training of nontechnical skills (NTS). We were interested how different summative assessment methods used in international life support courses assess these skills. To compare the perceived performance of two assessment types to test NTS best was the study goal

Materials and Methods: With Bern Cantonal Ethics Committee review (Req-2017-00579, 7 August 2017) and written informed consent, this ongoing study includes medical students of the University of Bern who participate in life support courses. The summative assessment type is randomized: type "ERC": one instructor mimes the entire team, and the assessed student leads this "team" through a scenario; or type "AHA"; students form a team, but only the team leader is assessed. Participating students and instructors are asked to rate the assessment using a visual analogue scale (VAS, 0 = no agreement, 10 = total agreement).

Results and Discussion: So far, 48 students (24/24 ERC/ÅHA), aged 24±2 years, 58% female participated. Six instructors (5 male), aged 40±4 years rated the two assessment types as comparable. The table shows the detailed preliminary students ratings. Even though team-leadership was not perceived as different, there was a significant difference between the two assessment types in regard to team-membership and practical CPR-skills (p < 0.05). At Euroanaesthesia 2018 we will present the results from about 230 students.

#### Conclusion:

The "AHA" assessment type is perceived as significantly better to test teammembership and practical CPR-skills compared with the "ERC" type. We generate the evidence that the final assessment is able to assess what was actually taught.

VAS scale 0-10, mean	ERC	AHA	p-value
Assessment overall	8.5 ± 1.4	8.1 ± 1.2	0.37
Team-leadership	8.1 ± 1.7	8.3 ± 1.3	0.59
Team-membership	$3.7 \pm 3.8$	5.9 ± 3.1	0.03
Communication	7.1 ± 2.3	7.9 ± 1.1	0.13
Teammanagement	7.3 ± 1.8	7.8 ± 2.0	0.41
Practical CPR skills	6.2 ± 3.3	7.9 ± 2.1	0.04
Medical knowledge	7.5 ± 1.9	6.9 ± 1.9	0.34

#### 16AP02-5

#### Development and Initial Results from Anaesthesiology Residents using Adaptive E-learning in Advanced Airway Management

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**Background**: An adaptive E-learning program in advanced airway management (AAM) was developed. The content consisted of 180 learning objectives (LOs) that were all covered by a learning resource (LR) and at least one probe (various question types).

If answering a probe incorrectly, a LR was offered, and a probe in the same LO was presented later. All LOs had to be answered correctly. The confidence in the answer was indicated for each probe using four categories of metacognition: "I know it", "I think so", "Unsure", "No idea". The answers were used by the adaptive part of the program to estimate individual learning needs for the following probes to address. The goal of the study was to explore if adaptive E-learning in AAM could facilitate learning and reflection on personal educational needs.

**Methods**: Twenty-nine 2<sup>nd</sup> year residents completed the E-learning and a questionnaire exploring usability and satisfaction with the E-learning on a Likert scale from 1-7 (7=highest).

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**Results and Discussion**: All 29 residents completed the E-learning and the questionnaire. The average experience in anaesthesiology was 2,5 years, and the average completion time for the E-learning was 4h18min (1h59min - 7h38min).

The E-learning results are summarized in Table 1. The metacognitive categories are simplified into two groups: "I know it" + "I think so" vs "Unsure" + "No idea". Results are termed "Aware" or "Unaware", respectively, depending on the correctness of the LO answer.

Table 1.

	Correct + Aware	Correct + Unaware	Incorrect + Aware	Incorrect + Unaware
Module 1: Airway assessment	75,8 %	4,3 %	4,1 %	15,9 %
Module 2: Airway management techniques	75,2 %	6,3 %	5,7 %	12,8 %
Module 3: Airway management cases	76,1 %	4,5 %	3,8 %	15,6 %

LOs were mostly answered Correct+Aware, reflecting the residents being mainly consciously competent. However, 12-16% of the LOs were answered Incorrect+Unaware, suggesting unconscious incompetence and therefore areas of important educational needs.

The E-learning was found very useful (5,3 of 7) and 97% would like to continue using the E-learning.

Conclusion: Adaptive E-learning in AAM was found very useful. The residents were consciously competent in AAM (75-76%), while the results from 12-16% of the LOs suggested that the residents were unconsciously incompetent. From a patient safety point of view, the latter LOs are areas of concern, and individualised training should focus on these.

#### 16AP02-6

## Learning curve for spinal anesthesia as a basic skill in the training program of the anesthesia resident in faculty of medicine, Cairo university

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Background and Goal of Study: There is a wide variability among the trainee in anesthesia regarding there learning response to different skills. One of this basic skill is spinal anesthesia. The aim of the present study was to describe the learning process during the first six months of an anesthesiological residency at Cairo university teaching hospital and to define the minimal number of cases of spinal blockage required to achieve minimal rates of failure in regional anesthetic procedures.

Materials and Methods: Fifteen anesthesia residents during the first six months of a residency at Cairo university teaching hospital were evaluated using a standardized self-evaluation questionnaire. The success or failure of the procedure tested was documented each day by the residents over 6 months period. To promote good compliance and a high response rate, data collection and analysis were anonymous. The clinical duties of the residents were being supervised by a senior staff member.

the technique was reviewed verbally with each trainee and then one of the principal investigators guided the student through the procedure in real patients before the trainee was allowed to perform the anesthesia technique.

1-Time from initial puncture until needle removal: less than 10min

the Adequate depth of anesthesia where only conscious sedation was required.
 3-No physical assistance from the instructor (verbal assistance allowed.

Results and Discussion: Regarding the learning curve there is a rapid improvement of success during the first 20 cases with success rate 40%, 70% success rate after 30 cases, 80% success rate after 40 cases and the number of cases required for each resident to reach proficiency which is 90% success rate is 50(49.3±4) cases (which was achieved within 99.93±23.5 days).

**Conclusion**: Trainee need around 100 days and 50 cases to achieve success rate of 90% in spinal anesthesia skill.

#### 16AP02-7

Success criteria:

Three (3) or fewer attempts.

#### The influence of training experience on trainees' selfassessment in cardiac anaesthesia: A 8-year retrospective exploratory evaluation

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Background and Goal of Study: Providing anaesthetic trainees with a structured training programme in each subspecialty area is preferable. However, there is no evidence on training requirements to obtain basic and essential skills. The goal of this study was to exploratory evaluate the influence of training experience on self-assessment of skills and knowledge in cardiac anaesthesia.

Materials and Methods: This study was conducted at a teaching hospital in Japan. All anaesthetic trainees who completed their intense basic training in cardiac anaesthesia from January 2009 to March 2017 were enrolled. After completing the programme, each trainee filled in a self-assessment questionnaire which

consisted of 73 items with a 5 point Likert scale. The items were then selected and categorised into 2 dimensions; "Skill" (SK) and "Anaesthetic management" (AM). SK contained 12 items (e.g. "I understand how to insert a pulmonary artery catheter, and can perform adequately."), and AM contained 21 items (e.g. "I can administer appropriate inotropes and vasopressors based on haemodynamic parameters."). The total number of cases each trainee experienced was analysed with decision tree methodology to be classified corresponding to the self-assessment scores.

Results and Discussion: 62 trainees were enrolled. The mean training duration was 4 months (range: 2-8). The median number of total cases was 31.0 (range: 16-74, SD=11.6). The median self-assessment value in SK and AM were 3.2 and 3.0 respectively (the first quartile: 2.8 and 2.7, the third quartile: 3.5 and 3.5). The analysis identified 3 groups with high to low scores. For SK, the highest-score group experienced more than 46 cases (mean: 3.9, 5 trainees) followed by intermediate group between 20 and 46 (mean: 3.1, 42 trainees), and the lowest had less than 20 (mean:2.7, 10 trainees). Similarly for AM, the highest had more than 46 cases with the mean value of 3.7 (mean: 3.7, 5 trainees) followed by intermediate between 20 to 46 (mean:3.1, 42 trainees), and the lowest had less than 20 (mean 2.6, 10 trainees).

Conclusion: More experience gave higher self-assessment scores. This study might suggest the probable required number of cases of roughly 50 to experience. However, this is a retrospective single centre study based on self-assessment, and it may not generally apply to other anaesthetic trainees. Further prospective studies will be needed to determine the requirements for basic training in cardiac anaesthesia.

#### 16AP02-8

## Perioperative management of diabetic patients - a survey of junior doctors current practice

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Background and Goal of Study: 10-15% of surgical patients are diabetic and, as such, it is common to observe higher complication rates, mortality and longer hospital stay!. The management of blood sugars in the preoperative period is fundamental in ensuring a safe surgical journey for these patients. Moreover, deranged bloods sugars are associated with post-operative infections and intraoperative adverse events. In many hospitals, the management of these patients preoperatively is dependent on junior doctors. However, research has shown that there is variability in the compliance to the latest guidelines which can lead to sub-optimal management? The aim of this survey was to determine the level of familiarity of junior doctors at Queens Hospital,Burton, UK on the latest national guidelines in the management of diabetic patients preoperatively.

**Method:** We employed a 10-part survey to explore junior doctors' current practice and knowledge base on perioperative glycaemic control.

Results: 34 foundation year doctors took part in this study. Of these, 20% had training in preoperative blood sugar management in the previous year; 41% could identify the correct ideal blood glucose range; 21% of respondents knew how to adjust a patient's current antidiabetic medication regime preoperatively; 74% of participants could recognise when to start a variable rate intravenous insulin infusion; and 58% knew to check blood sugar levels hourly while the patient is fasted

Conclusion: It is essential that diabetic patients are adequately optimised for surgery to avoid pre, intra and post-operative complications, each of which can have lasting and deleterious effects for patients and the heath service. However, our junior doctors appear inadequately trained in this discipline and are not aware of the latest guidelines. This survey has highlighted that there is a need to introduce preoperative blood sugar management into the junior doctors' induction curriculum and provide them with more support when managing these patients.

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#### 16AP03-1

## Unclear leadership challenges perioperative resuscitation – a simulation study

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Background and Goal of Study: Implementation of endovascular repair of a ruptured abdominal aortic aneurysm (rEVAR) using full-scale simulation offered option to study intraoperative resuscitation in a realistic setting. The aim of this observational study was to get an overview of the feasibility of the present guidelines using high-fidelity simulation as the investigational method.

**Materials and Methods**: After permission of the ethics committee and informed consent, 7 multidisciplinary simulation sessions were arranged in a real hybrid operation room. In every scenario, there was a resuscitation period after severe hypotension. Altogether 7-10 persons participate each session: a scrub nurse, one or two circulating nurses, two anaesthesia nurses, one radiology nurse, one or two anaesthesiologists and one or two vascular surgeons. In every session there was a new team. The facilitators remained the same. Simulations were video recorded and transcribed. The data was analyzed by four assessors using two measurement scales, TEAM (1) and CTS (2). Statistics: ANOVA, Cronbach's alpha.

Results and Discussion: The most frequently occurring problems were caused by atypical working order, architecture of the OR and technical problems with the radiology machines. The seven teams worked well together, roles were clear, they monitored the situation and they were able to prioritize matters in changing situations. Failing leadership, inadequate communication and inability to maintain holistic picture were the major weak spots. Physicians seldom thought aloud leaving the staff unaware of their intentions. After revision of the pre-briefing instructions, performance of the teams statistically significantly improved (p<0.05 – p<0.001). Both tools, TEAM and CTS yielded similar results. Reliability of the TEAM was 0.780 and CTS was 0.960.

Conclusion: This study illustrates the complicated reality in the OR, making it a challenge to train teams to perform perioperative CPR-D. Slowly progressing hypotension ending in PEA creates communication problems. In a university hospital, there will always be residents having insufficient crisis resource management skills. Using high-fidelity simulation training, we can make these innovative action models visible and to verbalize them for future learning.

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#### 16AP03-2

## Efficacy of metronome app and mental metronome "La Macarena" to improve the quality of chest compressions

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Background and Goal of Study: The quality of chest compressions during cardiopulmonary resuscitation increases chance of survival and improves outcomes (1). The goal of the study was to compare the efficacy of a smartphone metronome application and the musical mental metronome "La Macarena" to improve the quality of chest compressions.

Materials and Methods: A controlled, cluster sampling study of 2 minutes of continuous chest compressions on manikin was conducted with medical students, University of Barcelona. Subjects received no guidance (control), metronome app programmed at 103 bpm (App) or the order to perform compressions to the mental cadence of the song "La Macarena" (Maca). Demographic data, quality of chest compressions (Resusci Anne Wireless SkillReporter® Software) and a satisfaction survey were registered. Intention-to-treat (ITT) and per-protocol (PP) analyses were performed

Results and Discussion: 164 students were included (control ITT=71, PP=35; App=45; Maca=48). Groups were homogeneous except for sex (men, control ITT 46,5%, App 31,1%, Maca 22,9%, p=0.024; control PP 48,6%, p=0.048) and BMI (control PP 22,09, App 20,2, Maca 21,66 Kg/m2, p=0.038). The percentage of compressions between 100 and 120 per minute was significantly higher in the App (91 [87; 94]) and Maca (74 [8; 98]) than in the control group (ITT 24 [1; 92], PP 7 [0.64], p <0.001, p = 0.023 and p <0.001, p = 0.001). Any group reached the depth of 5 cm. The App group had the better overall quality compression scores (basic 25%, intermediate 60,4%, advanced 14,6%) but the longer onset delay of the first compression (4,3 [3,5;5,5] seconds). Students rated the app as the most useful help method.

**Conclusions**: Metronome app and mental metronome "La Macarena" improved the quality of chest compressions by increasing the proportion of adequate rate but not the depth of compressions. The metronome app was more effective but with a significant onset delay.

#### References:

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#### 16AP03-3

Education

Pork belly: a novel training phantom for skill of hydrodissection in a transversus abdominis plane block in novice anesthesia residents 363

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Background and Goal of Study: Ultrasound (US)-guided transversus abdominis plane (TAP) block becomes a popular analgesic technique for lower abdominal surgeries. A skill of hydro-dissection of TAP with local anesthetics was critical for a successful TAP block. A blue phantom is useful for practicing hand-eye coordination, but not for the skill of hydro-dissection. Pork belly has a similar three-layer muscular structure as that in human beings. We hypothesize that, used as a training phantom, pork belly could improve skill of hydro-dissection of a TAP block in novice anesthesia residents.

Materials and Methods: Sixteen PGY-1 anesthesia residents without US-guided TAP block experience were randomized into two groups: the control group (C group) and the pork belly (PB group), each of eight. The training course consisted of two modules: a knowledge module and a second practice module. PowerPoint slides and videos were used to show (1) mechanism of sonography, (2) anatomy and sonoanatomy of TAP block, (3) and skills of hydro-dissection and image optimization in the knowledge module in both groups. In practice module, a blue phantom was used for practicing hand-eye coordination in the C group. In the PB group, a 20cm×30cm pork belly was used for practicing hand-eye coordination and hydro-dissection. The practice module would not end until all trainees reached a mastery level. Skills of hand-eye coordination and hydro-dissection were tested respectively in a 20cm×30cm pork belly in both groups. Rates of mastery of handeye coordination and hydro-dissection were compared between the two groups using chi-square test. A P< 0.05 was considered as statistically significant.

Results and Discussion: Better mastery rate of hydro-dissection was observed in the PB group. An average of 7.8±2.4 trials was needed to reach a mastery level of hydro-dissection skill in the PB group. With a three-layer muscular structure, pork belly could be a good phantom to simulate anterior abdominal wall in human beings, which is useful for novice anesthesia residents to practice skill of hydro-dissection in a TAP block before their clinical practice.

**Conclusion**: Used as a training phantom, pork belly could be useful for novice anesthesia residents to practice skill of hydro-dissection in a TAP block.

#### 16AP03-4

## High-fidelity is not superior to low-fidelity medical simulation and leads to overconfidence in medical students

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Background and Goal of Study: Simulation has become integral to the training of both undergraduate medical students and professionals. Due to the increasing degree of realism and range of features, the latest mannequins are referred to as high-fidelity simulators. We assessed whether increased realism leads to a likewise improvement in trainees' outcome, and the influence on individual confidence and self-assessment

Materials and Methods: After institutional ethics board approval, 135 fourth-year medical students were randomly allocated to participate in either a high- or a low-fidelity simulated Advanced Life Support training session. Theoretical knowledge and self-assessment pre- and post-tests were completed. Students' performance in simulated scenarios was recorded and rated by experts. Test results were analyzed using ANOVA, Chi-Squared test and McNemar's test, data from video analysis were analyzed with Chi-Squared and t-test.

Results and Discussion: Participants in both groups showed a significant improvement in theoretical knowledge in the post-test as compared to the pretest, without significant intergroup differences. Performance, as assessed by video analysis, was overall comparable between groups, but, unexpectedly, the low-fidelity group had significantly better results in several sub-items. Participants of the high-fidelity group considered themselves to be advantaged, solely based on their group allocation, compared with those in the low-fidelity group, at both pre- and post-self-assessments. Self-rated assessment of their individual performance was also significantly overrated. Although current literature is controversial, several studies indicate high-fidelity simulation may favor emotional bias and positive expectations regarding the simulation tool.

**Conclusion**: The use of high-fidelity simulation led to equal or even worse performance and growth in knowledge as compared to low-fidelity simulation, while also inducing undesirable effects such as overrating of the individual performance that happened significantly more often in the high-fidelity group. Hence, in this study, high-fidelity was not beneficial compared to low-fidelity, but rather proved to be an adverse learning tool in this scenario.

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#### 16AP03-5

## Organisation of cardiopulmonary resuscitation training in obstetric department

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Background and Goal of Study: Increase the quality of ALS in obstetrician department

The management of patient with cardiopulmonary arrest inside hospital requires a perfect, high-quality CPR and depends on not only the basic resuscitation steps but also the organization and collaboration. In obstetrics practice sudden cardiac arrest associated with pregnancy is very rare and special attention is paid to the organization of emergency help and especially absence of skills of CPR providing can results to dramatically consequence. In this case the organization of routine interactive simulation-based medical education (CPR trainings) with evaluation and feedback took the primary role in all hospitals.

Materials and Methods: We organized a more than 50 trainings. Our study included 152 medical specialists: 72 anesthesiologist, 48 obstetrician 32 nurses. Participants completed a 8-hour 1 day interactive simulation course that included the theoretical and practical background on sudden cardiac arrest in pregnant women and ALS algorithm we used (ERC guidelines 2015). We simulate a sudden cardiac arrest scenario of cardiac arrest in obstetrician department. We asked to demonstrate self-ALS skills on a manikin of pregnant woman. Afterwards, participants themselves, and with instructor found and analyzed main mistakes. After analysis and theoretical work the participants performed the same scenario and we assessed their knowledge. Before in and after the training we fixed the skill of each participant in our chek list. We asked them how they rated their skills: whether they performed CPR most fully.

Results and Discussion: We used our check-list to identify the main mistakes: late/absence of call for help, slow initiation of CPR, wrong compression, long pauses, wrong or absence manually left lateral tilt, readiness for emergency Caesarian delivery, bad organization of collaborating process: bad communication skills, poor teamwork organization. The score from ability to provide true CPR in anesthesiologist, obstetrician, nurses groups was: before training 5%,4%, 0%, after training 97%, 90%, 95%.

**Conclusion**: This study has demonstrated that the knowledge of ALS by a group of obstetrics stuff before CPR training was inadequate. The optimal outcome of a patient after cardiac arrest depends on not only the basic resuscitation skills but also the perfect organization including routine trainings programs.

### 16AP03-6

#### A comparison of clinical simulation and classical learning for airway management in medical undergraduate students: a randomized controlled trial

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Background and Goal of Study: Clinical simulation is a useful learning tool in medical teaching. Multiple studies have proven its superiority over classical learning methods. Research on simulation of airway management has focused on endotracheal intubation training, while research on ventilation via facemask is scant. We aimed to compare clinical simulation and classical learning regarding the acquirement of basic skills for airway management by medical undergraduate students

Materials and Methods: A total of 102 last year medical students were randomized to clinical simulation or classical learning (51 per group). Students in the clinical simulation group received a 3-hour long training on airway management on the first day of their 28-day anesthesia rotation; while classical learning students only received training in the clinical setting, without previous practice on simulators. On the last day of rotation, they were evaluated based on a validated instrument of scores. Primary outcome was overall airway management score. Secondary outcomes were the rate of success of intubation and the incidence of complications. Results and Discussion: Students in the clinical simulation group obtained a significant higher score than those assigned to classical learning in ventilation but not in endotracheal intubation. Incidence of complications such as esophageal intubation and oral trauma were similar for both groups. Successful intubation rates were similar for both groups (p=0.091)

**Conclusion:** The proposed clinical simulation demonstrated to be educationally effective for ventilation via facemask but not effective for endotracheal intubation training in patients without predictors of difficult airway. Endotracheal intubation skills acquisition might be a complex process that requires longer training.

1 3		1 3	5	
Overall score for positive p	oressure ventilatio	n and endotrache	al intubation	コ
	Control group (n=51)	Simulation group (n=51)	p value	]
Positive Pressure Ventilation	6.9	7.4	0.046*	
Endotracheal Intubation	5	5.4	0.065	]

### Incidence of complications Control group Simulation group

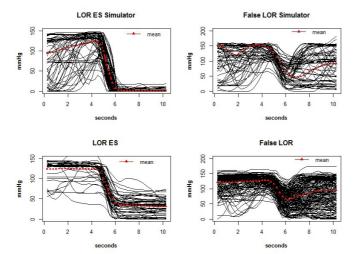
			p value
	n=51 (%)	n=51 (%)	
Esophageal Intubation	2 (3.9)	0 (0)	0.495
Oral Trauma	2 (3.9)	1 (2)	1.000

#### 16AP03-7

## Objective evaluation of a new epidural simulator with CompuFlo® Epidural Instrument

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Background and Goal of Study: One major limitation of the commercially available epidural simulator task trainers is that they do not reproduce the anatomical features of all the layers the needle must pass through We created an epidural simulator and evaluated its realism to actual patients by using the Compuflo Epidural Instrument (Milestone). The CF is a computerized system that measures the pressure of tissues in real-time during epidural block producing typical curves<sup>2</sup> Materials and Methods: After having removed the inner 3B Scientific length of plastic, we inserted in its place a modified polyurethane spinal column model. A layer of silicone was modelled on the spine to imitate the ligamenta flava and a mixture of closed cell neoprene with silicon was used to simulate other ligamenta and paravertebral muscles. Epidural block was performed by using CF, pressure curves were recorded and compared with those previously obtained in humans2. A sample size of 64 observations for each group was required to set 80% test power and a 95% significance level. Unpaired two samples t-test was used for analysis. Results and Discussion: Manikin and human pressure curves were very similar (Figure). There was a significant difference in % between the drop of pressure due to false loss of resistance (LOR) and that due to the entry of the needle in the epidural space in both groups (P<0.0000). There was a difference of less than 17% in false LOR values (P=0.04); and less than 32% in true LOR (P=0.03) between the simulator and the controls.



**Conclusion**: Our results suggest that our simulator can realistically reproduce the anatomical features of all the layers the needle must pass through to reach the epidural space as demonstrated by the similarity between the simulator and human pressure' curves and the small differences of pressure values recorded during the needle insertion. Our simulator may be a promising, realistic device in teaching epidural needle-handling skills for epidural technique. Compuflo may be used as an objective tool to create and assess epidural task trainers.

1.Lee RA et al Anaesth Intensive Care 2012; 2. Coccoluto A et Al EJA, 2017

#### 16AP03-8

## Most difficult still! ... Extreme simulation on board of a carrier navigating in the sea. Experience of the spanish military anesthesia

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**Background and Goal of Study**: Multiple studies have demonstrated the importance of simulation to achieve better learning of knowledge, skills and abilities for medical students, doctors in specialty training or medical specialists.

The objective of this study is to describe the improvement in the acquisition of competencies by second-year medical students after undergoing simulation on board an aircraft carrier of the Spanish Navy.

board an aircraft carrier of the Spanish Navy.

Materials and Methods: Prospective descriptive study conducted on the L-51 ship Juan Carlos I of the Spanish Navy from June 12 to 23, 2017, during the FLOTEX naval maneuvers (29 ships / 3000 military) in the Mediterranean Sea with 23 students from second of medicine belonging to the University Center of Defense. During this study period the students underwent four simulations (with 1,6,4,1 casualties respectively -voluntary healthy-). After carrying out the simulations, the students filled out a pre-designed form on their degree of satisfaction, knowledge and skills prior to and after the four simulations.

Results and Discussion: 100% of the students considered the drills a very satisfactory tool to acquire and improve medical knowledge, 98% improved their knowledge in terms such as "attention to mass casualties", "initial attention to the trauma patient", "Transfer of information about the patient", "patient mobilization", "resuscitation of damage control", "evacuation". For most students the most complicated variable was the "transfer of information about the patient". Everyone would repeat the simulation experience again.

**Conclusion**: Simulation can be a useful tool for medical students. The simulation can be done in an isolated and hostile environment such as a warship.

#### 16AP03-9

## Design and development of a low cost prototype for the training of bronchoscopy examination

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Background and Goal of Study: In the last decade, simulation in medicine has attained a fundamental role in the training of medical students as well as on improving and maintaining skills of expert clinicians. In anesthesia and intensive care bronchoscopy is a procedure that carries some risks, such as bleeding, perforation etc., Thus there is the need of alternative methods for training when patients are involved. Currently, physicians can use two distinct families of simulators, one based on Virtual Reality (VR) and the other on physical models. Our aim is to build a low cost and easy to use prototype integrating both the physical and the VR simulators to provide a complete and realistic system for training bronchoscopy examination

Materials and Methods: Images, acquired with Computed Tomography (DICOM format) with 0,625 mm slice thickness, are used to create a 3D digital model of the tracheo-bronchial tree. This model is used to create both a physical model to train manual skills and a VR model to provide a realistic visual feedback. To create the physical prototype we imported and elaborated the digital model in the CAD software, then by using a stereolithography process, we 3D printed a physical model of the tracheo-bronchial tract that could be navigated with a real bronchoscope. To create the VR model that the operator can navigate with a virtual camera, the digital model was imported and elaborated in Unity 3D. The physical and the VR models are connected so that each movement of the real endoscopic camera inside the physical model corresponds to a movement of the point of view in the VR model. A simple led-based system allowed computing the coordinates of the tip of the bronchoscope inside the physical model. These coordinates are sent to Unity 3D allowing the simultaneous navigation in the VR model.

Results and Discussion: Both components of this simulator are very realistic: the physical model of tracheo-bronchial tree is similar to the real airways; the bronchoscopic images of the VR system were compared with images of a real bronchoscopy, showing an high level of similarity. Furthermore, the system is low-cost: the software is open-source and the used 3D printer process not expensive. Conclusion: This system represents a good and innovative simulator combining visual and haptic feedback for bronchoscopy exam training. This prototype might help enhancing clinicians' skills in a safe and efficient way.

#### ESAPC2-1

### Submental ultrasound in the assessment of difficult mask ventilation

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Background and Goal of Study: Difficult airway management during general anesthesia could lead to cerebrovascular accident, aerodigestive tract injury, and death. Unanticipated difficult airway still occur despite the use of current clinical predictors. Mask ventilation (MV) is an essential component of airway management. Therefore, a reliable method to identify patients at risk for difficult MV may reduce morbidity and mortality. The objective of this study was to determine the sonographic measurements of the upper airway structures in distinguishing difficult and easy MV.

Materials and Methods: Adult patients undergoing endotracheal intubation for an elective surgical procedure were included. Submental ultrasonography (US) was performed in the resting state to measure the tongue base thickness (TBT), hyomental distance (HMD) in the mid-sagittal plane using curvilinear probe (Figure 1), and the distance between lingual arteries (DLA) in the transverse dimension using linear high frequency transducer(Figure 2). MV was graded as easy (grade 1-2) or difficult (grade 3-4) using grading scale originally proposed by Han et al. To allow for comparisons between difficult MV and easy MV groups, a two-sided Student's t-test and Fisher's exact test were employed as appropriate.

Figure 1. (white arrows=air-mucosa interface of the tongue; GG=genioglossus)

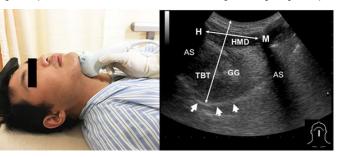


Figure 2.



**Results and Discussion**: The mean age of 30 eligible patients (11 female, 19 male) was 49.3 years. Fifteen of the 30 patients were classified as having difficult MV by anesthesia providers. Based on ultrasound measurements, patients with difficult MV had significantly greater TBT (69.2mm vs. 62.6mm, p<0.001), HMD (52.7mm vs. 46.2mm, p=0.001), and DLA (36.1mm vs. 28.1mm, p<0.001) compared to the easy MV group.

Conclusion: Submental ultrasound measurements of TBT, HMD, and DLA can be used to distinguish difficult and easy MV.

ESAPC S66

#### ESAPC2-2

## Expiratory Ventilation Assistance during mandatory ventilation in porcine ARDS improves arterial oxygenation – a randomized controlled animal study

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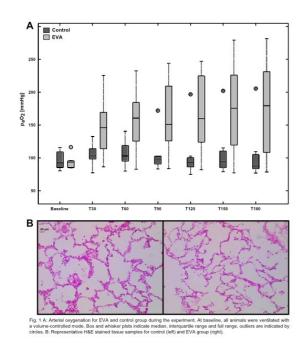
**Background and Goal of Study:** Mechanical ventilation aggravates acute respiratory distress syndrome (ARDS). The new ventilation mode Expiratory Ventilation Assistance (EVA) showed an improved oxygenation in lung healthy pigs compared to conventional volume controlled ventilation while utilizing similar inspiratory tracheal pressure ( $p_{trach}$ ), PEEP and tidal volume ( $V_{\tau}$ ). We hypothesized that EVA improves gas exchange and attenuates ventilator associated lung injury in a porcine model of ARDS.

**Materials and Methods:** 14 anaesthetised pigs with an oleic acid induced ARDS (initial Horovitz index 100 150 mmHg) were randomly allocated to either volume controlled ventilation as control or EVA ventilation with identical ventilation parameters (F<sub>Q</sub> 0.8, V<sub>+</sub> 7 ml/kg body weight, PEEP 9 mbar, respiratory rate adjusted to maintain arterial blood pH > 7.2). P<sub>aQ2</sub>, p<sub>a</sub>CQ2, p<sub>trach</sub> and minute volume (MV) were measured every 30 min. After three hours lung tissue was excised and H&E stained for determination of alveolar wall thickness. Statistics were performed with linear mixed model analyses and unpaired t-test's. Data are reported as mean ± SEM.

**Results and Discussion:** EVA significantly elevated p $_{\rm s}O_{\rm 2}$  compared to control group (107 ± 11 vs. 164 ± 21 mmHg, p=0.04). Peak inspiratory p $_{\rm trach}$  was similar in both groups (35 ± 2 vs. 32 ± 2 mbar, p=0.2) whereas mean p $_{\rm trach}$  was significantly elevated in the EVA group (17 ± 1 vs. 19 ± 1 mbar, p=0.02). A comparable p $_{\rm s}CO_{\rm 2}$  (control: 54 ± 2, EVA: 57 ± 3 mmHg, p=0.4) was achieved with a significant lower MV in the EVA group (8.7 ± 1.1 vs. 6.1 ± 0.8 l/min, p<0.001). Alveolar walls were thinner in the EVA group (7.8 ± 0.2 vs. 5.5 ± 0.1 µm, p<0.0001).

**Conclusion:** EVA ventilation stabilizes alveolar walls and hence improves gas exchange in porcine ARDS. This new ventilation technique may yield lung protective

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# ESAPC2-3 Postoperative outcome after hip fracture surgery - the impact of after-hours surgery

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Background and goal of study: Hip fractures are the most common osteoporotic fractures in Sweden and are associated with high mortality and morbidity. The poor outcome is not fully understood and may be related to other factors than the surgery itself. After-hours surgery is a much-debated subject and is often considered a risk factor. However, literature regarding the impact of after-hours surgery is equivocal.

The primary aim of this study is to investigate the effect of after-hours surgery on short- and mid-term mortalities (30 and 365 days) in Östergötland County Council (two hospitals included). Secondary aims of the study are to analyze the impact of logistical changes at Linköping University Hospital, and compare outcomes between the two hospitals.

Methods: A retrospective, registry-based cohort study including all adult (≥18 years) patients undergoing acute hip fracture surgery in Östergötland County Council from 1 Jan 2014 to 31 Dec 2015. Main outcome measures were all cause 30- and 365-day mortality. To analyze the impact of after-hours surgery and potential differences between hospitals we used COX-regression analysis along with Kaplan-Meier survival plots. (See Figure)

Results and discussion: A total of 1192 patients were included. No significant differences in mortality were found when comparing different times of surgery. Thirty day-mortality was 9.5 % and 365-day mortality was 26.8 %. The logistical changes at Linköping University Hospital affected waiting time for surgery and length of stay at post-anesthesia care units, but were not associated with any significant differences in mortality. Non-university hospital status was associated with significantly higher mortality: adjusted 30-day mortality was 11.2 % and 7.8 % respectively (p=0.040) and 365-day mortality was 31.5 % and 22.6 % respectively (p<0.001). Age, ASA-PS class and male gender were also associated with adverse

**Conclusion:** Time of surgery did not affect 30- nor 365-day mortality. Increasing age, higher ASA-PS class, surgery at a non-university hospital and male gender were associated with adverse outcomes on 30- and 365-day mortalities.

#### ESAPC2-4

#### Critical Care After Lung Resection - Influence of Anaesthetic and Analgesic Technique

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Background and Goal of Study: Un-planned critical care admission is a devastating complication of lung resection. Within the UK Association of Cardiothoracic Anaesthesia and Critical Care's annual collaborative audit into Critical care Admission following Lung Resection (CALoR) we sought to investigate the influence of anaesthetic and analgesic techniques on the need for unplanned post-operative critical care.

Materials and Methods: This was a multicentre retrospective audit examining adult patients undergoing lung resection in the years 2013-2014. Sixteen UK thoracic centres contributed to the audit where demographic and clinical data was collected on every patient fulfilling inclusion criteria. Control data was collected from a minimum of three consecutive contemporaneous control patients undergoing surgery prior to each case. Association was sought between mode of anaesthesia (total intravenous anaesthesia (TIVA) vs volatile) and analgesic technique (epidural vs paravertebral) and need for critical care admission. Multivariate regression analyses was performed on a 'complete case' basis and following multiple imputation by chained equations.

Results and Discussion: Sufficient data for analysis was available from 7,431 patients; 7178 controls and 253 cases. There was a strong and significant effect of both anaesthetic and analgesic technique on need for critical care admission. Patients receiving TIVA were estimated to have approximately half the odds of admission compared to these undergoing volatile anaesthesia, whilst patients receiving epidural analgesia had just over half the odds of admission compared to those receiving paravertebral (Table 1).

Table 1. Association between anaesthetic and analgesic technique and need for critical care admission following lung

					Mod	del			
Exposure		Univa	riate	C	omplet	e-case*	Mul	tiple in	putation*
•	N	OR	95% CI	N	OR	95% CI	N	OR	95% CI
Anaesthetic technique	4318			3,970			7,325		
- Volatile		1			1			1	
- TIVA		0.59	(0.41-0.83)		0.46	(0.32-0.65)		0.50	0.34-0.70
Analgesic technique	3,683			3,668			7,431		
<ul> <li>Paravertebral</li> </ul>		1			1			1	
- Epidural		0.77	(0.57-1.05)		0.57	(0.41-0.78)		0.56	(0.41-0.78)

\*Adjusted for age, sex, resection type, and surgical approach

Conclusion: This large retrospective study suggests a significant effect of both anaesthetic and analgesic technique on patient outcome. Furthermore, the results in favour of both TIVA and epidural analgesia might be considered to conflict with recent studies. We suggest that as a community of thoracic anaesthetists, it is incumbent on us all to attempt to address these fundamental questions in well-conducted, large-scale randomised controlled trials.

#### ESAPC2-5

Gold Nanorods-based Thermosensitive Hydrogel Produces Selective Long-lasting Regional Anaesthesia Triggered by Photothermal Activation of TRPV1 Channel

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Background and Goal of Study: Long-lasting regional anaesthesia and selective sensory block are useful in post-operative analgesia and treatment of pathological pain. Currently, duration of local anaesthetics is not satisfactory and their cardiac and central nervous systems toxicities have been widely reported. Previous studies have demonstrated that activation of TRPV1 channels facilitated the potency of a selective long-lasting regional anaesthetic drug QX-314 in vivo. Hydrogel is a solid jelly-like material. Gold nanorods is nanoparticles, which can be used for hyperthermia by exposure to near-infrared radiation.

Materials and Methods: We fabricated a gold nanorods and QX-314 containing hydrogel. The molecular weight of PECE hydrogel was adjusted to achieve a targeted phase transition temperature. Then, gold nanorods with a desired photothermal conversion efficacy and QX-314 were mixed with PECE hydrogel to produce a gold nanorods-QX-314/hydrogel nanocomposite. Biomaterials properties of this nanocomposite were determined and a rat model of sciatic nerve block was applied to evaluate the regional anaesthetic effect of this nanocomposite.

Results and Discussion: Both PECE hydrogel and GNRs-QX-314/PECE hydrogel nanocomposites showed the sol-gel transition within 2 min from room temperature (25°C) to physiological temperature. With exposure to near-infrared irradiation, the gold nanorods-QX-314/hydrogel nanocomposite can activate TRPV1 channels through photothermal conversion and release QX-314 at the same time. This gold nanorods and QX-314 loaded hydrogel exhibits a long-lasing regional anaesthetic effect with selective sensory function block. Sensory block duration of nanocomposite was significantly longer than 1% lidocaine (90.0±3.5 vs. 37.5±3.5 min, P<0.001). Motor block by the nanocomposite was observed for only 40% of rats with significantly shorter duration than its sensory block (42.5±4.1 vs. 90.0±3.5 min, P<0.001). With the 808 nm laser irradiation, the PECE hydrogel changes into gel phase to release QX-314 and thermal activate TRPV1 channel at the same time. The burst release of QX-314 from PECE hydrogel diffuses into cellular through TRPV1 channel and block voltage-dependent sodium channel to produce selective long-lasting regional anaesthesia.

**Conclusion**: This nanocomposites can produce selective long-lasting regional anaesthesia triggered by photothermal activation of TRPV1 channels.

#### ESAPC2-6

The effect of buffered lidocaine in local anaesthesia during subcutaneous implantable venous access devices insertion: a prospective, randomized, double-blind study

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Background and Goal of Study: Subcutaneous implantable venous access devices through the subclavian vein are routinely implanted under local anaesthesia. However, patients complain of pain during the injection of local anaesthesia. This randomized, double-blind study evaluated the effectiveness of sodium bicarbonate-buffered lidocaine on reducing pain during subcutaneous implantable venous access devices. Patients satisfactions were evaluated immediately after the procedure.

Materials and Methods: A prospective double-blind study was conducted over a period of 14 months (February 2015 to March 2016). Patients were randomized to receive either buffered (PH= 7.33) or plane lidocaine (PH= 3.50). All insertions were made by the same operator using a standard technique. All patients underwent real-time ultrasound-guided cannulation of the subclavian vein. Pain and satisfaction were evaluated on a VAS score (0-100 mm).

**Results**: A total of 120 patients were enrolled in this study. There was no difference detected between the two treatment groups pre-procedure and during needle insertion. Patients reported significantly lower pain scores with the buffered versus non-buffered lidocaine 15.70  $\pm$  7.58 mm vs.46.90  $\pm$  12.27 mm (p<0.001). The time of anesthesia onset was shorter with buffered lidocaine 3.25±1.33 minute vs. 5.46±1.28 (p=0.01). Mean procedure pain scores were similar between the two groups. Overall patient satisfaction is high for implantation of venous access devices under local anaesthesia. There was no difference between the two groups regarding satisfaction.

Conclusion: During vein cannulation under local anesthesia, pain is mainly due to acidity of the lidocaine solution. In our study, we showed that buffering lidocaine with sodium bicarbonate significantly reduces pain during intraparenchymal injections.

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13AP08-12, 13AP08-6, 14AP05-4

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