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Abstracts

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BAPC-1

Dexmedetomidine increases expression of peroxisome proliferator-activated receptor gamma (PPAR-gamma) in LPS-stimulated mouse macrophage-like cells

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Background and Goal of Study: Attention has been paid to an anti-inflammatory effect of dexmedetomidine (Dex). However, its mechanism has not fully been clarified. Peroxisome proliferator-activated receptor gamma (PPAR-gamma) is known to be involved in an anti-inflammatory pathway through the cyclooxygenase (COX) cascade. We hypothesized that Dex has an anti-inflammatory effect by increased PPAR-gamma expression. Therefore, the purpose of the present study was to evaluate the effect of Dex on PPAR-gamma expression in LPS-stimulated mouse macrophage-like cells, and also to investigate inflammatory responses and production of an endogenous PPAR-gamma ligand, 15-deoxy-delta-12,14-prostaglandin J2 (15dPGJ2).
Materials and Methods: We used the mouse macrophage-like cell line Raw264.7 (DS Pharma Biomedical). The cells were incubated with LPS (10 ng/mL) and Dex (1 or 3, and 10μmM) for 6 hours. Supernatants of the incubated cells were collected, and concentrations of tumor necrosis factor (TNF) -alpha, interleukin 6 (IL-6), and 15dPGJ2 were measured using the specific ELISA kits. Furthermore, gene expressions of PPAR-gamma and COX-2 were evaluated in the cells, using a real-time PCR system with specific primers. Difference among the values was analyzed using one-way ANOVA followed by Dunnett's multiple comparisons test.
Results and Discussion: LPS increased productions of TNF-alpha and IL-6 and gene expression of COX-2 in the incubated cells, while the addition of Dex at 10μmM inhibited them. Furthermore, the Dex significantly increased PPAR-gamma expression and 15dPGJ2 production in the cells (Fig. 1). The increase of 15dPGJ2 production is thought to be involved in the increase in PPAR-gamma expression, which inhibits inflammatory responses. Therefore, the results suggest that the anti-inflammatory action of Dex is by increased PPAR-gamma expression.
Conclusion: The results of the present study indicate that Dex increases PPAR-gamma expression in LPS-stimulated mouse macrophage-like cells, suggesting it is a possible mechanism of its anti-inflammatory effect.

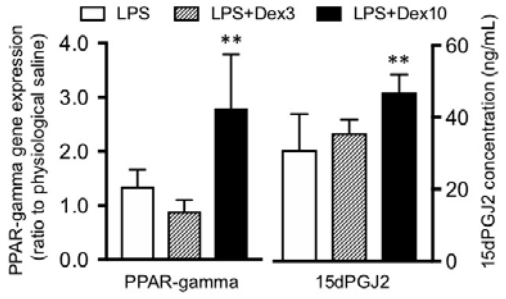

Fig.1 Effects of dexmedetomidine on peroxisome proliferator-activated receptor gamma (PPAR-gamma) gene expression and 15-deoxy-delta-12,14-prostaglandin J2 (15dPGJ2) production after 6-hour incubation of mouse macrophage-like cells.
Dex1 and Dex10: Dexmedetomidine at 1 and 10 μM, respectively,
**P< 0.01 vs. LPS

BAPC-2

Remote ischemic preconditioning attenuates lipopolysaccharide induced systemic inflammation through suppressing MAPK/AKT/NF-kB/COX-2 pathway, regardless of RIPC applied time

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Background and Goal of study: Remote ischemic preconditioning (RIPC) has a protective effect on ischemic-reperfusion (I/R) injury and septic inflammatory injury. The protective effect has been reported to have a biphasic pattern in I/R injury; acute protective effects wane after a few hours, but a delayed second window of protection occurs after 24 h. However, it is not yet known whether RIPC has biphasic pattern or not on the protective effects in sepsis. Therefore we investigated whether RIPC has protective effect by biphasic pattern in terms of survival rate, pro-inflammatory cytokines, and NF-κB activation in LPS-induced sepsis model. In addition, we studied whether RIPC was influenced by NF-κB nuclear translocation via MAPK and AKT pathways and COX-2.
Materials and Methods: The lipopolysaccharide (LPS)-induced sepsis model was created by injecting 20 mg/kg LPS intraperitoneally (i.p.) in BALB/c mice. RIPC was performed with three cycles of 10 min of ischemia and 10 min of reperfusion of the right hind limbs using a tourniquet (1, 4, 8, 10, 12, 14, or 24) h prior to the injection of 20 mg/kg LPS. The control group received i.p. normal saline. The 5-day survival rate and serum cytokine levels were measured. We determined the levels of total and phosphorylated AKT and MAPKs (ERK and p38) by western blotting. To investigate whether RIPC could affect the nuclear translocation of NF-κB (p65), we performed western blot analysis of NF-κB (p65) by fractional cytoplasm and nucleus from liver tissues.
Results and Discussion: Survival was significantly increased in mice who received RIPC compared to the LPS group (((80–100) vs 30) %, P<0.05). Levels of interleukin-6 and -12 were significantly decreased in RIPC treatment groups compared to the LPS group (all P<0.05). All of the RIPC/LPS groups showed significantly decreased phosphorylation of ERK, p38, and AKT, as compared to the LPS-only group. All RIPC/LPS groups showed significant decrease in nuclear NF-κB binding, as compared to the LPS-only group. All of the RIPC/LPS groups showed significantly decreased COX-2, compared to the LPS-only group.
Conclusions: Our study demonstrates that the protective effect of RIPC was not limited to the biphasic time pattern in terms of survival rate and pro-inflammatory cytokines in an LPS-induced sepsis model. RIPC appears to exhibit protective effects by suppressing the activation of MAPKs, AKT, NF-κB activation, and also COX-2.

BAPC-3

Dose-response relationship of perineural dexamethasone for interscalene brachial plexus block: a randomised, controlled, triple-blinded trial.

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Background: Literature has established that 4 mg of perineural dexamethasone represents a ceiling dose to prolong duration of analgesia after injection of long-acting local anaesthetics for peripheral nerve block. Evidence below 4 mg is lacking. This randomised controlled triple-blinded trial tested the hypothesis that increased doses of perineural dexamethasone from 1 to 4 mg would prolong duration of analgesia in a dose-dependent manner.
Methods: Eighty ASA I-II patients scheduled for shoulder arthroscopy under general anaesthesia with ultrasound-guided interscalene brachial plexus block were randomly allocated to 5 groups: normal saline (control), dexamethasone 1mg, 2mg, 3mg and 4mg, associated with ropivacaine 0.5%, 20 mLs. Postoperative pain treatment consisted of paracetamol, diclofenac and oxycodone, made available on request, following a pre-defined protocol. The primary outcome was duration of analgesia, defined as the time between the block procedure and the first analgesic request. Secondary outcomes included rest, dynamic pain scores (numeric rating scale out of 10), and paracetamol, diclofenac and oxycodone consumptions at 2, 24 and 48 postoperative hours. The analysis of the dose-response relationship was performed using the "Multiple Comparison Procedure-modelling".
Results: Duration of analgesia was significantly prolonged in a dose-dependent manner with increased doses of perineural dexamethasone (group control: 685min[590-860]; dexamethasone 1mg: 835min[740-1110]; dexamethasone 2mg: 904min[710-1130]; dexamethasone 3mg: 965min[875-1025]; dexamethasone 4mg: 1023min[838-1239]; p=0.03). There were no significant differences among the secondary outcomes.
Conclusions: Perineural administration of dexamethasone with doses ranging from 1 to 4 mg prolongs duration of analgesia in a dose-dependent manner, when combined with ropivacaine for interscalene brachial plexus block.

BAPC-4

In vivo performance of a membrane CO_2 scrubber during target controlled closed-circuit anesthesia

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Introduction: Sodalime is safe [1], but not ideal for reasons of ecology (production, disposal), ergonomics (need to replace), economy (not used to full potential), and dust formation. Memsorb [MS](DMF Medical, Halifax, Canada) uses cardiopulmonary bypass oxygenator technology: a sweep gas driven through semipermeable hollow fibers adds or removes gases from the circle breathing system (whose gases pass between the fibers) according to partial pressure gradients and permeability. [MS] was tested in the Zeus (Dräger, Lübeck, Germany) during target-controlled closed-circuit anesthesia (TCCCA) with desflurane in O_2/air.
Methods: IRB approval/written informed consent was obtained in 12 ASA PSI-III patients undergoing robotic prostatectomy. TCCCA targets were 39% inspired O_2 (F_IO_2), 5.0% end-expired desflurane ($F_A$des), and 4.5-6.0% F_ACO_2 (by adjusting ventilation). The O_2/air (40% O_2) sweep flow from a blender to the [MS] was adjusted to keep $F_ICO_2 \leq 0.8\%$. Data collected were F_IO_2, $F_A$des, F_ICO_2, F_ACO_2, minute ventilation (MV), O_2 and air fresh gas flow (FGF), sweep flow, and cumulative desflurane usage (Vdes). Vdes ($F_A$des = 5.0%) was compared with historical data of the Zeus used with sodalime (Dräger 800+) during TCCCA [2] and manual CCA [3]
Results: Fig. 1. Age, height, and weight were 67(7), 173(5) and 78(13) resp. A 14-30 L/min sweep flow (A) kept $F_ICO_2 \leq 0.8\%$ (B) and $F_ACO_2 \leq 6.0\%$ (C) with 5-7.8 L/min MV (D). $F_A$des (E) and F_IO_2 (F) were on target. Total FGF (G) became 0 within 1.5-6 min, occasionally briefly increasing thereafter, e.g. when abdominal pressure was applied. Vdes (H) was higher than reported with sodalime with Zeus TCCCA and manual CCA (blue and green line in pane H, resp.).

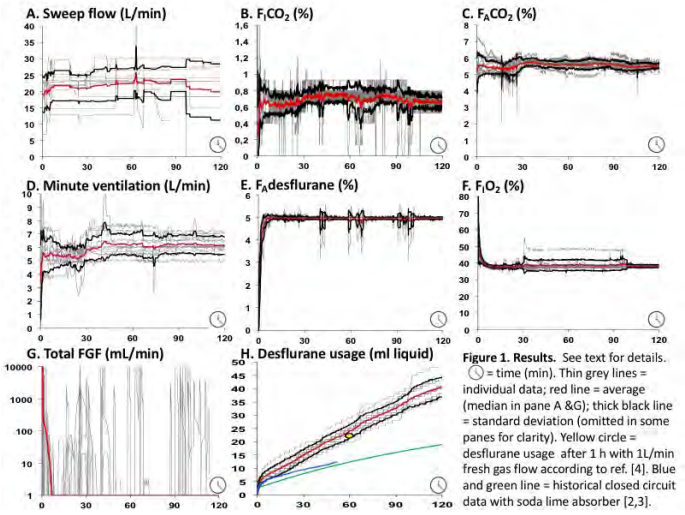

Figure 1. Results. See text for details. = time (min). Thin grey lines = individual data; red line = average (median in pane A &G); thick black line = standard deviation (omitted in some panes for clarity). Yellow circle = desflurane usage after 1 h with 1L/min fresh gas flow according to ref. [4]. Blue and green line = historical closed circuit data with soda lime absorber [2,3].

Discussion: [MS] removed CO_2 well. A small F_ICO_2 rise may require a small MV increase. O_2 transfer from the [MS] covered O_2 uptake. Per 1% $F_A$des, ±2.0 mL/h liquid desflurane may be lost via the [MS] or Zeus, waste equivalent to that of a 1h anesthetic with ±1 L/min FGF [4].
References:
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BAPC-5

Comparison of distribution patterns among three approaches for quadratus lumborum block: an imaging study by 3D-CT scanning

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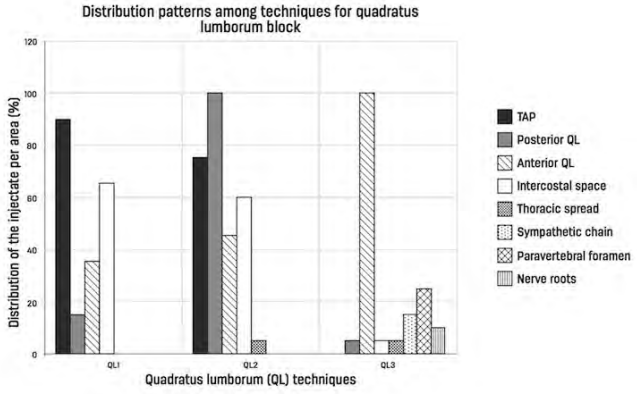
Background and goals: The quadratus lumborum (QL) block is an interventional analgesic method which comprises several different injection techniques thought to result in different local anesthetic (LA) spread patterns around the QL muscle (lateral spread with QL1, posterior spread with QL2 and anterior spread with QL3). Recent data in human cadavers suggests that injection in the anterior, transmuscular approach (QL3) also reaches the thoracic paravertebral space. Because the distribution of injectate in cadavers may differ from that in patients, the goal of this study to determine the LA distribution using 3D-CT imaging.
Materials and methods: After ethics committee of University Hospital of Liege approval and registration (Eudra-CT 2017-004221-32), 30 patients scheduled for abdominal surgery were randomized to receive one of the three injection techniques in each side: QL1, QL2, and QL3 (20 blocks per group). For QL1, the injection was made within the fascia transversalis, for QL2 the posterior aspect of the QL, and for the QL3 group into the plane between the QL and psoas muscle above the transverse process of L2. Injections consisted of 18 mL of ropivacaine 0.375% with 2 mL of radio-opaque contrast; followed by high-definition CT scanning and 3D image reconstruction. Images were reviewed by three trained observers blinded to the randomization to assess the presence of the contrast in 8 defined anatomical areas of interest (Figure 1).
Results and discussion: Demographic data of patients included was similar among the groups. The distribution of contrast injected with each QL technique is presented in Figure 1. Dissemination patterns varied among the three QL techniques. QL1 and QL2 injections resulted in a similar distribution, although QL2 showed a more extensive and consistent spread around the QL muscle. Spread after QL3 was highly variable.
Conclusions: Injection of radiopaque dye-containing local anesthetics in QL blocks results in an inconsistent and highly-variable spread, as assessed by CT imaging and 3D reconstruction.



BAPC-6

Lidocaine levels when used intravenously or in thoracic paravertebral space during lung resection surgery

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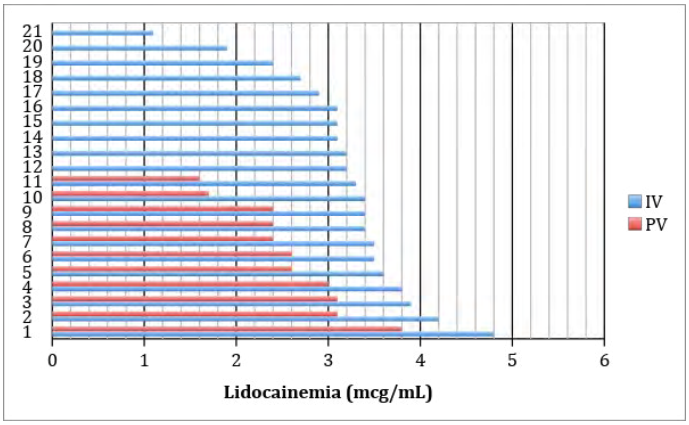
Background and Goal of Study: Lidocaine administered intravenously (IV) is recommended in patients undergoing surgery. However, anesthesiologist could be concerned about toxicity related to high levels of plasmatic lidocaine. Although thoracic paravertebral (PV) analgesia is commonly used in lung resection surgery (LRS), local anesthetics injected in PV space have a high systemic absorption. The aim of this study was to compare plasma concentration of lidocaine at the end of thoracic surgery in patients who received this local anesthetic IV or by PV route and to evaluate safety of those concentrations.

Materials and Methods: We designed a prospective study approved by a local ethics committee. 32 patients who underwent LRS that required > 1 hour of One Lung Ventilation (OLV) were included and randomized in 2 groups (IV lidocaine and PV lidocaine). In both groups a PV catheter was inserted in T5-T6 and 3 ml of lidocaine 1% with adrenaline were administered as a test dose. Group 1 received IV lidocaine (1.5 mg/kg/h) whereas group 2 received lidocaine 2% by paravertebral route (0,15 ml/kg/h). At the end of surgery a blood test to determinate plasmatic levels of lidocaine was taken. Statistical analysis was carried out with Mann-Whitney test.
Results and Discussion: In the group where lidocaine was administered IV, mean value (standard deviation) of plasma lidocaine was 3.21 (0.7) µg/mL and the median (interquartile range) was 3.3 µg/mL [3-3.55] while in the group where it was administered in thoracic PV space, those values were 2.61 µg/mL (0.6) and 2.6 µg/mL [2.4-3.1], respectively. Lidocaine levels when administered in PV space were 80% of those reached when administered IV. The differences between both values were statistically significant. There was no patient in any group who showed levels greater than 5 µg/mL, which is the limit for lidocaine's therapeutic range. In addition to that, no patient developed toxicity.



Conclusion: Lidocaine administered by paravertebral route has a high systemic absorption and both, intravenous administration and administration by paravertebral route, are safe during lung resection surgery.

General Anaesthesiology

01AP01-1
Propofol-based general anaesthesia reduces incidence of delirium in elderly patients after major cancer surgery: a multicentre, randomized controlled trial

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Background and Goal of Study: Delirium is a common complication in elderly patients after surgery and is associated with worse outcomes. The choice of anaesthetics, that is, either inhalational or intravenous anaesthetics, may affect delirium occurrence but evidences are conflicting. This study was designed to compare the impact of anaesthetics on the incidence of delirium in elderly patients after major cancer surgery.
Materials and Methods: This multicentre, randomized controlled trial was conducted in 17 tertiary hospitals in China. Elderly patients (age ≥65 but <90 years) who were scheduled to undergo major cancer surgery (predicted duration ≥2 hours) were randomized to receive either propofol-based or sevoflurane-based general anaesthesia. Other medications including sedatives, opioids and muscle relaxants are administered in both groups according to routine practice. Delirium was assessed twice daily during the first 7 days after surgery with the Confusion Assessment Method (CAM) or the CAM for the Intensive Care Unit (CAM-ICU). The primary end point was the incidence of delirium during the first 7 postoperative days. This trial was registered with Chinese Clinical Trial Registry (www.chictr.org.cn, ChiCTR-IPR-15006209) and ClinicalTrials. gov (NCT02662257).
Results and Discussion: From April 1, 2015 to November 30, 2017, 1220 patients were enrolled and assigned to either propofol (n=610) or sevoflurane (n=610) group. Of these, 1190 were included in the final intention-to-treat analysis. The incidence of delirium within 7 days was significantly lower in the propofol group (8.3% [50/601]) than in the sevoflurane group (11.9% [70/589]; odds ratio [OR] 0.672, 95% confidence interval [CI] 0.458 to 0.984; p=0.040). Secondary outcomes including incidence of non-delirium complications within 30 days, length of stay in hospital after surgery, and 30-day mortality did not differ between groups. There were no significant differences between groups regarding the incidence of adverse events. This is the first sufficiently powered multicentre trial that compares the effect of two commonly used anaesthetics on postoperative delirium in the elderly.
Conclusion: For elderly patients undergoing major cancer surgery, propofol-based general anaesthesia reduces the incidence of postoperative delirium when compared with sevoflurane-based general anaesthesia. The impacts of anaesthetics on long-term outcome are currently under investigation.

01AP01-2
An audit of anaesthetic practice and neurological outcomes after endovascular clot retrieval at Austin Health.

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Background and Goals of study: Endovascular Clot Retrieval (ECR), has transformed the treatment of stroke, yet ideal anaesthetic technique is yet to be clarified. This audit was conducted to evaluate the role of the anaesthetic unit at a tertiary hospital in managing ECR cases. The primary outcome was in-hospital mortality, with subgroup measurement of survival differences between GA and CS/LA patients, and an assessment of functional level at discharge.
Materials and Methods: A retrospective audit of ECR cases at Austin Health over one year was performed. Patient details and neurological data were sourced from a stroke database and collated in a secure spreadsheet. Further data sourced from patient notes included, procedure time, hospital length of stay (LOS), In-hospital mortality, NIHSS (National Institute Health Stroke Score) at presentation and after 24 hours, and a qualitative comment on functional status at discharge.
Results: 76 cases were performed between August 2017-18. Of these, 59 were performed under LA+-CS and 17 under GA. Overall mortality was 19.7% (17/76), which was higher in the GA group (41% vs 13% OR 4.46 CI:1.3-15.1,p=0.016). There seemed to be a difference in neurological outcome at discharge, with 2 GA patients (11%) being discharged home at pre-morbid level of function, compared with 24 (41%) given CS/LA (OR 5.14). The majority of patients were able to discharge home either at, or just below pre-morbid function (62%), but 13 patients required transfer to full time care and this was not affected by anaesthetic technique. Anaesthetic presence (94%) was high and unexpected change to GA (3%) was rare. 59% of the GA cases occurred where choice of GA vs LA/CS was pre-determined and independent of the anaesthetist. 53% of cases occurred during business hours, and only 8% occurred during the overnight shift. The average ECR duration was 66 minutes, with an average hospital LOS of 10 days.
Discussion: This audit highlights many issues in the management of urgent ECR cases. It shows the observed binary nature of neurological outcomes to be expected after such a procedure, these being neurological recovery, or failure of the procedure leading to palliation. Contrary to recent trials, our audit demonstrated a higher mortality in patients being managed with GA compared with LA/CS.
Conclusion: Anaesthetic involvement in ECR is recommended. Our audit demonstrates an ongoing tendency for anaesthetists to favour local anaesthesia or conscious sedation.

01AP01-3
Acquired Hemophilia in a Patient offered Central Neuraxial Anesthesia

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Background: Guidelines regarding the need for preoperative tests for coagulation do not recommend that they be performed for ASA I/II patients before surgery. However, unexpected rare complications may increase the risk of bleeding in patients for surgery under central neuraxial anesthesia. We describe a case where a patient offered central neuraxial anesthesia was subsequently found to have acquired hemophilia, and discuss the need for coagulation tests in patients being offered central neuraxial blocks.
Case report: A 59-year-old gentleman was planned for saucerisation of perianal abscess. His only significant past medical history was that of well-controlled hypertension. He denied any alcohol history, was not on any antiplatelet or anticoagulation, and had no history of bleeding diathesis. Initial blood investigations were as follows: hemoglobin 16.4g/dL, platelet 191 x 10^9/L. No coagulation screen was done. The patient was offered both the option of general anesthesia or central neuraxial anesthesia for his surgery. He chose to have a general anesthesia; LMA #4 was inserted, and the operation proceeded uneventfully. He was re-admitted on postoperative day (POD) 2 for hemostasis of the perianal wound, and again on POD 9 for persistent ooze from his wound. CT pelvis showed active extravasation and he underwent angio-embolisation of the anterior division branch of the left

internal iliac artery. Coagulation screen at that point showed elevated aPTT values. He continued to have persistent bleeding and increasing a PTT values despite treatment with vitamin K. He was referred to a haematologist and the impression was that of acquired hemophilia. Factor 8 inhibitor level was elevated at 170, and Factor 8 level decreased at <1%. He was started on IV FEIBA, oral prednisolone and oral cyclophosphamide.
Discussion: This is a case in which a potential neuraxial bleed was narrowly avoided. Acquired hemophilia is a rare disease with a worldwide distribution. It mainly occurs in older adults and there is no known association between increased susceptibility and race or gender. In patients with acquired coagulopathy, performing a central neuraxial block may result in the development of a spinal/epidural hematoma. While there are no anesthesia guidelines that recommend doing a coagulation profile before proceeding with surgery for ASA I/II patients, it should be considered if a central neuraxial block is being offered.

01AP01-4

Prolonged low bispectral index and low mean arterial pressure during massive bleeding is associated with poorer post-operative outcomes.

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Background and Goal of Study: Prolonged concurrent periods of low bispectral index (BIS) and hypotension during surgery is associated with higher morbidity. The "Double Low (DL)" condition is defined as the cumulative period of concurrent low BIS and low mean arterial pressure (MAP) and has been considered as a strong predictor of morbidity than low MAP alone. In massive bleeding patients the BIS often presents extremely low values and the DL duration time in such patients may predict poorer outcomes. We tested the association of cumulative DL duration time and all-cause 30-day mortality in patients surviving intraoperative massive bleeding.
Materials and Methods: After review board approval, we retrospectively reviewed all surgical records at our center from 2010 to 2018. Massive bleeding was defined as intraoperative blood loss exceeding 10,000ml and data from these cases were collected. We excluded hypothermic circulatory arrest cases and patients with pre-diagnosed cerebral dysfunction. Blood transfusions were performed in accordance with guidelines and depth of anaesthsia was titrated. Patients were allocated to either the DL or to the control group, by using 15minutes as a cut off value for the cumulative duration of concurrent low BIS (<30) and low MAP(<65mmHg). Our primary outcome was all-cause 30-day mortality. Secondary outcomes included all-cause 100-day mortality rate. Kaplan-Meier survival analysis and multiple logistic regression models were used for statistical analysis.
Results and Discussion: Data from 70528 cases were analyzed. Massive bleeding occurred in 0.13%(n=96). The most frequent surgical procedure was living donor liver transplantation (18.8%). After removing incomplete data cases, 81 cases were included for further analysis. Patients were assigned to either the DL group (n=28) and the control group (n=53). The all-cause 30-day mortality rate of DL group was significantly higher than the control group (24.1% vs 7.5%, p<0.001). In our multiple regression model, the DL condition significantly increased the odds for 30-day mortality (Odds ratio 4.97, 95% confidence interval 1.24-20.01, p=0.024) The 100-day mortality rate of DL group was also significantly higher (51.0% vs 20.7%, p<0.001). The BIS monitor maybe useful for the detection of inadequate cerebral perfusion during surgery.
Conclusions: The prolonged "Double Low" condition in massively bleeding patients is associated with higher all-cause 30-day and 100-day mortality.

01AP01-5

Association Between Changes of GFAP After Surgery and Postoperative Delayed Neurocognitive Recovery: An observational pilot study.

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Background and Goal of Study: In previous studies association between plasma brain-specific protein glial fibrillary acid protein (GFAP) and cognitive decline 1 month after non-cardiac surgery was detected. We hypothesized that changes of GFAP could be related to early postoperative delayed neurocognitive decline (DNR).
Materials and Methods: 30 patients undergoing prolonged oncological surgery were enrolled. Inclusion criteria were anticipated duration of surgery >300 min and age >60 years. GFAP was drawn before induction of anesthesia (1), next day after surgery (2) and on 4-5 day (3). Neuropsychological testing was performed before surgery and on 4-5 postoperative day.
Results and Discussion: Neuropsychological testing results present in table 1.

	Preoperative	Postoperative	P-value (Wilcoxon matched pairs test)
General info test (score)	3 (0)	3 (0)	1,0
Orientation test (score)	3,43 (0,73)	3,37 (0,89)	0,64
Clock-drawning test (score)	8,97 (1,03)	8,4 (1,71)	0,04
Mental arithmetic test (score)	3,63 (0,72)	3,6 (0,77)	0,83
Short-term auditory-verbal memory test (score)	1,83 (0,95)	2 (0,91)	0,54
Trail-making test (score)	4,6 (1,4)	4,6 (1,38)	0,94
Digit symbol substitution test (sec)	59,4 (19,7)	69,3 (20,4)	0,0006
Stroop test (sec)	90,3 (39,1)	81 (24,7)	0,14
Composite Z-score	0 (1)	0,128 (1,07)	0,58

DNR (>1 SD decrease in Z-score from preoperative) was observed in 5 cases (17%).
Plasma GFAP levels present in table 2.

	1	2	3	P-value (Friedman ANOVA)
GFAP (ng/mL)	0,151 [0,098;0,184]	0,137 [0,115;0,163]	0,134 [0,079;0,164]	0,22

There was no correlations between plasma GFAP levels and composite Z-score. Also there was no difference in plasma GFAP levels and its changes between patients with or without DNR.
Conclusion: In our study we detected much higher levels of GFAP before surgery. This could be related to non-brain release from stellate cells of tumor and could mask changes of brain-released GFAP.

01AP01-6

Anaesthesia for electroconvulsive therapy in a patient with Huntington's disease. A case report

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Background: Huntington's disease (HD) is an inherited progressive neurodegenerative disorder characterized by choreiform movements, psychiatric problems and dementia. Electroconvulsive therapy (ECT) is used in clinical practice for severe or treatment-refractory mood disorders and catatonia.However ECT may be involved in causing cognitive adverse effects and there is a concern about performing ECT in patients with HD because they already have cognitive deficits(1).
Case report: A 67 year-old-woman with genetically confirmed HD was admitted to a psychiatric unit because of therapy-resistant major depression.Following a risk-benefit analysis, we decided to perform 16 ECT sessions. The patient was admitted to an inpatient psychiatric unit in the fisrt week but the next sessions were ambulatory. The induction agent of choice was propofol, titrated to BIS 60-70 and succinylcholine 0.5 mg/kg for muscle relaxation The goal of ECT is to produce a generalized cerebral seizure longer than 15 secs in order to achieve better outcomes(2). The benefits were seen after 3 weeks of treatment and included improved mood and ambulation without developing cognitive deficits. However we started to see less effective seizures(less than 15 sec) after 10th session despite the fact that we were tapering propofol up to 50 mg(BIS always less than 70)(3). Considering the fact that therapeutic ECT seizures are important to achieve better outcomes, we decided to switch to etomidate. The last 5 treatments performed under etomidate were considered effective and the only side effect we saw was longer acute confusion after ECT(10 minutes with propofol and 40 min with etomidate) but no cognitive side effects
Discussion: Propofol is the most frequently used hypnotic agent in countries where metohexital is not available but due to its anticonvulsivant properties it should be properly titrated. In this scenario BIS monitor plays an important role as most effective seizures are achieved on 60-70 BIS. However when effective seizures are not achieved despite propofol titration, switching to etomidate is an alternative
Conclusions: Choosing hypnotic agent and dose is crucial for success BIS monitor plays an important role in reducing hypnotic dose
References
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2. Technique for performing ECT. UpToDate chapter
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1AP01-7
Acute catatonia in a postoperative patient

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Background: Catatonia is a psychomotor syndrome that is associated with psychiatric, medical and neurologic illness. Patients with a history of mental illness are at risk of catatonia when they become acutely unwell, especially when longstanding psychiatric medications have been stopped. [1] These conditions occur in the postoperative period, where the presentation of catatonia overlaps with delirium.
Case Report: A 56-year-old Chinese woman with breast cancer presented for skin sparing mastectomy, sentinel lymph node biopsy and reconstruction with TRAM flap. She has a history of bipolar disorder which was well-controlled on lithium, olanzapine and lurasidone. The medications were omitted one day before operation. The uneventful operation lasted 10 hours, during which she had been maintained on total intravenous anaesthesia with target-controlled infusions of propofol and remifentanil. She was extubated awake and transferred to recovery. In recovery, she was noted to be staring blankly, and giving inconsistent monosyllabic answers. She did not obey simple commands, exhibited unusual posturing and had waxy rigidity on examination. There were no focal neurologic signs, and no fever, rigidity or dysautonomia. Blood tests and CT brain were unremarkable. Olanzapine was restarted, and the symptoms resolved by the next morning. The patient had no recall of the events overnight.
Discussion: Catatonia is diagnosed by the DSM-V if the clinical picture is dominated by at least three of the following: stupor, catalepsy, waxy flexibility, agitation, mutism, negativism, posturing, mannerisms, stereotypy, grimacing, echolalia and echopraxia. The differential diagnosis of catatonia includes NMS, delirium and stroke. It is difficult to distinguish postoperative delirium from catatonia. Delirium is more common in the elderly, whereas catatonia is usually associated with a history of bipolar disorder and schizophrenia. Alertness and consciousness are typically not impaired in catatonia. Acute catatonia typically responds to benzodiazepines, and antipsychotic drugs are not recommended. However, where withdrawal of longstanding psychiatric medications may be a triggering factor, as in this case, restarting these medications may result in improvement of symptoms.
References:
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Learning points: Recognise catatonia as a differential diagnosis for postoperative delirium, especially in patients with a history of mental illness.

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01AP01-8
Management of a cerebrospinal fluid leak after mild thoracic trauma in a patient with previous post-dural puncture headache

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Background: Cerebrospinal fluid leaks (CSFL) are most common after spine surgery, though may occur spontaneously, with an incidence of 5/100,000. Orthostatic headache is the prime manifestation together with subdural fluid collections, enhancement of the pachymeninges and sagging of the brain in MRI, however, in 20% of cases no CSFL is identified.
Case report: 30 year-old ASA 1 woman, with a previous history of post-dural puncture headache (PDPH) after an epidural analgesia for vaginal delivery 8 months ago was admitted with orthostatic headache after a mild thoracic trauma. The patient described a headache of the same characteristics as PDPH, brain-CT was normal and she was sent home with paracetamol and NSAIDs. She returned 3 weeks later due to worsening headache, neck and back pain. MRI showed “brain sagging” and other signs of intracranial hypotension and spine-MRI a herniated disc at T9-10, no CSFL. Due to high suspicion of a CSFL a myelography was performed, showing a leak at T8-T9 and another one at L3-L4, this last one was considered to be iatrogenic as this space was used to inject the contrast for the myelography. An epidural bloodpatch (EBP) was performed at T8-T9, the patient´s headache improved but not significantly, so a second EBP was performed 2 days later at L3-L4. After the second EBP the headache slowly improved but due to severe back pain oral opioids were prescribed. 1 week after the last EBP a new spine-MRI showed no signs of CSFL nor epidural hematomas and the patient was discharged. At a control 2 weeks later the patient had no headache, the back pain was minimal and she could perform her daily activities with paracetamol and NSAIDs.
Discussion: The patient presented with a typical orthostatic headache, a lumbar CSFL after mild spine trauma and an iatrogenic L3-L4 CSFL after myelography. 2 EBP were necessary for the symptoms to subside. EBP are the treatment of choice, with success rates of up to 90% depending on the protocol used.
References:
JAMA 2006;295:2286-96. Eur Spine J. 2004;23:1772-6. Eur J Neurol 2010;17:715-719. Acta Anesthesiol Scand 2012;56:1332-5
Learning points: -EBP is the treatment of choice in CSFL, with more than 1 being necessary to mitigate the symptoms. -If there is a high suspicion of a CSFL and the MRI is negative, a myelography should be done to diagnose the level of the leak and increase the EBP success. -Good communication between neurologists and anaesthesiologist is crucial for the treatment of CSFL.

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01AP01-9
How substantial is preoperative evaluation: history of unknown epilepsy and the resulting resistant convulsion during caesarean section

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Background: Preoperative evaluation is an important stage in which medical conditions of the patients to be operated, their previous operations, cardiovascular, respiratory, metabolic and all other systems, allergy history, harmful habits, and difficult airway risks are evaluated in detail. We present a case of resistant convulsion during caesarean section(CS) in a patient with a history of unknown syncope and convulsion not mentioned in the patient’s anamnesis during perioperative evaluation.
Case Report: 29-year-old woman with a history of unknown epilepsy was diagnosed with gestational hypertension and type II diabetes at the time of pregnancy. The patient pregnant for 38 weeks and 3 days was taken to the operating room for CS. Spinal anaesthesia with a 2.5 cc 0.5% heavy marcaine via a 26 Gauge Tuohy needle was performed to the patient who had 140/75 mmHg blood pressure, 105 / min pulse, and 97% peripheral oxygen saturation at the beginning of the operation. Towards the end of the CS, the patient had blurred consciousness, deviation in the eyes and then tonic-clonic contractions. 2mg midazolam was administered intravenously in order to stop seizures in the following process. The patient whose convulsions could not be stopped with the interventions was intubated with 50mg rocuronium and 400mg thiopental injection. Following the end of the CS, the patient was transferred to the anaesthesia intensive care unit (ICU) for postoperative care. Admission to ICU, the patient was evaluated as GCS: 9-10 (intubated) and in the second hour of ICU, she was uneventfully extubated after antagonizing with sugammadex (2 mg / kg).During the next period, GCS:15 was evaluated and no new seizures were observed. Brain MRI of the patient before and during the ICU, did not reveal any pathological findings that could explain the current neurological event. The patient discharged to Obstetrics service with GCS:15 two days later and discharged to home from here without any problems.
Discussion: It is possible for surgical and anaesthesia team to encounter unforeseen and serious perioperative complications as a result of patients’ incomplete or false information about their medical history either intentionally or unconsciously not allowing to take the necessary precautions. As a result, it is essential both for the physician and the patient to be alert against the diseases not mentioned in the medical history and resulting possible complications.

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01AP01-10
Anaesthetic Management of Cervical Dissection of a Vagal Schwannoma Tumor – Case Report

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Background: Schwannomas are solitary benign tumours of Schwann cells arising from any nerves covered with a neurilemmal sheath. About 35% occur in head or neck. Vagus nerve Schwannomas are rare arising typically from the nerve sheath compressing nerve fibres extrinsically.[1]
Case Report: Female, 67 years old, ASA III scheduled for cervical dissection of a suspected vagus Schwannoma. The patient understood the possible morbidity related to the procedure. She was submitted to intravenous anaesthetic induction and endotracheal intubation with NIM® 3.0 tube followed by balanced anaesthesia manutention. During tumoral dissection, partial section of the vagal nerve occurred. Nerve monitoring revealed no nerve response proximally to the section site. Sectioned nerve fibre was immediately sutured. At the end of the surgery the patient was extubated, awaken and transferred to post anaesthesia care unit. Four days after surgery, the patient had dysphagia for liquids; Laryngoscopy revealed right vocal cord paralysis. Epiglottis and left arytenoid sensibility were maintained. Nine months after surgery the patient had no dysphagia or other complaints.
Discussion: Surgical excision of Schwannoma is the treatment of choice. It is possible to open the capsule and shell out the tumor, leaving the capsular nerve fibers undisturbed avoiding functional deficit.2 Endotracheal intubation with Nerve Monitoring tube is a useful tool providing a patent airway for ventilation and nerve monitoring of both vocal cords. Also, close follow-up of the patient is needed to access post-operative neurological status [2] and manage possible damages.

References:
1. Suresh Pillai.Ancient schwannoma mimicking a thyroid mass with retrosternal extension, 2013 Sep 3; BMJ Case Rep
2. Ku HC.Cervical schwannoma:a case report and eight years review; J Laryngol Otol.2000 Jun

Learning points: Schwannomas are benign tumours arising from nerves covered with a neurilemmal sheath. Surgical excision is the treatment of choice and should consist on opening the capsule and shell out the tumour, thereby leaving the capsular nerve fibres undisturbed avoiding functional deficit which sometimes is not possible. Endotracheal intubation with Nerve Monitoring provides a patent airway for ventilation, intraoperative nerve monitoring of both vocal cords, identification of the recurrent laryngeal or vagus nerve, control manipulation during neck dissection and verify the integrity of the nerves prior to surgical closure.

01AP02-1
Anaesthetic management for transoral robotic surgery. A prospective observational preliminary study.

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Background and Goal of Study: Transoral robotic surgery (TORS) in the field of otorhinolaryngology is a novel technique with multiple advantages. Aim of this study was to perform a descriptive analysis of intraoperative anaesthetic management and of the postoperative outcome of patients operated through TORS in our centre.
Materials and Methods: In this descriptive, prospective and unicentric observational study data from electronic medical records of all patients operated through TORS were recorded over a period of 5 months (July to November 2018). Variables collected were ASA-classification, demographics, comorbidities, anaesthetic technique and postoperative complications. Statistical analysis was performed by using PASW Statistics 18®. Data are presented in absolute values, percentages or mean ± SD.
Results and Discussion: 21 patients were analysed (mean age 65.67±11.48 years, 71% male). Up to 33.3% had a neck surgical history and 19% had received radiotherapy previously. Most frequent used intubation method (76.2%) was the nasotracheal intubation assisted by videolaryngoscope. Intraoperative mean bleeding was 141.19mL ± 107.82. 5 cases (23.8%) suffered a respiratory infection postoperatively. The vast majority (71.4%) could be extubated in the operating room, requiring in 19% of the cases 24 hours of mechanical ventilation in the ICU, with only 2 reintubations due to respiratory failure. Only one case remained 120 hours intubated due to lingual oedema, with no other complications. Mean ICU stay was 1.19±2.06 days and in-hospital stay was 7.20±7.59 days, with only 15% of the patients remaining ≥14 days (problems with feeding, respiratory infection and chemotherapy). No re-do operation was needed. 81% of the cases presented mild pain intensity (EVN≤3) in the first 48 hours. Finally, only two cases died in the first month due to heart and kidney failure, respectively.
Conclusions: This study - the first one carried out from the anaesthetic point of view - highlights the considerations about the management of high risk patients operated by TORS. In this kind of surgery, complications can occur anytime and it represents a big challenge for the anaesthesiologist. This is a preliminary study, so that patient recruitment will continue in order to achieve a bigger sample size and to propose some recommendations.

01AP02-2
Effect of forced-air warming by an underbody-type blanket in surgical patients after anesthetic induction: general piecewise linear mixed effects model

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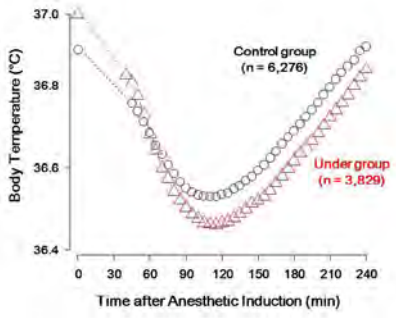
Background and Goal of Study: Forced-air warming is required for the first 3 hrs after the start of general anesthesia because core-to-peripheral redistribution of body heat causes a rapid decrease of body temperature immediately after anesthetic induction. Underbody blankets have recently been used for forced-air warming during surgery. The aim of this study was to determine mathematical models of changes in body temperature after anesthetic induction and to compare the effects of underbody-type and other types of blankets.
Methods: We retrospectively reviewed data for 20,644 patients who underwent surgery under general anesthesia between April 2014 and March 2018. We obtained data for surgical procedure, type of blanket, and body temperature every 5 min for 4 hrs after the start of general anesthesia. After exclusion of 3,786 patents who underwent pediatric or cardiac surgery and 6,753 patients with inaccurate or missing data, the remaining patients in whom an underbody-type and other types of blanket were used were allocated to an Under group and a Control group, respectively. We analyzed the changes in body temperature using a general piecewise linear mixed effects model. Difference in blanket type was included in blanket-type × time interaction term.
Results: In the present study, 10,105 patients were enrolled. The figure shows changes in body temperature for 4 hrs after anesthetic induction in the Under (n =3,829) and Control (n = 6,276) groups. In the Under group, the temperature decreased with a slope of -0.00619°C/min and then increased with a slope of 0.00329°C/min from the breakpoint at 100 min. In the Control group, the temperature decreased with a slope of -0.00419°C/min and then increased with a slope of 0.00307°C/min. The slope after 100 min in the Under group was greater than that in the Control group (Wald test, p = 0.0006).
Conclusions: Although an underbody-type blanket was not better than other types of blanket for preventing the decrease of body temperature in the first 100 min after anesthetic induction, the efficacy of an underbody-type blanket for warming from 100 min after induction may be superior to that of other types of blankets.



01AP02-4
The effect of low pressure pulmonary recruitment maneuver on post-laparoscopic shoulder pain: A randomized controlled trial

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Background and Goal of Study: Most gynecologic operative procedures are conducted with laparoscopic method, which has various advantages including lesser postoperative pain. However, patients often suffer from C4 dermatomal post-laparoscopic shoulder pain (PLSP) due to phrenic nerve irritation caused by carbon dioxide (CO_2). PLSP is effectively reduced by pulmonary recruitment maneuver (PRM) which facilitates the removal of CO_2 from the peritoneal cavity. A typical pressure recommended for recruitment is 40 to 60 cmH_2O which may cause pulmonary barotrauma or hemodynamic instability. The goal of this study is to assess the efficacy of PRM using maximal inspiratory pressure of 30 cmH_2O which is lower than previously studied pressure for reducing PLSP.
Materials and Methods: Eighty-four aged 19–65 years (American Society of Anesthesiologists classification I or II) who underwent elective gynecologic laparoscopy with multi ports, were randomly assigned to one of two groups: the control (n = 42) or the PRM (n = 42). The PRM was consisted of five manual pulmonary inflation for five seconds at the end of laparoscopic procedures under Trendelenburg position. The primary outcome was the intensity of the shoulder pain using a visual analogue scale (VAS). The surgical pain score and vital signs during the PRM were also recorded. The Mann-Whitney U test was used for the VAS. The independent *t* test was used for the other continuous data, and the chi-square or Fisher exact test was used for categorical data.
Results and Discussion: The VAS score of shoulder pain (median [IQR]) was significantly lower in the PRM group than in the control group for 0 to 24 h (0 [0-0] vs 1.5 [0-4.0], $P < 0.001$) and 24 to 48 h (0 [0-0] vs 1.0 [0-2.0], $P < 0.001$) after surgery. The incidence of shoulder pain was significantly lower in the PRM group than in the control group for 0 to 24 h (9.5% vs 57.1%, $P < 0.001$) and 24 to 48 h (4.8% vs 52.4%, $P < 0.001$), also. Other variables including surgical pain score and vital signs were similar between the two groups.
Conclusions: The PRM with 30 cmH_2O is a simple and safe method to reduce PLSP effectively. Therefore, it would be helpful to perform the PRM with 30 cmH_2O routinely in patients without significant cardiopulmonary risk. Further study might be needed to evaluate the effect of a low pressure PRM on other longer duration laparoscopic surgeries, because a longer duration of pneumoperitoneum might be related to more PLSP.

01AP02-5
Feasibility of phase change materials (PCMs) to reduce environmental thermal stress during drug storage

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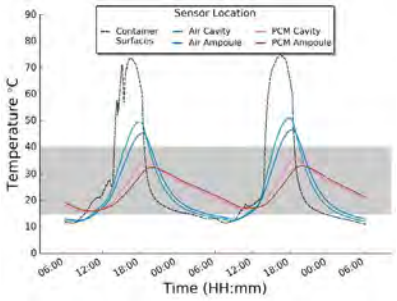
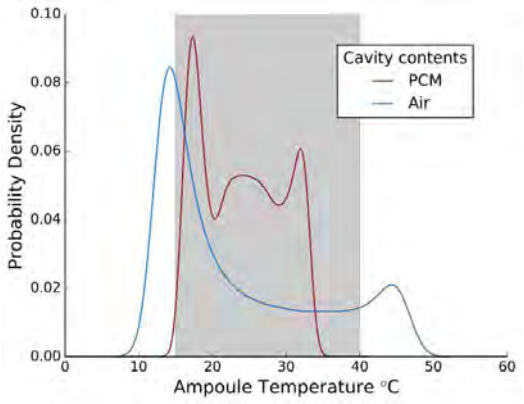
Background and Goal of Study: Extreme environmental temperatures may cause irreversible physico-chemical changes to drugs during storage or transport, especially in out-of-hospital use by emergency medical services.[1,2] Drug containers could incorporate phase change materials (PCMs), e.g. organic waxes, and utilise their latent heat of fusion to attenuate extremes of environmental temperature.
We compared temperature changes in a custom-made drug container incorporating a PCM within a wall cavity ("PCM") to an identical container with an air cavity ("Air").
Materials and Methods: Drug ampoules were placed in both containers in a challenging thermal environment, including periods of direct sunlight. Temperatures at multiple locations were recorded at 0.1 Hz for 48 h and analysed using a custom designed data logger and software.
Results and Discussion: 2,880 data sets were collected over 48 h and plotted as time series and Kernel Density Estimation plot



Ampoule



temperatures were maintained within the clinically recommended range 15°C to 40°C (shaded) in 100.0% PCM and 55.4% Air readings. Levene's Test indicated unequal variances (W= 583, p<0.001). Temperatures (°C):

	Min	Max	Mean	SD
PCM	15.9	33.1	23.9	5.5
Air	12.5	46.6	23.4	10.9

There was also a longer time delay in transfer of ambient temperature changes to ampoules in the PCM container compared to the Air container.
Conclusions: Drug containers which incorporate PCMs provide significantly better thermostability than those which use an air gap. This could inform design of transport containers to reduce thermal stress on stored drugs.
References:
1. J Travel Med 2006;13(1):35-47
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01AP02-6
Anesthetic management for neck tumors resection. A case report

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Background and Goal of Study: Between 4-7% of the general population presents thyroid nodules (TN). About 80% of TN is due to benign hyperplasia and thyroid cáncer is responsible for less than 10%. Thyroid gland tumors represent a high risk of airway compression.
Materials and Methods: A 73-year-old male with thyroid gland tumor was programmed for total thyroidectomy. In neck CT, hypodense mass was found (10.8*7.4*10cm), obliterating the ipsilateral parapharyngeal space with mass effect on larynx, trachea, esophagus, carotid artery and left internal jugular vein. Mallampati III, TMD <6.0cm, OA <4cm, limitation for mobility of the neck. Creatinine: 1.17; Glucose: 109; Hemoglobin: 18.7; Hematocrit: 53.9%; Platelets: 352,000; TSH: 2.06; t4L: 0.96. For high risk of airway complications we offered awake intubation but patient did not accept. ASA III; NCEPOD: 3. Ten weeks after the preoperative assessment, he came for surgical resection. Hemodynamic monitorizing with SpO2/NIBP/eTCO2/DII was started; preoxygenation; IV anesthetic induction (midazolam, remifentanil and propofol). Video laryngoscopy (c-mac 8403ZX/STORZ) with visualization of the glottis was performed and an orotracheal tube was inserted (EMG-EndoTracheal/NIM Trivantage 8.0mm ID.) with stylet for intubation. Mechanical ventilation in CMV-AF mode. Total intravenous anesthesia (TIVA) was used (remifentanil and propofol). Neuromuscular relaxation was not used to avoid interference with recurrent laryngeal nerve monitoring. At end of surgery, patient fully awake was extubated without complications. He was moved to the PACU; alert, calm, without respiratory distress. Two hours later he moved to the general hospitalization room. The next day was assessed by head and neck surgery, adequate postoperative evolution was considered and was discharged with ambulatory control.
Discussion: Neck tumors represent a challenge for anesthesiologist because it requires optimal capabilities is the management of the airway. The gold standard is awake intubation with a fiberoptic bronchoscope, but new technologies, such as video laryngoscope increase the range of possibilities. TIVA without neuromuscular relaxation allow the monitoring by electromyography guaranteeing safe and complete resection. Joint work of all the surgical group (surgeon, anesthesiologist, support team) offers good results.
References :
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01AP02-8
Preoperative oral ingestion of 5-aminolevulinic acid for transurethral resection of bladder tumor causes intraoperative hypotension: a propensity score matching analysis

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Background and Goal of Study: Preoperative oral ingestion of 5-aminolevulinic acid (5-ALA) improves diagnostic accuracy in the resection of malignant tumors. In transurethral resection of bladder tumor (TURBT), 5-ALA was used for photodynamic diagnosis (PDD). In previous studies, 5 to 11% of patients who received 20 mg/kg of 5-ALA for PDD-TURBT preoperatively became hypotensive. Our search of a medical database, however, failed to yield any controlled studies and uncovered only a few case-series reports. Thus, we designed a study comparing the proportion of patients who showed intraoperative hypotension among those who received 5-ALA preoperatively and those who did not.
Materials and Methods: This study was a retrospective single-center study. Twenty-five patients underwent PDD-TURBT after receiving oral 5-ALA (ALA-group) while 742 patients underwent TURBT without oral 5-ALA. After propensity score-matching to balance the baseline variables, 25 patients were randomly extracted (the control group). The primary outcome was the number of hypotension cases in which the systolic or diastolic blood pressure was below 80% of the preoperative blood pressure. The secondary outcomes were the number of cases in which the systolic blood pressure fell below 90% (mild systolic hypotension) or 70% (severe systolic hypotension) of the preoperative value and the dosage of the pressor drugs used in the operation.
Results and Discussion: The proportion of patients with hypotension was 96% (24/25 patients) in the ALA-group and 72% (18/25 patients) in the control group (p=0.049). The proportion of patients in the two groups with mild systolic hypotension was 100% (25/25) and 88% (22/25) (p=0.24), and the proportion of those with severe systolic hypotension was 76% (19/25) and 52% (13/25) (p=0.14), respectively. The dosage of the pressor drugs was 260 mg and 60 mg of ephedrine (p=0.0014), 8.34 mg and 0.1 mg of phenylephrine (p=0.00019), and 1.85 mg and 0 mg of noradrenaline (p=0.35), respectively.
Conclusions: In the oral ALA-group, intraoperative hypotension occurred at a significantly greater rate than in the control group.
References:
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01AP02-9
Comparison of efficacy of PONV prophylaxis with Apfel risk score application versus a simplified algorithm.

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Background and Goal of Study: The identification of patients at risk of postoperative nausea and vomiting (PONV) and their prophylaxis is an essential element in ambulatory surgery (AS). Apfel risk score have been classically used in guidelines considering the following risk factors: female, non-smoker, history of PONV/kinetosis and postoperative opioid administration. According to the presence of PONV risk factors different antiemetic strategies has been proposed in guidelines. However, low adherence to these guidelines is common in clinical practice. Recently it has been proposed a simplify algorithm for PONV (triple prophylaxis in female and double prophylaxis in male). We aim to compare the incidence of emetic events according to the adherence to PONV prophylaxis with Apfel scale vs the simplified algorithm
Materials and Methods: After IRB approval, a retrospective analysis of a prospective data collection from patients undergoing AS that received general anaesthesia was performed. PONV prophylaxis according to the Apfel risk factors was compared to the prophylaxis according to the simplified gender scale. Antiemetic agents administered and the incidence of emetic events in the postoperative period were analysed. Statistical analysis: Chi-square test
Results and Discussion: Data from 200 patients, 58% women, were analysed. The mean age was 46±17 years, 60% of patients were ASA I, 38% ASA II and 2% ASA III. PONV prophylaxis according to Apfel criteria was performed appropriately in 22% of patients, overtreatment in 71.5% and under-treatment in 6.5% of cases. When the prophylaxis was evaluated using the new simplified scale, appropriate treatment was performed in 38% of cases, under-treatment in 59.5% of patients and in excess in 2.5% of cases. The incidence of early (0-6h after surgery) emetic events occurred in 17 (8.5%) patients, in 15 of whom the prophylaxis was good or in excess according to Apfel criteria. However, when the incidence of early emetic events was evaluated according to the simplified scale, 14 patients with PONV belonged to the default prophylaxis group (p=0.045)
Conclusions: The results of our analysis have shown that PONV prophylaxis according to simplified criteria based on patient's gender more effectively predicts the incidence of PONV in AS. Implementation of this new simplified scale in prospective studies conducted in the area of AS may result in greater adherence to prophylaxis and in a reduction in postoperative emetic events

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01AP02-10
Allergic reactions during peroral endoscopic muotomy; is there a possibility it masks aspiration pneumonia?

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Background: Peroral endoscopic myotomy (POEM) is a new technique to treat achalasia (1).Although the incidence of aspiration during POEM is not well known , it seems to be low(2). We aimed to discuss a case aspiration pneumonia occurred and recognised lately.
Case Report: 37 years old female with a history of achalasia and allergies, was planned to undergo POEM, taken into the Operating Room after informed consent was taken. Rapid sequence induction (RSI) and intubation with cricoid pressure were performed. Lucid secretions around trachea were seen during laryngoscopy, after aspiration she was intubated then allergic reactions occurred on the skin instantly. Patient's airway pressure was increased and peripheric SPO2 values were decreased. When auscultated bilateral rhonchi were noticed. Bronchospasm was thought to be as a result of an allergic reaction to the drugs used, and was treated accordingly. Due to presence of lucid secretions in the endotracheal tube, and the surgical team's statement that the oesophagus was not endoscopically aspirated, the possibility of aspiration pneumonia was considered and the preparations were made accordingly. During the procedure there were no other pulmonary complications, so the patient was extubated. The thorax CT scan showed signs of aspiration pneumonia. The patient received the proper antibiotheraphy and was discharged at the 6th day postoperatively.
Discussion: Achalasia patients are at high risk for aspiration pneumonia due to the presence of undigested food material. Even if the oesophagus is emptied the day before POEM and the patient has fasted, there is always a risk of aspiration because some residual fluid may accumulate in the oesophagus. In our case, secretions around the trachea were minimal and clear, hence we did not think of aspiration pneumonia in the first place. Although we have performed RSI and intubated with cricoid pressure, we do not know if the pressure applied was enough . Oesophageal aspiration was not performed, so the patient may have aspirated the oesophageal content any time before the procedure.

References:
1.Inoue H, et all. Dig Endosc. 2018 July
2. Nabi Z et all . Gastrointest Endosc. 2018
Learning points: Before POEM oesophagus must be emptied and the pulmonary system must be examined. It is also important to remember when dealing with atopic patients , any allergic reaction following intubation can mask aspiration pneumonia which is also possible.

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01AP03-1
Dexmedetomidine IV infusion during laparoscopic cholecestectomy; effects on post-operative pain and recovery profile.

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Background and Goal of Study: Enhanced recovery after surgery concept was proposed to improve perioperative care and accelerate recovery. Postoperative pain management using multimodal analgesia is a key component. Dexmedetomidine is a highly selective α2 adrenoreceptor agonist. It offers sedation, anxiolysis, and analgesia without respiratory depression.
Materials and Methods: This study evaluated adding IV infusion of dexmedetomidine with general anesthesia for laparoscopic cholecystectomy regarding: anesthetic requirements, postoperative pain relief, and recovery profile. After approval of Ethics Committee, and taking a written consent from patients, this study was carried out on 40 adult patients, belonging to ASA classification I or II and scheduled for elective surgery. Patients were categorized into 2 equal groups using the closed envelope method. Patients received general anesthesia with a multimodal analgesia protocol consisting of IV fentanyl at induction , IV acetaminophen at induction and every 8 hours postoperatively and IV ketorolac at skin closure. Group (dex group) received IV dexmedetomidine infusion (diluted in 50 ml normal saline) with a loading dose (1 µg/kg) over 10 minutes then maintenance infusion (0.4 µg /kg/hour) using a syringe pump. Group II patients (control) received a free IV infusion (50 ml normal saline) using a syringe pump.
Results: In group I , there were significant decreases in heart rate and mean arterial blood pressure values throughout intra-operative and post-operative periods. These decreases were significant relative to the control group. The percentage of inhaled isoflurane was lower in group I. Time to recovery, recovery profile and time to ward discharge, were not statistically different between groups. In the post-operative periods, the mean VAS score values were lower in the dex group. The first time to receive analgesia was significantly longer in the dex group .The total dose of rescue analgesics were significantly lower in dex group. There was no significant difference regarding hemodynamic complications postoperatively. PONV was significantly less in the dex group. No events of respiratory depression were recorded. There was a trend in the dex group towards higher sedation level.
Conclusions: Dexmedetomidine as an adjuvant to general anesthesia produced stable hemodynamics with sparing effects on inhalational anesthesia and postoperative opioid consumption. It provided better recovery but more sed

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01AP03-2
Target-controlled intravenous anaesthesia guided by spectral analysis in teenage conjoined twins.

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Background: Anaesthesia management for conjoined twins poses unique pharmacological, physiological and anatomical challenges, turning pharmacokinetics and pharmacodynamics of anesthetic drugs unpredictable. The use of a brain monitoring device is an essential tool to titrate the anesthetic needs when using target-controlled infusion (TCI) anaesthesia because pharmacokinetic models were not developed for this particular population.
Case report: A pair of 16-year-old conjoined parapagus twins, 66 kg, ASA III, were referred to our University Hospital to perform an hysterectomy of a rudimentary uterus. They shared the abdominal and pelvis region, with one fused liver, two kidneys and one bladder. It was their fourth surgery and, as a special request, they both asked us to emerge from general anaesthesia at the same time. After full monitoring, including BIS bilateral sensor, anaesthesia was induced with sevoflurane and iv cannulas were placed. Marsh model for propofol was selected for maintenance of anaesthesia and pumps were set with an input weight of 33 kg for each patient. A remifentanil infusion was started at 0,5 mcg/kg/min and dexmedetomidine at 0,2 mcg/kg/h. Spectral analysis showed that different concentrations of propofol (3,3 mcg/ml vs. 2,3 mcg/ml) were needed to maintain similar BIS values and spectrogram patterns in each patient during surgery. After end of surgery both patients were extubated simultaneously.

Discussion: To our knowledge, this is the first report using propofol TCI for anesthesia maintenance in conjoined twins. Because it is difficult to establish an adequate anesthetic regime for each patient as differences in drug pharmacokinetics may exist, brain function monitoring with spectral analysis is a useful and validated way to visualize EEG waves and make anesthetic concentrations adjustments. Dose titration of anesthetics using TCI guided by spectral analysis showed that although Marsh model was not developed to use in this kind of patients, once the desired level of anaesthesia was reached it could be maintained throughout the surgical procedure without doing any further change in the plasma target concentration of propofol. Spectrogram patterns at emergence from anesthesia allowed us to awake both patients at the same time.
Learning Points: TCI anaesthesia guided by spectral analysis may be a good alternative to deliver safe anesthesia and provide a predictable recovery in complex pharmacological cases.

01AP03-3
Opioid sparing anesthesia for esophagectomy – A case report

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Background: According to the current literature, opioid-sparing anesthesia has revealed many potential advantages regarding the post-operative period. The authors describe a Subtotal Esophagectomy case under a multimodal opioid-sparing strategy.
Case report: We report a case of a 53 year-old male patient, ASA II, submitted to an Ivor Lewis Subtotal Esophagectomy due to an epidermoid carcinoma. The patient was monitored with ASA standards, invasive blood pressure, bilateral BIS™, NMT-Mechanosensor®, ANI and Cheetah Starling™ SV. A thoracic (T7-T8) epidural catheter was placed before induction. General anesthesia was maintained with TIVA-TCI of remifentanil/propofol. Neuromuscular relaxation was maintained with rocuronium boluses. Our opioid-sparing strategy was performed with: 120mg intravenous lidocaine bolus followed by an infusion at 140mg/h; 2g magnesium sulphate; 8mg dexametasone; 20mg ketamine bolus followed by an infusion at 25 mg/h; remifentanil 2.6mg; 1g paracetamol; epidural analgesia with a perfusion of 5 mg/h ropivacaine 0.1% and 10mcg sufentanil; 150 mg ropivacaine instilled in the surgical wounds. Goal-directed fluid management (1600ml) and vasopressor support were made according to the hemodynamic monitoring and clinical judgement. ANI values were > 50 in 48% of the records. No signs of dissociative anesthesia were found on raw EEG nor DSA spectrum analysis. Neuromuscular relaxation was kept aiming post-tetanic counts < 10. The patient was extubated and transferred to the Intensive Care Unit, pain management was assured mainly by the epidural prescription (maximum pain score 8/10 referred to thoracic drain insertion). Hospital discharge was in 15 days and at 30 days follow-up after discharge, no adverse events were reported.
Discussion: The use of opioid medication can have many undesired effects. However, in order to avoid opioid administration in major procedures, it is still deemed necessary a complex analgesic multimodal approach, which is a challenge in respect to the correct titration of the analgesic medication. We had access to many monitors in order to lessen those difficulties and avoid side-effects.
References:
Durkin C et al. Current trends in anesthesia for esophagectomy. Current Opinion in Anaesthesiology. 2016;:1
Learning Points: Multimodal pain management in major surgery; Anti-nociception, depth of anesthesia and hemodynamic considerations in an opioid-sparing anesthesia for Esophagectomy.

01AP03-4
Propofol versus ketofol for endoscopic retrograde cholangiopancreatography with BIS guided sedation. A randomized controlled trial

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Background and Goal of Study: Endoscopic Retrograde Cholangiopancreatography (ERCP).when sedated with propofol related adverse events (SRAES) includes hypotension, arrhythmia, oxygen desaturation, unplanned intubation and procedure termination. The aim of this study is to evaluate the effect of adding a small synergistic dose of ketamine to propofol (Ketofol) versus propofol alone
Methods: 80 adults (ASAI - II) scheduled for elective ERCP randomized into Ketofol [KP] (n=40) and Propofol (P) (n=40) groups. Patient and Anesthesiologist were blinded to medication. In Propofol [P] group, 1.5mg/kg over 3-5min then 50-75 mic/kg/min guided by BIS (>60). In KP group: 1.5ml/kg of (Propofol 1%+ Ketamine (50mg) + 4ml normal saline) over 3-5min then 25-50 mic/kg/min (BIS >60). Induction and recovery time, Propofol consumption, haemodynamics, pain and agitation assessment, nausea and vomiting were recorded post-operative. 5minute measured time intervals: T1-T5
Results: Data: Median [IQR]. Demographics were comparable in P vs. KP, age 57[40-57] vs. 50[31-55] y, p= 0.349 and weight 75[70-80] vs 80[70-82] kg, p= 0.105. Induction time in P vs.KP groups was 5[4.5-6] vs 7[6-8] min, p<0.001. Recovery time in P vs KP groups 6[6-7] vs 9.5[8-10] min, p<0.001. Propofol consumption in P vs KP was 395[310-450] vs 270[250-300] mg, p=0.00. Sedation with Propofol only increased the depth of sedation (BIS) during endoscopy compared to Ketofol T1: 59.5 [54.5-63.5] vs 71.50 [69.5-73.5], p<0.001, T3: 55.0 [51.5-61.0] vs 62.0 [55.0-66.0], p=0.003 and T5: 54.0 [51.0-61.0] vs 64.0 [60.0-68.0] p<0.001. No difference between P and KP groups in the incidence of agitation p=0.239, pain p=0.124, nausea and vomiting p= 0.230, arrhythmia p= 0.239, hypotension p=1, hypertension p= 0.474 and desaturation p=0.671.
Conclusions: Despite the ability of Ketamine to a reduce propofol consumption a prolongation in induction time and recovery times with Ketofol was noticed. The effect of ketamine on BIS readings need to be further investigated

01AP03-5
Epidural oxycodone versus epidural morphine for postoperative pain in adults: a meta-analysis.

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Background and Goal of Study: Oxycodone is a strong opioid with advantages over morphine in terms of better pain control, less severe side effects, and faster onset of action when given intravenously. Despite these advantages to morphine, oxycodone has not been widely used for epidural analgesia. This review would like to assess the evidence for efficacy and safety of epidural oxycodone versus epidural morphine for acute postoperative pain.
Materials and Methods: We searched the Cochrane Central Register of Controlled Trials (CENTRAL) and MEDLINE from inception to April 2018. Randomized controlled trials comparing epidural oxycodone to epidural morphine in adults who underwent abdominal, obstetric, gynecologic, or lower extremity surgery were included. Only studies in the English language were included. RevMan 5.3 was used for data synthesis.
Results and Discussion: Four studies met our inclusion criteria. For postoperative pain at rest, epidural morphine appeared statistically superior to epidural oxycodone at six hours postoperatively (MD 1.20; 95% CI 0.37 to 2.02). There was no statistically significant difference between epidural oxycodone and epidural morphine in terms of postoperative pain at rest at zero hours (immediately postoperatively), three hours, twelve hours, twenty-four hours, and forty-eight hours postoperatively. For postoperative pain on movement, epidural morphine appeared statistically superior to epidural oxycodone at twelve hours (MD 2.0; 95% CI 0.35 to 3.65), twenty-four hours (MD 0.77; 95% CI 0.01 to 1.52), and forty-eight hours postoperatively (MD 1.27; 95% CI 0.05 to 2.50). There was no statistically significant difference between epidural oxycodone and epidural morphine in terms of postoperative pain on movement at zero hours (immediately postoperatively), three hours, and six hours postoperatively. Only one study reported presence of respiratory depression with both epidural oxycodone (13%, 2/16) and epidural morphine (8%, 1/13). The other three studies reported no respiratory depression on both treatment groups. There was no statistical difference in the relative risk of pruritus, nausea and vomiting between epidural oxycodone and epidural morphine. There was no forest plot generated with the outcome of sedation because of differences in reporting.
Conclusions: Epidural oxycodone has no statistical significant advantage over epidural morphine in terms of postoperative pain control and incidence of opioid side effects.

01AP03-6
Comparison the Effect of Granisetron, Dexamethasone and Lignocaine on Intravenous Propofol Pain - a randomised double-blind, placebo-controlled study

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Background and Goal of Study: Propofol causes pain and discomfort during intravenous injection (i.v.) for induction, in 28%-90% of the patients. Various methods both non pharmacological and pharmacological, have been tried for attenuating pain during i.v. injection of propofol. Neither a single agent nor any method is found till date that has 100% efficacy to relieve the pain of the patient.Our prospective, randomized, double-blind, placebo-controlled study was planned to compare pre-treated analgesic effects of granisetron, dexamethasone ,lignocaine and placebo after injection of propofol.

Materials and Methods: After obtaining Ethics Committee approval and written informed consent, 100 patients (ASA I-II) aged between 18 and 50 years ,admitted for elective surgery under general anaesthesia, were included in the study. The subjects were randomly divided into four groups (n=25, in each group) to receive either 2 ml of 0.9% normal saline(group P), 2 ml of 1% lignocaine(group L), 2 ml of granisetron (1 mg/ml)(group G) or 2 ml dexamethasone (8mg)(group D). This was followed by a 0.5 mg/kg injection of propofol. Pain scores and intensity of pain recorded immediately following the injection of propofol. Hemodynamic parameters and O2 sat were recorded 1, 3, 5, and 10 min after propofol injection. Student's t-test and Chi-square test were used for analysis.
Results and Discussion: It was observed and obvious that the relief of pain was significant ($p<0.05$) when granisetron, dexamethasone or lignocaine was compared with the placebo group. But there was insignificant difference ($p>0.05$) when granisetron was compared with other in terms of relieve of pain induced by propofol. There were no differences in either mean arterial pressure or O2 Sate at any time point after drugs injection among the groups.
Conclusions: It was concluded that parenteral administration of granisetron is effective and safe in reducing the incidence and severity of pain due to propofol injection and can be considered to be superior to lignocaine or dexamethasone as pre-treatment medication for pain relief after propofol injection for general anaesthesia, along with the advantage of its anti-emetic effect.

01AP03-8
When Propofol Induces Myoclonus: Case Report

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Background: Propofol is a popular hypnotic agent for intravenous induction and maintenance of general anaesthesia and is, in most cases, the drug-of-choice for sedation in ambulatory procedures. Transient and generally uncomplicated side effects have been reported extensively in the literature, but prolonged effects are rare and remain undiagnosed. In this report, we describe the case of propofol-induced sustained myoclonus and opisthotonus.
Case Report: A 55-year-old man with a stomach polyp presented for endoscopic exeresis by esophagogastroduodenoscopy under sedation. He was classified as an ASA II (ex-smoker, gastritis) and had no previous anaesthetic records. No premedication was prescribed. The induction and maintenance of sedation were obtained with the use of 1% propofol. Immediately after the first bolus, the patient developed myoclonic activity with violent opisthotonus-like movements, with no reactivity to the oral introduction of the endoscope. A total of 600mg of propofol was administered during the procedure. Ventilatory and hemodynamic stability were maintained throughout, but the motor response never ceased, worsening with each bolus. After the emergence of the sedation, the phenomenon continued in the post-anaesthesia care unit, decreasing in intensity over time and ceasing after 15 minutes. The complete regain of consciousness occurred in 30 minutes, with no alterations in the neurological exam.
Discussion: The occurrence of involuntary movements during the induction and emergence is a known phenomenon with propofol, but it is often described as transient and short-duration, and very rarely reported during the maintenance of anaesthesia. Furthermore, despite the similarities with seizures, propofol has been described as anti-epileptogenic in systematic studies and reviews.
Learning points: The relevance of this case report is due to the sustained nature of the myoclonus and its duration throughout the procedure and early recovery. The physiopathologic explanation of this phenomenon is still to be understood but appears to be related to the higher variability of consciousness during sedation with boluses of propofol, with higher levels of cerebral excitability, corroborating the theory that low doses of propofol can be centrally excitatory. This report aims to increase awareness of this rare phenomenon amongst the anaesthesiologist community, as well as discussing its diagnosis and management.

01AP03-9
A prospective study on the effect of continuous infusion of dexmedetomidine, on sevoflurane requirement during general anesthesia with continuous monitoring of depth of anesthesia by bis (bispectral index) analysis.

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Background and Goal of Study: The AIM of this study is to evaluate the effect of continuous infusion of dexmedetomidine, on sevoflurane requirement during general anesthesia with continuous monitoring of depth of anesthesia by BIS (bispectral index) analysis in patients undergoing elective laproscopic hysterectomies. The objective of this study aims at assessing the effect of intravenous dexmedetomidine on perioperative haemodynamics and also postoperative recovery in elective laproscopic hysterectomies.
Materials and Methods: After the Hospital's Ethics Committee approval and their informed consent,50 patients with physical status ASA I and II, aged between 35and 55 years, submitted to elective laproscopic hystrectomies under general anesthesia were randomly divided into two groups A & B of 25 each. Group A received a loading dose of Inj. Dexmedetomidine at 1 µg/kg for 10 min(10 minutes before induction of anesthesia),followed by maintenance dose of 0.5 µg/kg/h., till the end of surgery. Group B received similar volume of IV normal saline. Anesthesia was maintained with Sevoflurane in oxygen and nitrous oxide keeping BIS between 40 and 60. Intraoperative variables were documented during the pre-induction period, at the time of induction of anesthesia, during laryngoscopy and intubation, and 15 min after creation of pneumoperitoneum and then every 30 min till the end of surgery and continued during extubation , after extubation till the patient was shifted from PACU. Any side effects like hypotension, bradycardia, , postoperative nausea ,vomiting and respiratory depression were noted. Mean arterial blood pressure (MAP), heart rate (HR), SpO2, ETCO2, Inspired fraction of sevoflurane, Endtidal sevoflurane and BIS were evaluated fifteen minutes before induction (MI), at induction (M0) ,15 min after creation of pneumoperitoneum(MP) and every 30 minutes after anesthetic induction (M30, M60, M90, M120 and M150 and M180).
Results and Discussion: Dexmeditomedine group had a stable haemodynamics during laryngoscopy and creation of pneumoperitonium. Inspired sevoflurane & End tidal sevoflurane concentration was significantly lower in dexmeditomedine group throughout the surgery.
Conclusion: continuous infusion of dexmedetomidine, as adjuvant in general anesthesia, significantly decreases the requirement of sevoflurane for maintaining adequate depth of anesthesia. Dexmedetomidine infusion attenuates hemodynamic response to laryngoscopy and creation of pneumoperitoneum.

01AP03-10
Intraoperative remifentanil versus dexmedetomidine: a systematic review and meta-analysis.

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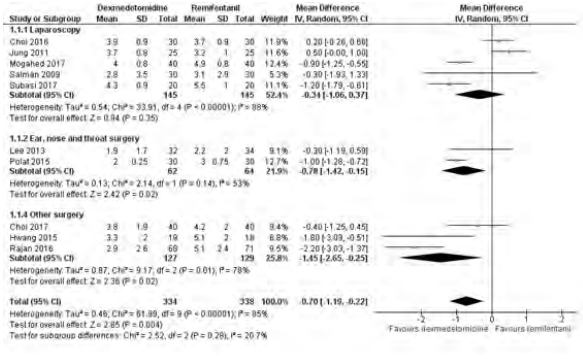
Background: Intraoperative remifentanil is associated with increased postoperative analgesic requirements and opioid consumption. Dexmedetomidine has characteristics suggesting it may substitute for intraoperative remifentanil during general anaesthesia, but existing literature has reported conflicting results. We undertook this meta-analysis to investigate whether general anesthesia including dexmedetomidine would result in less postoperative pain than general anesthesia including remifentanil.
Materials: The MEDLINE and PUBMED electronic databases were queried up to June 2018. Only trials including patients receiving general anaesthesia and comparing dexmedetomidine with remifentanil administration were included. Meta-analyses were performed mostly employing a random-effects model. The primary outcome was pain score at rest (analogue scale, 0-10) at 2 postoperative hours. Secondary outcomes included pain score at rest at 24 postoperative hours, opioid consumption at 2 and 24 postoperative hours and rates of hypotension, bradycardia, shivering and PONV.
Results: Twenty-one controlled trials, including 1309 patients, were identified. Pain scores at rest at 2 postoperative hours were lower in the dexmedetomidine group (mean difference [95%CI]: -0.7[-1.2;-0.2];I2=85%;p=0.004; quality of evidence: moderate) [Figure 1]. Secondary pain outcomes were also significantly lower in the dexmedetomidine group. Rates of hypotension, shivering and PONV were at least twice as frequent in patients who received remifentanil. Time to analgesia request was longer and use of postoperative morphine and rescue analgesia was less with dexmedetomidine, while episodes of bradycardia were similar between groups.
Figure 1



Conclusions: There is moderate evidence that intraoperative dexmedetomidine during general anaesthesia reduces pain outcomes during the first 24 postoperative hours, when compared to remifentanil, with fewer episodes of hypotension, shivering and PONV.

01AP04-1
The impact of anesthesia using Dexmedetomidine (DXM) on postoperative narcotic use in morbidly obese patients (MOP) undergoing laparoscopic bariatric surgery (LBS).

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Background: The anesthetic management of MOP undergoing LBS presented a number of challenges, including increased risk of postoperative opioid-related respiratory depression. These patients (pts) could benefit from adjunctive analgesics with opioid-sparing effects to optimize perioperative pain control. DXM is a selective, short acting, central α2-adrenergic agonist, with sedative and analgesic properties without respiratory depressant effects. We aim to determine the effect of intraoperative DXM on opioid requirement and postoperative pain in MOP undergoing LBS.
Materials and Methods: After IRB approval and informed consent, 60 consecutive MOP (BMI > 40 kg/m2), ASA I-II, scheduled for elective LBS, were included in this randomized, double-blind, placebo-controlled study. Exclusion criteria were cardiac disease, renal or hepatic failure, inability to understand and use the visual analog scale (VAS), obstructive or central apnea, current use of positive airway pressure device and current treatment with narcotics, digoxin, benzodiazepines, α-2 agonists and anti-hypertensives. After preoxygenation, a rapid sequence anesthesia induction was performed using propofol and succinylcholine, followed by endotracheal intubation. Anesthesia was maintained with sevoflurane (sevo), remifentanil (remi) and rocuronium. After induction, pts were randomized to receive either DXM IV infusion of 0.3 µg/kg/h (based on estimated lean body mass) (Gr D), or placebo (Gr P). Sevo and Remi dosage were adjusted to maintain the Bispectral Index 40 to 60 and mean arterial pressure within 25% of baseline values. Statistical analysis used RMANOVA, unpaired Student's t-test and $\chi 2$ test. $p<0.05$ was considered significant.
Results and Discussion: Remi dosage required for anesthetic maintenance was significantly lower in GrD than GrP (17±1.4 vs 20±1.8 µg/min, $p<0.001$). The incidence of hemodynamic instability (bradycardia, hypotension) or respiratory complications (desaturation) were comparable in the 2 groups. Postoperative nausea and vomiting (PONV) were reduced (2 vs 8 pts, $p=0.038$) in GrD vs GrP. Postoperative morphine dose required to maintain a VAS<4 was significantly reduced in GrD vs GrP (6.1 ± 1.6 vs 9.1 ± 1.9 mg, $p< 0.001$).
Conclusion: DXM infusion in MOP is a promising and safe alternative because pts had overall better pain control with significant opioid sparing and lower incidence of PONV in early postoperative recovery phase.

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01AP04-2
Opioid free anaesthesia for bariatric surgery

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Background and Goal of Study: Opioid Free Anaesthesia(OFA) is based on a multimodal regimen including lidocaine(LD), clonidine, dexmedetomidine(DEX), ketamine(KT), magnesium sulfate(MS) and simple analgesics. Obstructive sleep apnea(OSA) is common in bariatric patients who are at risk for postoperative airway obstruction and respiratory complications. An OFA technique may reduce opioid respiratory depression and postoperative nausea and vomiting(PONV). Goal of the study was the efficacy of OFA protocol based on Mulier's technique(1) in a case series of patients who underwent laparoscopic bariatric procedures(sleeve gastrectomy, mini gastric by-pass).
Materials and Methods:12 patients, ASA II-III, planned for laparoscopic bariatric procedure were included. Local protocol included a loading dose of DEX 1µgkg^{-1} 20min pre-induction. During induction, a bolus of KT 0.1mgkg^{-1}, LD 1mgkg^{-1}, DEX 0.1µgkg^{-1}, propofol 2mgkg^{-1} and rocuronium 1mgkg^{-1} were administered followed by a continuous infusion of LD 1mg(kgh)$^{-1}$, KT 0.1mg(kgh)$^{-1}$ and DEX 0.1µg(kgh)$^{-1}$. Desflurane 0.9-1.2MAC, MS 40mgkg^{-1}, paracetamol 2g, parecoxib 40mg, dexamethasone 8mg, droperidol 0.625mg, ondasetron 4mg and local infiltration were provided. Infusion rate was halved after pneumoperitoneum release and continued up to 30min in PACU. Vasoactive drugs were used if needed. Postoperatively, patients received ondasetron 4mg tds, parecoxib 40mg bds and paracetamol 1g qds. Haemodynamic alterations >20% baseline, pulse oximetry, postoperative pain score(NRS scale),PONV(0-10),rescue analgesia with tramadol or morphine and antiemetics were recorded for 24 hours.
Results and Discussion: 12 patients aged 37±13.28, with BMI 48±5.98, received 176±31.6mg LD. Surgery duration was 44±18.14min and total PACU stay 36±9.7min. No patient needed rescue antiemetics in PACU and only one with PONV>4 received droperidol in the ward. NRSscore>4 was observed in 9 patients in PACU and 3 in the ward, with tramadol 94±49.55mg in PACU and 167±115.47mg in the ward given. One patient received 3mg morphine in PACU. Only 2 patients had nightmares in the ward. Haemodynamic stability was recorded throughout the procedure. No vasoactive agents needed.
Conclusion: Although OFA maintained cardiovascular stability it did not totally abolish opioid needs. Further research is needed for titration.
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01AP04-3
Effects of opioid free anaesthesia on intraoperative hemodynamics, postoperative recovery and analgesia in morbidly obese patients undergoing sleeve gastrectomy surgery guided by sedline and ani (analgesia nociception index) monitoring.

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Background and Goal of study: Opioids are associated with postoperative nausea, vomiting, drowsiness, and increased analgesic requirement. A nonopioid anesthesia technique may reduce morbidity, enable day care surgery, and possibly decrease tumor recurrence. We compared opioid-free anesthesia with opioid-based general anesthesia for BARIATRIC SLEEVE GASTRECTOMY.
Materials and Methods: We selected 30 patients scheduled for elective BARIATRIC SLEEVE GASTRECTOMY (ASA I&II,) were randomised into 2 groups STUDY (S)&CONTROL(C) groups.(TABLE 1).After thorough preoperative evaluation and obtaining written informed consent, patients were explained about numeric rating scale for assessment of postoperative pain.. After noting the baseline vitals, patients were premedicated with inj.glycopyrrolate 0.004mg/kg , inj.ondansetron 4mg and inj.midazolam 0.02mg/kg. Drug chart of anesthetic management is shown in Table 1 below Depth of anaesthesia was monitored intraoperatively with) MASIMO SEDLINE MONITOR16-21, the sensors of which was placed on frontotemporal region as per manufacture's guidelines. Intraoperative and post-operative pain was monitored using ANI(ANALGESIA NOCICEPTION INDEX MONITOR)12-15 Two probes of ANI monitor (MetroDoloris, Lille, France) were suitably placed, according to recommendation of the manufacturer Intraoperatively all vitals like heart rate, blood pressure (Systolic, diastolic and mean BP), Oxygen saturation, endtidalCO2 and sedline value, and ANI were monitored before induction, 1 min and 3 min of intubation and thereafter at 10 minutes intervals throughout the surgery. Propofol infusion was adjusted to maintain the SEDLINE value within 25-50. The time to first rescue analgesic request is taken as duration of postoperative analgesia. The total rescue analgesic consumption in 24 hrs were noted. Any recall of intraoperative events and 24 hr patient satisfaction was assessed in each patient using BRICE QUESTIONNAIRE. Any complications like –nausea, vomiting, pruritus, urinary retention, bradycardia, hypotension etc. was noted throughout the study.
Results and Discussion: BARIATRIC SLEEVE GASTRECTOMY under the nonopioid technique was adequate in all patients. Time in the recovery room, postoperative nausea, analgesic requirement, and visual analog scale scores were all significantly less in the nonopioid group.
Conclusions:OPIOD FREE ANESTHESIA technique is adequate and safe for BARIATRIC SLEEVE GASTRECTOMY it offers lesser morbidity and may allow for earlier discharge.

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01AP04-4
Opioid-free general anesthesia and recovery from anesthesia in a patient with myotonic dystrophia (Steinert syndrome)

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Background: Myotonic Dystrophia (MD) is an autosomal dominant, progressive disease which is characterized by consistent contracture of muscle following stimulation. A myotonic crisis can be induced by numerous factors including hypothermia, shivering, mechanical or electrical stimulation, emotional stress and pain. The patients are more sensitive to anesthetic agents and opioids.
Case Report: A 48-year-old female patient (160cm, 85kg) with a diagnosis MD was scheduled for laparoscopic cholecystectomy. In the operating room, routine monitoring of non-invasive blood pressure, ECG, oxygen saturation, bispectral index (BIS) and train-of-four (TOF) were established. Opioid-free general anesthesia was reserved for the patient. With the patient in the sitting position, an epidural catheter was inserted from the T7/8 interspace. After achieving a T4 sensory level with epidural anesthesia, general anesthesia induction was held with dexmedetomidine

in a loading dose of 0.6µg/kg over 10minutes followed by injection of propofol 60mg and rocuronium 30mg. The patient was intubated with fiberoptic bronchoscope in order to avoid laryngoscopy. Aintree intubation catheter with the aid of a fiberoptic bronchoscope was passed through I-gel supraglottic airway. After removing the laryngeal mask, an endotracheal tube was inserted. General anesthesia was maintained with 1% sevoflurane and continuous infusion of dexmedetomidine 0.4 mg/kg/ hour (BIS:45±5) (Table-1). The surgery was ended after 60minutes uneventfully. After detection of a TOF ratio of 0% with a neuromuscular monitor, sugammadex 2mg/kg was administered as a reversal agent. However, the patient was unconscious (BIS:40) and there was no spontaneous breathing in the following 25minutes, although her TOF ratio was 100%. Following theophylline administration, the patient gained consciousness (BIS:90) and extubated.
Discussion: A successful anesthetic management of a MD patient is presented. Dexmedetomidine can be an alternative agent in opioid-free anesthesia. Additionally, theophylline can be safely administered for acceleration of recovery from general anesthesia.
Learning points:

Table-1: Perioperative vital parameters of the patient.

		Heart Rate (bpm)	Blood Pressure (mmHg)	SpO_2 (%)	$EtCO_2$	BIS	TOF (%)
	Preoperative	109	155/102	93	-	97	-
Anesthesia induction	Induction	100	136/90	100	-	40	0
	Intubation	112	146/93	100	-	45	0
	Incision	93	132/87	98	46	50	0
	Trocar insertion	99	138/88	95	40	42	0
Anesthesia maintenance	10. min	83	105/74	96	36	45	0
	20. min	78	110/78	95	35	50	0
	30. min	80	113/81	95	36	48	0
	40. min	81	108/80	94	38	51	0
	50. min	76	106/72	94	37	43	0
End of anesthesia	0. min; Sugammadex	74	111/81	95	37	40	84
	10. min	79	109/85	94	36	38	105
	20. min	65	121/92	93	37	40	100
	30. min; Theophylline	83	115/78	97	38	41	100
	40. min; Extubation	88	132/80	93	-	93	104

BIS: Bispectral Index; TOF: Train-of-Four Stimulation

01AP04-5
Anesthetic management in a patient with narcolepsy

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Background: Narcolepsy is a chronic neurological disorder characterized by excessive daytime sleepiness, a sudden loss of muscle tone, hypnagogic/ hypnopompic hallucinations and in some cases cataplexia due to malfunction of the orexinergic system. Modafinil, methylphenidate and amphetamines are used to managed daytime sleepiness, and sodium oxybate and antidepressants are used for cataplexy.
Case Report: We present a case of 48 years old, obese type I, smoker of 46 pack/ year drinker of 10 g alcohol/day diagnosticated of COPD and narcolepsy type 1 since seven years ago. Actually in treatment with sodium oxybate 4,5 g/día at night, desmopressine 0,2 mcg/day, fesoterodine 4 mg/day and betmiga 50 mg/day. He suffered of bladder hyperreflexia and it was programed for bladder toxin botulin infiltration. He was classified like ASA II and the treatment was maintained until operation. He was premedicated with midazolam 2 mg i.v and a spinal anesthesia was elected by Anesthesiologist (hyperbaric bupivacain 0,5% 10 mg in association with fentanyl 10 mcg). The operation lasted 40 minutes and intraoperative and postoperative periods were uneventually. The patient was discharged next 6 days after surgery.
Discussion: Anesthetic management of patients with narcolepsy has yet not to be established because of the rarity of the disease. Patients with narcolepsy have an increased perioperative risk due to interactions among anesthesia, narcolepsy and narcolepsy medications.In relation to mechanism of loss of consciousness by general anesthesia it would be expect a delayed recovery or of a apneic episodes after general anaesthesia and in the case of use regional anaesthesia narcolepsy-cataplexy fits might be more frequent, although the experience in the last are minimal and based on isolated cases reports.
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1. Hu S, Singh M, Wong J, Auckley D, Hersner S, Kakkar R, et al. Anesthetic Management of Narcolepsy Patients During Surgery: A systematic review. Anesth Analg.2018;126(1):223-46.
Learning points: The desirable anesthetic management of patients with narcolepsy is to decrease the dosage of general anesthetic and analgesic agents and/or use short-acting agents to prevent delayed emergence. Thus, avoiding sedative premedication and continuing medical therapy on the day of surgery and combination general and regional anesthesia are recommended to avoid these complications.

01AP04-6
Are we doing well about hyperthermia during hyperthermic intraoperative chemotherapy?

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Background and Goal of Study: Effectiveness about cytoreduction and hyperthermic intraoperative intraperitoneal chemotherapy (HIPEC) as a treatment for peritoneal carcinomatosis were proved in 19951. Its positive effects are due to cytotoxicity in cancer cells (proteins, DNA and cytoskeleton changes have been observed2), but, we cannot dismiss that it causes harmful effects in healthy cells. Our main goal is to check this issue out.
Materials and Methods: Retrospective data from 25 patients subjected to cytoreductive surgery plus HIPEC were recollected since 2016. The set of variables were: maximum central temperature during HIPEC (MCT), hyperthermia preventive measures (HPM), number of intraoperative blood products, days in intensive Care Unit (ICU), number of total blood products and mortality 6 months after surgery. Statistical analysis was runned by SigmaPlot v13.0. A p-value <0,05 was considered statistically significant.
Results and Discussion: Hyperthermia causes vasodilation in the splancnic circulation, this could increase bleeding and increased blood products needs. However, our results showed that changes in MCT were not significantly related to intraoperative transfusion neither univariate nor multivariate analysis (including HPM). Attending to p-values, 54,8% of associations were due to chance, in the multivariate model this percentage increased up to 96,1%. Similarly, MCT and number of total blood products were not related to number of days in ICU. 9% and 10% of associations with MCT and number of blood product replacement, respectively, were by chance. We looked for associations with mortality 6 months after surgery. Neither of the two models (univariate or multivariate) showed significant relations. Associations due to chance in univariate models were: MCT (49%), days in ICU (48,7%) and number of total blood products replacement (9,3%). These values for multivariate model were 9%, 57,6% and 68,5%, respectively. Our statistical analysis has not been conclusive due to the low strength of the study.
Conclusions: We can neither confirm or deny our hypothesis. Consequently, further studies with higher sample size are required. This will allow us to determine if high temperatures during HIPEC treatments cause harmful effects and to avoid it.

01AP04-7
Volume and pH of Gastric Contents in Patients undergoing Gynaecologic Laparoscopic Surgery during Emergence from General Anaesthesia.

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Background and Goal of Study: Pulmonary aspiration is defined as inhalation of stomach contents through the larynx to the lower respiratory tract, causing the inflammation of the lung which is known as Mendelson's syndrome. Gastric content becomes crucial factors to determine the severity of aspirated pneumonitis. A previous study showed the incidence of pulmonary aspiration as 1:900-1:10,000 patients undergoing general anaesthesia, particularly during induction 20% and emergence 80%. This might due to unconscious patients could not protect themselves. In addition, delayed gastric emptying time, full stomach, incompetent lower esophageal sphincter tone, lithotomy and Trendelenburg position may aggravate the situation. Investigators would like to study the volume and pH of gastric contents in gynaecologic patients undergoing laparoscopic surgery during emergence of general anaesthesia.
Materials and Methods: After IRB approval (COA: Si437/2018), the study has been registered via Clinical Trials.gov (NCT03672734). The study was conducted in 100 participants. Inclusion criteria were patients aged 18-65, BMI<30 kg/sq.m. Exclusion criteria were patients with full stomach. Withdrawal criteria were the difficulty of orogastric (OG) tube insertion and the turning of laparoscopic surgery to exploratory laparotomy. Prior to the commence of surgery, pH and gastric volume were collected at 1-hour interval till the end of operation.
Results and Discussion: Five patients were dropped out: 3 for exploratory laparotomy and 2 for difficulty of OG tube insertion. Ninety-five patients were divided into two groups: A-28 premedicated with antacid and B-67 patients without antacid. After surgery, the average pH and gastric volume were 1.7 ± 1.6 and 43.6 ± 40.7 ml or respectively. Interestingly, group A significantly showed a higher pH and lower volume of gastric content than those in group B. This might due to H2 receptor antagonist and proton pump inhibitor were effectively to suppress gastric acid secretion.
Conclusions: Regarding cut-off point of pH and gastric volume for Merdelson's syndrome, patients premedicated with antacid effectively dropped the risk of aspirated pneumonitis. In addition, the fasting time did not guarantee the incidence of this complication in gynaecologic patients undergoing laparaoscopic surgery during emergence of general anaesthesia.

01AP04-8
Postoperative acute kidney injury after cytoreductive surgery with hyperthermic intraperitoneal chemotherapy: a prospective study

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Background and Goal of Study: Acute kidney injury (AKI) associated with cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (CRS + HIPEC) has a significant impact in morbidity and mortality of this procedure. Our aim was to examine the association of AKI according to RIFLE criteria in patients who underwent CRS+HIPEC.
Materials and methods: After IRB approval, a prospective cohort study was performed evaluating patients undergoing CRS + HIPEC from 2016 to 2018. Postoperative renal function was assessed using serial serum creatinine measurements and was based on serum creatinine changes from pre-operative values, according to the risk, injury, failure, loss, end-stage kidney (RIFLE) classification.
Results and discussion: We evaluated 103 patients, ASA I-III with a mean age of 57± 11 years. Median (Interquartile range) of the peritoneal carcinomatosis index was 12(0-39). HIPEC time was 30 min in 12% of patients, 60 min in 73% of cases and in a 15% of patients HIPEC time lasted 90 min. Postoperative acute changes in renal function were observed in 16 patients (16.5%); (Risk: n=6; Injury: n=4; Failure: n= 6; Loss: n=0). AKI were observed in 4 of the 38 (10.5%) patients who received mitomicyn C; 0 of the 16 patients who received oxaliplatin (13) or other antineoplasic (2) and in 13 of the 49 (26.5%) of patients who received cisplatin ($p<0.02$). Patients with AKI received more colloids (1383±351 vs. 1087±452mL, p=0.019) had less urine output during HIPEC (585±172 vs. 798±295 mL, p=0.005) and presented higher lactate levels at the end of surgery (3.49±1.59 vs. 2.69±1.37 mmol/L, p=0.037) than those who did not developed AKI. Regarding perioperative hemodynamic parameters lower cardiac index before HIPEC (2.5±0.47 vs. 3.1± 0.9 ml.m-2, p=0.032) and lower global end-diastolic volume index (432±147 vs. 492± 90 ml.m-2, p=0.05 were related whit the occurrence of AKI.
Conclusions: AKI during CRS/HIPEC was associated with chemotherapy with cisplatin. Colloid volume administered, urinary output during HIPEC and high lactate levels were correlated with the occurrence of AKI. Our data suggest that pre-HIPEC optimization of hemodynamic parameters may be protective against AKI.

01AP04-9
Radical prostatectomy with opioid-free anesthesia compared to conventional general anestesia – preliminary results.

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Background and Goal of Study: In male patients, prostate cancer is among the most prevalent and surgery is one of its main treatments. Recent studies suggest that anesthetic management may influence the cancer outcome. Some hypnotics, opioids, volatile anesthetics and other perioperative events can inhibit NK cells, stimulate neoplasic cells proliferation and promote angiogenesis, thus creating a favorable environment for tumor progression. The aim of this study was to evaluate whether opioid-free anesthesia have potential advantages as good analgesia and abbility to reduce the incidence of biochemical recurrence of prostate cancer when compared to conventional general anesthesia. Possible differences between visual analogue pain score (VAPS), the need for rescue analgesia with morphine, satisfaction with anesthesia technique, adverse effects on the PACU and time to PACU discharge were also analyzed.
Materials and Methods: Patients with prostate cancer (40 – 80 years) undergoing radical prostatectomy with medium to high-risk D'Amico criteria for biochemical recurrence were randomized into two groups. The intervention group (IG) received general opioid-free anesthesia associated with TAP block while the control group (CG) had conventional general anesthesia with the same drugs and fentanyl. PSA dosages at 6 months and 1 year post-operatively were obtained. The VAPS, the need for rescue analgesia with morphine, adverse effects and time to delivery were evaluated at PACU. STATA software was used. Due to the low sample size, an alfa value of 10% was considered.
Results and Discussion: To the present, 55 patients were included in the study (28 in IG and 27 CG). In a preliminary analysis, 10 patients had biochemical recurrence with no statistical difference between groups. IG had lower needs for blood transfusion (p=0,004) and a lower time to PACU discharge (p=0,007). There was no statistical difference between the groups on the VAPS, rescue analgesia and anesthesia satisfaction.
Conclusions: We could not find differences in recurrence rates, maybe due to the small sample size and short follow-up period. However, the IG group had lower intraoperative bleeding and PACU delivery time, what could help to reduce adverse effects, costs and psychological distress of the patients.
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Sekandarzad MW, van Zundert AAJ, Lirk PB, Doornebal CW, Hollmann MW. Perioperative Anesthesia Care and Tumor Progression. Anesthesia & Analgesia. 2017;124(5):1697-708.

01AP04-10
A Large Ovarian Tumour : Anaesthetic Challenges

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Background: Giant intra-abdominal tumors exert mechanical compressive effects on cardiovascular and pulmonary systems. Giant ovarian tumors have become uncommon in contemporary medical practice, since patients now present earlier for medical care. But when they present they give rise to numerous anesthetic concerns in the perioperative period like re-expansion pulmonary edema, supine hypotension syndrome, difficult intubation etc. which can lead to disastrous complications including significant mortality and morbidity. We hereby report successful management of huge ovarian cyst weighing 23.7 kg. Written informed consent for scientific presentation of her data was taken from the patient.
Case Report: The patient was 48 year old female presented with abdominal distension for last ten year. Her abdominal girth measured 152 cm with stretched umbilicus. Abdominal superficial veins were prominent. Patient was dyspneic on supine position. A CT revealed a 34x22x40 cm cystic mass of ovarian origin. After standard ASA monitors were attached and following adequate preoxygenation rapid sequence induction was done in semi-recumbent position. Patient was intubated and ventilated at low pressure and low tidal volume. In order to prevent hypotension, patient was preloaded with 500 ml of ringer lactate solution before induction. After an abdominal midline incision an ovarian mass weighing 23.7 Kg was resected. Immediately after removal of tumor blood pressures dropped to 84/42 mmHg which was managed with noradrenaline infusion. Hemodynamic stability regained gradually and noradrenaline was tapered off before uneventful extubation.
Discussion: Surgical removal of large ovarian tumors, are associated with appreciable morbidity and mortality.[1] Intraoperative concerns include acid aspiration, difficult airway, splanchnic shock, supine hypotension syndrome, bleeding, re-expansion pulmonary edema, DVT etc. By addressing all mentioned concerns, we successfully managed the case.
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Learning points: Haemodynamic and respiratory monitoring with meticulous airway and fluid management are the keys to successful outcome. If necessary, central venous catheterization, arterial cannulation and blood gas monitoring should be carried out. In postoperative period, pain management should be taken care of so as not to impair respiration.

01AP05-1
Tramadol can reduce postoperative recurrence and mortality in breast cancer surgery via its action on the 5-HT receptors and transient receptor potential vanilloid-1

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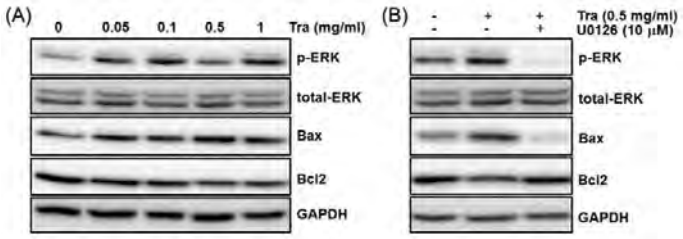
Background and Goal of Study: There is growing interest in the effect of postoperative analgesics on oncological outcomes after cancer surgery. We analysed the impact of tramadol after breast cancer surgery on postoperative recurrence and mortality. The mechanism via which tramadol has an effect on breast cancer cells was also explored in an in vitro experiment.
Materials and Methods: The electronic medical documents of patients with breast cancer between November 2005 and December 2010 were reviewed. Cox regression analyses were used to identify factors related to postoperative recurrence and mortality. Multivariate associations between tramadol and recurrence-free and overall survival were assessed by Kaplan-Meier survival analysis. We also confirmed the effects of tramadol on human breast adenocarcinoma (MCF-7) cells by assessment of cell viability, cell cycle analysis, clonogenic assay, Western blot analysis, and flow cytometry in the in vitro experiment.
Results and Discussion: Nine hundred and forty-three (36.4%) of 2,588 patients had received tramadol. Those who had received tramadol had a 0.73-fold decrease in risk of recurrence and a 0.59-fold decrease in risk of mortality. Recurrence-free survival and overall survival were significant longer in patients who received tramadol than in those who did not. Assays of the viability of the cell cultures and colony formation demonstrated the anti-proliferative effect of tramadol on the MCF-7 cells. Tramadol also induced apoptosis via the pathway for extracellular signal-

regulated kinases(figure 1), and flow cytometry revealed high 5-hydroxytryptamine (HT)2B levels and expression of transient receptor potential vanilloid (TRPV)-1.
Conclusions: Patients who received tramadol had a decreased risk of postoperative recurrence and better overall survival. Tramadol appears to inhibit proliferation of breast cancer cells via its effects on the 5-HT2B receptor and TRPV-1.



01AP05-2
The influence of TIVA versus inhalation on angiogenesis in patients with breast cancer. A pilot study.

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Background and Goal of Study: In the last years, mostly in vitro studies suggest that TIVA may be beneficial in patients with cancer. Because local anesthetics have been reported to decrease cell proliferation and angiogenesis, we hypothesised that adding a continuous infusion of intravenous lidocaine during surgery and up to 24h postoperatively would decrease angiogenesis by influencing VEGF-A levels. We wanted to investigate if there are differences in angiogenesis factors after TIVA versus Sevoflurane anesthesia in patients undergoing surgery for breast cancer.
Materials and Methods: Our study enrolled 65 patients undergoing breast cancer surgery who were randomised to 4 groups. Group I (n=19) received Sevoflurane anesthesia, group II (n=13) Sevoflurane and iv lidocaine, group III (n=16) received propofol-fentanyl anesthesia and group IV (n=17) propofol-fentanyl and iv lidocaine. Serum VEGF-A levels were measured before the surgical intervention and 24h postoperatively.
Results and Discussion: When comparing Sevoflurane anesthesia with TIVA the mean VEGF-A concentration before surgery was 315,66±176,64 pg/ml and 285,18±176,82 pg/ml (CI 95%) at 24h postoperatively for group I; for group III the mean VEGF-A concentration before surgery was 277,77± 229,14 pg/ml and 173,05±121,43 pg/ml at 24h after the intervention (p=0,039). In group II meaned VEGF-A was 240,26±206 pg/ml before surgery and 236,91±176,64 pg/ml postoperatively while for group IV meaned VEGF-A before surgery was 347,95±277,31 pg/ml and 286±216,87 pg/ml 24h postoperatively.
Conclusions: In our pilot study we found that propofol anesthesia significantly decreased VEGF-A levels up to 24h after surgery as compared with Sevoflurane anesthesia for breast cancer. Adding lidocaine did not change significantly VEGF-A levels, but our lidocaine dose may have been too low. Further studies on larger groups of patients are necessary.
References:
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01AP05-3
Hypoxia tolerance improves cardiac function in CX3CR1 deficient mice

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Background and Goal of Study: CX3CR1 plays an essential role in the recruitment and adhesion of monocytes. Ly6Clow CX3CR1high expressing macrophages were found to accumulate in the left ventricular (LV) tissue in response to chronic pressure overload. The adaptation to hypoxia is known to be mediated by hypoxia induced factor (HIF) regulation. With regard to therapeutic purposes the immune modulatory potential of HIF regulation in chronic pressure overload should be studied.
Materials and Methods: Chronic pressure overload was induced to mice due to transverse aortic constriction (TAC). Cardiac function was examined using pressure-volume-measurement. The cardiac immune response was characterized by flow cytometry. HIF1α was stained in histological slices and mRNA-expression of Glut-1 and Glut-3 was analyzed using qRT-PCR.
Results and Discussion: Cardiac hypertrophy and cardiac function in left heart catheter after TAC was significantly reduced in Cx3cr1-/- mice compared to wild type mice. Cx3cr1-/- mice showed an early pro-inflammatory phenotype associated with high numbers of neutrophils and Ly6Chigh macrophages after TAC. High levels of MCP-1, IL1-α and IL6 were detected in the cardiac tissue. HIF-1α is upregulated in the hearts of Cx3cr1-/- mice accompanied by a higher capillary density and a better glucose metabolism. Therapeutic targeting of HIF-1α by Echinomycin abrogated the positive cardiac effects in Cx3cr1-/- mice.
Conclusions:Our data implies that the abolished TAC induced cardiac impairment in Cx3cr1-/- is due to a better adaptation to hypoxic conditions. The early pro-inflammatory immune response with the release of IL1β might cause the faster HIF-1β regulation and contributes to the preserved cardiac function in Cx3cr1-/- mice.

01AP05-4
Anti-tumour potential of a 5-HT3 receptor antagonist on lung cancer: A retrospective clinical study

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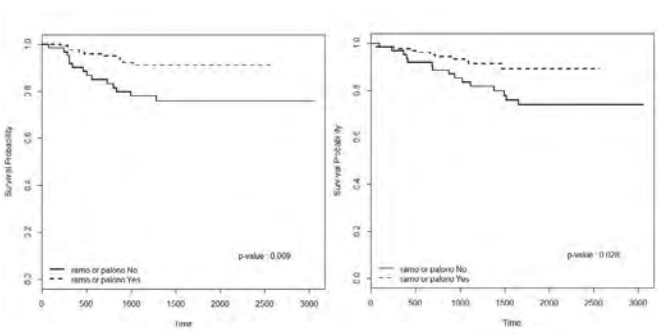
Background and Goal of Study: Serotonin (5-hydroxytryptamine, 5-HT) is a monoamine neurotransmitter also known to be involved in cancer cell proliferation. Though studies have shown that 5-HT1 and 5-HT2 receptor antagonists (RA) is study to determine whether perioperative use of 5-HT3RAs, which are widely used antiemetics, produce anti-tumour effects after lung cancer surgery.
Materials and Methods: Data from 411 patients who underwent open lung cancer surgery from January 2009 to December 2014 were collected. Demographic data and perioperative variables were collected and analysed as variables that could potentially be associated with the prognosis of lung cancer after open surgery. Propensity score matching (PSM) was used to produce 61 of 1:2 matched pair of patients and analysed
Results and Discussion: Demographic characteristics and cancer recurrence, all-cause mortality after PSM are listed in Table 1. According to the multivariate Cox regression analysis with 1:2 PSM, factors associated with lower recurrence rate were perioperative usage of palonosetron or ramosetron (HR, 0.293; 95% CI 0.110-0.780, p = 0.0141) and cancer stage, pathology type of lung cancer. Kaplan–Meier curves for cancer recurrence and overall mortality are shown in Figure 1.
Conclusions: Our findings demonstrate that palonosetron and ramosetron may have anti-tumour potential on lung cancer cells, suggesting the need to consider these drugs as first choice antiemetics in patients undergoing lung cancer surgery.
Table 1. Patient's characteristics and recurrence/mortality.

	Total population	P-R group (n=313)	No P-P group (n=98)	p-value	Propensity-matched population	P-R group (n=122)	No P-R group (n=61)	p-value
Age (yrs)		68.8 ± 9.7	67.0 ± 10.7	0.117		66.9 ± 10.5	68.0 ± 10.1	0.516
Sex (M/F)		242/71	77/21	0.795		92/30	45/16	0.810
Recurrence		35 (11.18)	31 (31.63)	<0.0001		10 (8.20)	14 (22.95)	0.005
Mortality		46 (14.7)	36 (36.73)	<0.0001		11 (9.02)	15 (24.59)	0.004

Figure 1. K-M curve



01AP05-5
Effect of opioid receptor polymorphism on the risk for breast cancer in Japanese

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Background and Goal of Study: Opioid receptors are expressed in breast cancer cells. It has been reported that morphine administration promotes tumor progression and metastasis by causing immunosuppression and vascular hyperplasia. The mu-opioid receptor 1 (OPRM1) A118G SNP is frequently discussed in terms of opioid analgesia and affinity with endogenous opioid. There are several research reports on the association between the G allele in the OPRM1 A118G SNP of the opioid receptor and the incidence of breast cancer, and the results conflict as to whether the mutation is associated with an increase or decrease in breast cancer incidence. To investigate the cause of this discrepancy in research results, a three-group comparison with GG genotype as independent group has not yet been performed due to the low frequency of G allele in Caucasians. We performed a three-group comparison to confirm the association between the OPRM1 A118G SNP and breast cancer in Japanese women, who have a higher frequency of the mutant.
Materials and Methods: With approval from the Ethics Committee, sample blood was taken from 63 Japanese breast cancer patients and 758 healthy people. Real-time PCR was performed to determine genotype. The t-test was used for statistical analysis with p values less than 0.05 considered to indicate statistically significance.
Results and Discussion: The distribution of the SNP genotypes among the women with breast cancer was as follows : 57% had the AG genotype, 30% the AA genotype, and 13% the GG genotype. There was no difference in the distribution of the SNPs between breast cancer patients and healthy women. No significant difference in the frequency of G allele of the SNP was seen between the two groups.

01AP05-6
Comparison of endothelial injury during total knee arthroplasty between propofol and desflurane

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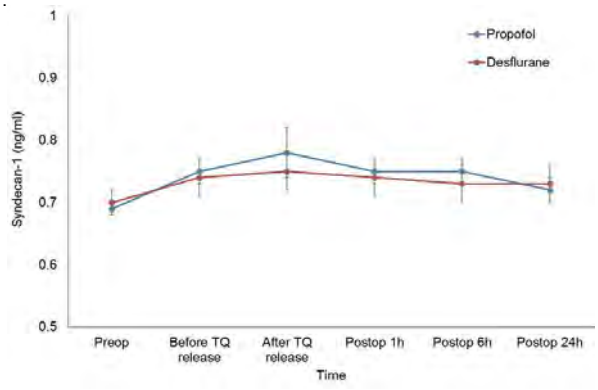
Background and Goal of Study: Glycocalyx is a network of membrane bound proteoglycan and glycoprotein, covering the endothelium. Experimental data have demonstrated that the disruption of glycocalyx enhances vascular inflammation and related complications. Applying tourniquet during total knee arthroplasty (TKR) induces ischemia-reperfusion injury (IRI). We hypothesized that the endothelial injury at IRI during TKR would differ according to anaesthetic agents. The study was designed to compare the damage of glycocalyx in patients undergoing TKR by using different anaesthetic agents, propofol and desflurane.
Materials and Methods: Patients undergoing TKR were enrolled. Propofol and Desflurane groups were anaesthetised using propofol and desfluane, respectively. Blood was obtained preoperatively and up to postoperative 24 hours. Syndecan-1 was measured to check the damage of glycocalyx, using enzyme-linked immune-sorbent assay (ELISA). Laboratory findings including haematocrit, lactate, creatinine phosphokinase (CPK), and lactate dehydrogenase (LDH) were also evaluated.
Results and Discussion: In total, 80 patients were included in final analysis (40 patients in each groups). Demographic data, perioperative haemodynamic changes and total blood transfusion amounts did not show significant differences between the two groups. The changes of syndecan-1 in desflurane group were lower up to postoperative 24 hours, but they did not show statistical significance between two groups. Other laboratory findings including serum haematocrit, lactate, CPK and LDH did not show significant intergroup differences.



Conclusions: Endothelial injury between propofol and desflurane based anaesthesia did not differ during TKR.
Acknowledgements: This research was supported by Ilsung Pharmaceuticals.

01AP05-8
Regulating renal protection from ischemic reperfusion injury by specific microRNAs after sevoflurane or ischemic preconditioning procedure in rats

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Background and Goal of Study: In some renal surgery with temporary renal vascular clump and some cardiovascular surgery with cardiac arrest using cardiopulmonary bypass, the kidneys are at risk of ischemic reperfusion injury (IRI). To alleviate IRI, sevoflurane anaesthetic preconditioning (APC) and ischemic preconditioning (IPC) were reported to be effective to such organs as heart and brain and lungs. Dynamics of microRNA (miR), that is noncoding short RNA, was reported to be affected by IRI. We evaluated whether sevoflurane APC is effective to rat kidneys and verify dynamics of miRs after APC and IPC for anticipating their targeted cell-survival pathways in rat IRI model.
Materials and Methods: Male Wistar Rats weighing about 300g were divided in 4groups (APC, IPC, IRI, Sham model; n=7/group). IRI model rats were performed right nephrectomy and ischemic reperfusion procedure to left kidney with 45-minutes-clump followed by 4hour-reperfusion. APC was performed with 15minutes-1MAC sevoflurane preconditioning, and IPC was performed with 3cycles of 2minutes-clump-and-5minutes-reperfusion. All rats were monitored their vital signs during the surgical procedure and sampled their blood and left kidneys in the end of the procedure.
Results and Discussion: Both APC and IPC procedures significantly ameliorated elevation of serum creatinine level caused by IRI. Comprehensive miR screening experiment and analysis by the Ingenuity Pathway Analysis™ resulted that sevoflurane APC promoted the expression of miR-17-3p and suppressed those of miR-27a while IPC promoted the expression of miR-19a, and that all the miRs might be related to the common cell-protective substance “Akt”. It has been proved that miR-17 and miR-19a directly blocks PTEN, that is upstream of an important cell-survival PI3K/Akt pathway, and miR-27a directly blocks PI3K. It meant that both sevoflurane APC and IPC promoted the expression of miRs increasing Akt phosphorylation via PTEN/PI3K/Akt pathway.
Conclusions: We anticipated that both sevoflurane APC and IPC promoted renal cell survival via PTEN/PI3K/pAkt pathway. We will verify whether there is actual expression change of the proteins of this pathway, and differences between APC and IPC in detail effect in the future.

01AP05-9
Trial sequential analysis uncovers lack of power and incorrect conclusions in current anaesthetic meta-analyses.

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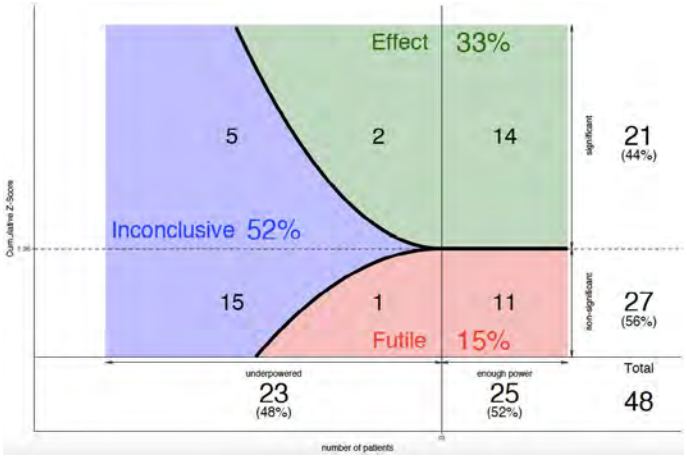
Background and Goal of Study: Apparently significant meta-analytic findings may appear misleading especially if the strength of the evidence is insufficient due to lack of statistical power and the impact of multiplicity (1). Trial Sequential Analysis (TSA) may uncover these spurious findings using monitoring boundaries and providing the required information size. We evaluated the prevalence of these effects in current anaesthesia literature.
Materials and Methods: We selected meta-analyses published on Medline in 2017 in the ten most influential anaesthetic journals, ranked by impact factor (Journal Citation Reports). The methods and results of each review were assessed and binary data abstracted from the forest plots were reanalysed applying TSA. Statistical parameters were set as previously published α=5%, β=20% and relative risk reduction was established on the low risk bias trials. Based on the calculated information size, the cumulative Z-score and the heterogeneity corrected monitoring boundaries, the results of all included analyses were allocated into 3 categories: ‘Inconclusive’, ‘Effect’ and ‘Futile’.
Results and Discussion: A total of 48 meta-analyses out of 19 reviews were eligible (figure). 23 analyses appeared underpowered. 21 out of 48 (44%) meta-analyses were accounted statistically significant (P<0.05) using the conventional statistical significance threshold. When applying TSA only 16 out of 48 (33%) showed significant evidence of effect, while the other 5 meta-analyses originally classified statistically significant had potentially spurious findings. Of the 27 meta-analyses conventionally considered nonsignificant, 12 established futile after TSA. Futility conveys an assumed effect could be considered unachievable. After running TSA, 52% of the meta-analyses could be classified as inconclusive, 33% as giving firm evidence of effect and 15% as demonstrating firm evidence of futility.



Conclusion: Underpowered and falsely conclusive meta-analyses are common in current anaesthesia literature. Using TSA systematically allows for more nuanced conclusions and should become mandatory.

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01AP05-10

The mechanisms of the effect of morphine addiction on the 50% effective dose of ketamine and propofol in mice

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Background and Goal of Study: Opioids, including morphine, are widely used to relieve acute and chronic severe pain. However, chronic morphine exposure can lead to morphine addiction, morphine tolerance, hyperalgesia and multiple physical pathologies. Our previous study found that the 50% effective dose (EC_{50}) of ketamine in morphine-addicted mice was increased but propofol EC_{50} was decreased. Thus, this study was aimed to investigate the mechanisms of the effect of morphine addiction on EC_{50} of ketamine and propofol in mice.
Materials: All male mice, aged 8~12 weeks, were randomly divided into 2 groups: morphine addiction group and saline group. Mice in morphine addiction group were subcutaneously injected with morphine for 5 days to induce morphine addiction. Mice were injected morphine at 8:00 12:00 and 16:00 with increasing doses of 10 mg/kg, 20 mg/kg, 40mg/kg, 40mg/kg thrice daily, for 4 consecutive days. On the fifth experimental day, only one dose of morphine of 40 mg/kg was administered at 08:00. Mice in saline group were injected with equal saline at the corresponding time. All mice were evaluated the model of morphine addiction with naloxone (1mg/kg) after the last injected morphine. We used the Western bolt and the immunofluorescence staining method to determine the protein levels of NMDAR1, GABAβ3 and MOR receptors in hippocampus and prefrontal cortex on the following day 1 (D1), day 3 (D3) and day 7 (D7) after morphine addiction.
Results and Discussion: Western blot analysis showed that, following treatments of morphine for 5 days, in hippocampus and prefrontal cortex, the expressions of NMDAR1 were significantly increased on D3 compared to the saline group ($P<0.05$). Compared to the saline group, in morphine addiction group, the expressions of GABAβ3 in hippocampus were decreased on D1 ($P<0.05$), and in prefrontal cortex, the expressions were decreased on D1, D3 and D7 ($P<0.05$). MOR significantly increased on D1, D3 and D7 after morphine exposure compared to the saline group ($P<0.05$) both in hippocampus and prefrontal cortex. The results of immunofluorescence staining showed the same change.
Conclusions: The expressions of NMDAR1 in morphine-addicted mice were up-regulated in hippocampus and prefrontal cortex. However, the amounts of GABAβ3 were inhibited in the morphine-addicted state. These results indicated that the increased NMDA and decreased GABA may contribute to the EC_{50} changes in ketamine and propofol in morphine-addicted mice.

01AP06-1

The use of rocuronium-sugammadex allows the intraoperative neuromonitoring of pelvic nervous system during laparoscopic low anterior rectal resection

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Background and Goal of Study: Low anterior resection syndrome(LARS) with faecal incontinence after low anterior rectal resection is not rare due to the damage of the innervation of anal sphincter. Intraoperative neuromonitoring(IONM) of superior hypogastric plexus(SHP),hypogastric nerves(HN) and inferior hypogastric plexus(IHP) might reduce the incidence of LARS. An adequate IONM requires lack of neuromuscular blockade(NMB) and represents a challenge because achieving a correct laparoscopic visualization needs enough NMB's degree. The goal of the study was to test the use of sugammadex to reverse rocuronium's effect at the time IONM was needed.
Materials and Methods: We present 3 patients scheduled to laparoscopic low anterior rectal resection with IONM. After racheal intubation (propofol+ sufentayl+ suxametonium) two electrodes were placed transanally under endosonograhic guidance at internal and external anal sphincter(t0).Anaesthesia was maintained with propofol perfusion(BIS 40-60),sufentanyl(0.1-0.3μg/Kg/h) and rocuronium(0.6mg/Kg+10mg bolus for TOF<2). IONM took place at 3 different times to locate and preserve the structures during dissection:SHP(t1),HN(t2) and IHP(t3). When IONM was necessary(t1,t2 and t3) sugammadex was administered(100mg bolus repetitively until TOF ratio100%).After IONM the required rocuronium's dose to achieve TOF<2 to continue the surgery was administered.At the end of the surgery(t4) and before extubation the required sugammadex's dose to recover muscular function(TOF ratio>90%) was administered. Required rocuronium's dose between every IONM and required sugammadex's dose to recover NMB were recorded. IONM's success and postoperative complications related to NMB were also recorded.
Results and Discussion: Rocuronium and sugammadexs' doses used are: IONM was performed with and adequate electromyographic signal in all times described. None of the patients developed complications related to NMB.

	T0-T1 Rocuronium dose (mg)	T1 Sugammadex dose (mg)	T1-T2 Rocuronium dose (mg)	T2 Sugammadex dose (mg)	T2-T3 Rocuronium dose (mg)	T3 Sugammadex dose (mg)	T3-T4 Rocuronium dose (mg)	T4 Suggamadex dose (mg)
Patient 1	70	300	150	300	70	300	80	300
Patient 2	90	200	65	120	55	120	50	200
Patient 3	70	200	70	300	70	200	40	200

Conclusion: It's feasible to monitor intraoperatively the function of the anal sphincter in laparoscopic rectal surgery by using sugammadex-rocuronium when needed. This might decrease the incidence of LARS. Further studies are needed to confirm it.

01AP06-2

The effect of neuromuscular blocking agents on the development and severity of metabolic features of malignant hyperthermia

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Background and Goal of Study: Succinylcholine has a controversial role in triggering a hypermetabolic malignant hyperthermia (MH) reaction in the absence of volatile inhalation anaesthetics. In combination with a volatile anaesthetic, succinylcholine produced a significantly higher serum creatine kinase (CK) after an MH reaction, while the use of non-depolarising muscle relaxants (NDMR) was associated with lower serum CK concentrations. Our aim was to investigate the effects of succinylcholine and NDMR on the timing of the first hypermetabolic sign and the maximum derangement of end-tidal CO_2, temperature, and pH during MH reactions.
Materials and Methods: We included MH susceptible probands tested in the UK National MH Unit since 1989. The clinical details of the reaction were retrieved from anaesthetic charts and/or referral letters. We excluded patients when clear information about the drugs used during the case was missing. Patients were divided into: volatile anaesthetic-only group and volatile with succinylcholine group. The effects of the use of succinylcholine and NDMR on the end-tidal CO_2, temperature, and pH were compared between the groups using the non-parametric Mann-Whitney test and we present the median and interquartile range.

Results and Discussion: Of 329 probands referred in the time period, we had sufficient information to include 271 in the analyses. The time to the first hypermetabolic sign was significantly longer in the volatile-only triggering group-*n*.36 (median 60, IQR 36.25-90 vs 30, 15-60 min: ***P***=0.0003) compared to when succinylcholine was used-*n*.72. The maximum values of the reported metabolic features were similar between the groups, table1.

Table1

	Volatile anaesthetic-only	Volatile with succinylcholine
$EtCO_2$ (*n*.158)	*n*.79- (Med. 10.6, IQR 8.7-13 kPa)	*n*.79- (Med. 10, IQR 8-12 kPa)
Temp. (*n*.187)	*n*.80- (Med. 39.1, IQR 38.5-39.9 °C)	*n*.107- (Med. 38.8, IQR 38.2-40 °C)
pH (*n*.139)	*n*.56- (Med. 7.13, IQR 7.04-7.23)	*n*.83- (Med. 7.19, IQR 7.06-7.260)

No difference could be found in the maximum value of reported metabolic features with the use of NDMR.
Conclusion: The combination of succinylcholine with volatile anaesthetics was associated with a more rapid development of the hypermetabolic features of MH with no significant effect on their peak values.

01AP06-3
Neuromuscular monitoring, reversal of block and postoperative residual curarization: a survey over the years

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Background and Goal of Study: Neuromuscular block (NMB) often persists in the postanaesthesia care unit (PACU). This study evaluated the incidence of residual NMB, defined by train-of-four (TOF) <90%, upon PACU arrival. Hypothesizing change in our practice since 2006-2012 (1,2), residual NMB as well as the use of intraoperative neuromuscular transmission (NMT) monitoring and reversal of neuromuscular blocking agents (NMBAs) were again prospectively evaluated in 2018. We then compared the three periods (2006-2012-2018) in terms of management of NMB and incidence of residual NMB.
Materials and Methods: Approximately 600 adult patients who were to receive NMBAs were prospectively and successively enrolled. Upon PACU arrival, a nurse trained in TOFscan monitoring (iDMed, France) recorded the acceleromyographic response of the adductor pollicis muscle (as TOF%). Patients' characteristics and perioperative data, as well as the management of NMB, were retrieved from the 2006 and 2012 databases (1,2) and the same variables were collected for the 2018 study population (Figure 1). The 2006-2012-2018 data were then statistically assessed by means of the Kruskal-Wallis Test with Dunn's Multiple Comparisons Post-Test, or Chi-squared Test, where applicable.
Results and Discussion: Figure 1 shows the general characteristics of patients and the perioperative NMBA management for the three periods (2006-2012-2018). Data are median (ranges) or absolute number (%).

Variable	2006[1]	2012[2]	2018	*P-value*
Number of patients included	636	624	587	-
Age (yr.)	45 (15-94)	57 (18-91)	58 (16-91)	< 0.0001
Weight (kg)	70 (35-130)	74 (40-150)	77 (40-158)	< 0.0001
Surgery (n)				
Abdominal	63/636 (10%)	56/624 (9%)	113/587 (19%)	< 0.0001
Non-abdominal	573/636 (90%)	568/624 (91%)	474/587 (81%)	
Duration of anaesthesia (hr)	0.98 (0.2-4.9)	1.08 (0.2-5.3)	1.25 (0.2-8)	< 0.0001
NMT monitoring before extubation (n)	99/636 (16%)	293/624 (47%)	442/587 (75%)	< 0.0001
Intraoperative reversal of NMBAs (n)	218/636 (34%)	183/624 (29%)	300/587 (51%)	< 0.0001
Neostigmine	218	139	220	-
Sugammadex	-	44	80	
TOF% in the PACU	93 (4-100)	98 (23-100)	98 (28-100)	< 0.0001
TOF<90% in the PACU (n)	270/636 (42%)	88/624 (14%)	78/587 (13%)	< 0.0001
TOF<80% in the PACU (n)	156/636 (25%)	45/624 (7%)	28/587 (5%)	< 0.0001

NMBA monitoring and reversal regularly increased between 2006 and 2018. Concurrently, there was a dramatic decrease in postoperative residual NMB. Despite a substantial improvement since 2006, 25% of patients still have their NMB not monitored before tracheal extubation; and residual blockade remains apparent at PACU arrival.
Conclusions: During the last 12 years the incidence of residual NMB strongly decreased in our institution. This study confirms the importance of changing attitude towards monitoring and reversal of NMB in routine anaesthetic practice.
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01AP06-4
Comparison of emergence agitation between succinylcholine and rocuronium-sugammadex in adults following closed reduction of nasal bone fracture

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Background and Goal of Study: Sugammadex allows rapid recovery from rocuronium induced neuromuscular blockade. Succinylcholine has been used in brief surgery but it is associated with myalgia, headache, histamine release and rise in lactate level. Thus, we assumed that succinylcholine may affect the emergence agitation (EA) and compared effects on EA between succinylcholine and rocuronium-sugammadex in patients undergoing closed reduction of nasal bone fracture under general anaesthesia.
Materials and Methods: Forty-two patients were allocated randomly to succinylcholine group (group SC) or rocuronium-sugammadex group (group RS; each n = 21). The neuromuscular block and its reversal were achieved by succinylcholine and normal saline in group SC whereas rocuronium and sugammadex in group RS. After surgery, the incidence of EA (Ricker Sedation-Agitation Scale [RSAS] ≥ 5) as a primary outcome, the incidence of dangerous EA (RSAS = 7) and duration of EA as secondary outcomes were compared.
Results and Discussion: The incidence of EA was higher in group SC than group RS (90.5 vs. 47.6%; mean difference, 42.9%; 95% confidence interval [CI], 15 to 63%; relative risk 4.26; P = 0.006). The incidence of dangerous EA was also increased in group SC than group RS (33.3 vs. 4.8%, mean difference, 28.5%; 95% CI, 4 to 50%; relative risk 2.13; P = 0.045). The duration of agitation was longer in group SC than group RS [106.5 (65.1) vs. 40.4 (26.0) sec; mean difference 66.1sec; 95% CI 31.0 to 101.1sec; effect size 1.3; P = 0.006). This would be the first randomized controlled study to compare the effect of different kinds of neuromuscular blocking agents with its reversal on EA after general anaesthesia. Our results implicate that different type of neuromuscular blocking agents and/or its reversal may potentially affect the characteristics of EA.
Conclusions: Succinylcholine increases the incidence, severity, and duration of EA compared to rocuronium-sugammadex in closed reduction of nasal bone fracture.

01AP06-5
Did sugammadex improve recovery profile of patients undergoing thyroid surgery

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Background and Goal of Study: Sugammadex is a selective relaxant binding agent provides rapid reversal from neuromuscular blockade [1,2]. The study purpose was to evaluate the effect of sugammadex on recovery profile in patients undergoing thyroid surgery with intraoperative neuromonitoring (IONM).
Materials and Methods: Eighty patients undergoing thyroid surgery were allocated into sugammadex and control group. Sugammadex group (n=40) received rocuronium 0.6 mg/kg at induction and sugammadex 2 mg/kg at skin incision. Control group (n=40) received rocuronium 0.3 mg/kg at induction. No more neuromuscular blocking agent was given during entire operation. Main outcome was assessed by extubation time (from skin closure to extubation). Secondary outcomes were measured by turn over time, recovery time and postoperative adverse events.
Results and Discussion: Extubation time for sugammadex and control group were 4.7±11.2 and 4.8±9.9 min respectively (p>0.05). Turn over time, recovery time and postoperative adverse events did not differ significantly between groups. Sugammadex group showed better intubation quality than control group (p<0.001). All patients had detectable neural monitoring signal when surgical procedure needed in both groups.
Conclusion: We concluded that the single dose of rocuronium (0.3mg/kg) was not inferior to the sugammadex with rocuronium (0.6mg/kg) in recovery profile after thyroidectomy. Both sugammadex and reduced dose of rocuronium were feasible for anaesthesia with IONM.
Reference :
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01AP06-6

Neuromuscular blockade, recovery and postoperative pain after laparoscopic-assisted vaginal hysterectomy with low-pressure pneumoperitoneum versus normal-pressure

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Background and Goal of Study: Laparoscopic assisted vaginal hysterectomy (LAVH) is often performed for older women. High pneumoperitoneum pressure can affect the patient's statement, while low pressure reduces visualization and lengthens the operation. The use of deep neuromuscular blockade (NMB) improves surgical conditions during a low-pressure pneumoperitoneum[1]. **The aim** of our study was to determine the effect of pneumoperitoneum pressure on muscle relaxant consumption, recovery after laparoscopic intervention and early postoperative pain.
Materials and Methods: Having obtained the informed consents, 48 women (scheduled for LAVH) were randomized into 2 groups: LP (n=23) low-pressure pneumoperitoneum (8 mmHg) and NP (n=25) normal-pressure one (12 mmHg). NMB was established with atracurium. Episodes of alarm from the insufflator led to NMB was deepened. Pain was assessed on a visual analogue scale (VAS) in 1, 5 and 24h after surgery. Other endpoints were surgeons' satisfaction; and time to mobilization. Both groups were similar in relation to physical status (ASA II). Data are presented as mean±SD or % patients with parameters. Mann-Whitney U test was used for statistical analysis, *p<0.05 was considered as statistically significant for comparison between groups.

Table.

Indicators	Low-pressure **(n=23)**	Normal-pressure **(n=25)**	p
Duration of surgery (min)	120.±12.3	110.5±4.5	0.04
Extubation (min)	22.7±5.1	14.4±3.2	0.02
Atracurium (mg)	80.9±8.1	70.1±4.1	0.01
VAS-1h (mm)	18±7.4	22.7±6.5	0.04
VAS-5h (mm)	14.4±3.	20.3±2.5	0.001
VAS-24h (mm)	13.2±2.9	14.0±1.4	0.5
Ambulation (min)	300.2±134.02	320±116.6	0.04
Surgeons' satisfaction (%)	68	84	0.03
Episodes of alarm	18.4±2.4	9.9±1.4	0.001

Results and Discussion: As the duration of the operation in LP was longer, and extubation of patients was performed later than in NP (Table). Surgeons' satisfaction was 16% less in LP. The consumption of atrakurium was 8.7% less in NP (p=0.06). Postoperative pain was significantly less in LP, both at 1 and 5 hour, and did not differ after 24 hours. Women started walking earlier after the operation in LP. Correlation were revealed between pressure of pneumoperitoneum and the VAS level after 1 hour (0.73, p=0.03) and 5 hours (0.65, p=0.04). Surgeons' satisfaction correlated with consumption of atrakurium (0.68, p=0.04).
Conclusions: Low-pressure pneumoperitoneum was associated with increased muscle relaxants consumption and cuted surgeons' satisfaction. However it can reduce early postoperative pain and hasten mobilization.
References:
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01AP06-7

Rocuronium does not affects on serum tryptase concentration during general anaesthesia in overweight and obese patients.

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Background and Goal of Study: Both female sex and overweight or obesity (Body Mass Index (BMI) ≥ 25) are risk factors of pathological activation mast cells and increasing basal serum tryptase concentration (STC). It is important to determine the safety of using rocuronium, which is the most common neuromuscular blocking agent (NMBa) causing perioperative hypersensitivity reactions, during general anaesthesia in these groups of patients. The aim of study was to present changes of STC during combined - volatile general anaesthesia with using rocuronium in overweight and obese female patients.
Materials and Methods : The study was accepted by the Ethical Commission of Medical University in Bialystok, Poland. The study was conducted in two female groups. Patients in Group I (66 gynaecological operations) undergoing volatile general anaesthesia with rocuronium, in Group II (60 thyroid operations) undergoing volatile general anesthesia without using any NMBa. Measurements of STC before (STC 0) and after anaesthesia (STC 1) were performed.
Results and Discussion: Serum tryptase concentrations before anaesthesia in patients with normal Body Mass Index, overweight and obesity were not statistically significant, but the highest value (3.44 mcg/ml) was observed in obese patients (Figure 1). In both study groups STC 1 non-statisticaly decreased in all categories of BMI(Figure2). Serum tryptase concentration after anaesthesia did not correlate with intubating dose and total dose of rocuronium. Neither STC 0 nor STC 1 presented correlation with BMI. Overweight and obesity did not induced specific changes of STC before and after volatile - combined general anaesthesia with rocuronium and it did not affect specifically on STC in these groups of patients.
Conclusions: The using of rocuronium as a component of combined - volatile general anaesthesia in overweight and obese female patients was safe and did not cause perioperative hypersensitivity reactions assessed by changes in serum tryptase concentrations. Due to selection of the study group, the explanation of the rocuronium effect on serum tryptase concentration require testing on larger and more diverse group.
References:
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01AP06-8

Outcomes of Deep and Moderate Neuromuscular Blockade among Individuals undergoing Surgical Procedures: A Systematic Review of Randomized Controlled Trials

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Background and Goal of Study: While neuromuscular blockade (NMB) facilitates intubation and can improve surgical conditions, published data conflict on the optimal level of NMB. We examined the impact of deep (d) and moderate (m) NMB on perioperative outcomes using a systematic review and meta-analysis framework.
Materials and Methods: PubMed, EMBASE, the Cochrane Library, DARE and grey literature were searched through September 14, 2018 to identify randomized controlled trials (RCTs) comparing the effects of dNMB with mNMB. Meta-analyses using random-effect models calculated pooled estimates with 95% confidence intervals (CI). Heterogeneity between studies was examined using I2 statistics and sensitivity analyses were used to explore the robustness of the findings. Analyses were conducted using R version 3.5.1.
Results and Discussion: Of 6,975 retrieved citations, 17 RCTs met study selection criteria, including 15 abdominal laparoscopic surgeries and 2 laryngeal microsurgeries. Among included studies, dNMB definitions varied, ranging from post-tetanic count 1 to 5, with mNMB definitions ranging from train of four counts 1 to 3. Overall risk of bias was low in 6 studies, moderate in 6, and unclear in 5. Nonetheless, across all surgeries, compared to mNMB, dNMB had better surgical-field rating with high heterogeneity, decreased mean post-operative pain score in the recovery room, and a lower likelihood of need to increase intraabdominal pressure during surgery, both with low heterogeneity (Table 1). There were no statistically significant differences in duration of surgery, length of stay, and postoperative nausea/vomiting between dNMB and mNMB groups. In evaluating the impact of depth of NMB by surgery type, the treatment effect for post-operative pain, surgical field ratings, and length of stay varied.
Conclusions:While results show variations in included studies by NMB definitions. deep NMB led to a better surgical field and less pain compared to moderate NMB. Findings suggest where clinically feasible, the use of dNMB may be preferred over mNMB to optimize surgical conditions and ultimately improve both surgical and patient outcomes.

Table 1. Parameters Estimates on the Effect of dNMB vs. mNMB for Peri-Operative Outcomes

Peri-Operative Outcomes	# of Studies	Type of Variable	Summary Statistics	Pooled Estimates with 95% CI	P-value	I^2 Statistic[c]
Surgical Outcomes						
Surgical field ratings	6	Continuous	pSMD[§]	0.51 (0.05, 0.98)	0.031	77.2%; High
Increase in IAP level[a]	4	Binary	pOR£	0.38 (0.20, 0.72)	<0.05	0%; Low
Patient Outcomes						
Post-operative pain at PACU	5	Binary	pOR	-0.51 (-0.70, -0.31)	<0.0001	0%; Low
Post-operative nausea/vomiting at PACU	4	Binary	pOR	0.62 (0.27, 1.43)	0.2639	23.1%; Low
Resource Use						
Duration of surgery (minutes)	11	Continuous	pMD[§]	-1.85 (-4.92, 1.23)	0.240	22.8%; Low
Length of recovery room stay (minutes)	3	Continuous	pMD	-4.36 (-10.83, 2.11)	0.186	0%; Low
Length of hospital stay (days)	3	Continuous	pMD	-0.68 (-1.95, 0.59)	0.295	69.6%; Moderate

Abbreviations: CI: confidence intervals; IAP: intra-abdominal pressure; PACU: post anesthesia care unit/recovery room; pMD: pooled mean difference; pOR: pooled odds ratio; pSMD: pooled standardized mean difference.
Notes:
[a]Increase in IAP level from either 8 to 12 mmHg OR 10/12 to 15 mmHg;
[£]The estimate of pOR for dNMB vs mNMB < 1 with CI excluding 1 indicates that dNMB is more effective than mNMB.
[§]The estimate of pMD/pSMD for dNMB vs mNMB < 0 with CI excluding 0 indicates that dNMB is more effective than mNMB.
[c]The I^2 statistic reflects heterogeneity, i.e. the percentage of variation across included studies which was classified as low (<25%); moderate (25-75%); and high (>75%).

01AP06-9
Influence of reversal of a partial neuromuscular block on the ventilatory response to hypoxia: a randomized controlled trial in healthy volunteers

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Background and Goal of Study: The ventilatory response to hypoxia is a life-saving chemoreflex that is impaired by non-depolarizing neuromuscular blocking agents.[1] We intended to study the effect of reversal strategy on the restoration of this chemoreflex.
Materials and Methods: This was a single center randomized controlled trial in healthy volunteers. During the experiment, subjects received a continuous rocuronium infusion aimed to reach a TOF ratio of 0.7 (measured by EMG at the adductor pollicis muscle). Hereafter, subjects were randomized to have the NMB reversed by (1) placebo, (2) neostigmine/atropine (1/0.5 mg) or (3) sugammadex 2 mg/kg. Ventilatory responses to 5-min hypoxia (oxygen saturation 80±2%) and ventilation at hyperoxic isohypercapnia (end-tidal pCO2 55 mmHg) were obtained at baseline, during the rocuronium-induced partial neuromuscular block and following the reversal at reaching a TOF-ratio = 1.0 We hypothesize that the hypoxic ventilatory response is fully restored following the return to a TOF-ratio of 1.
Results and Discussion: We confirmed that low-dose rocuronium reduced the ventilatory response to hypoxia by 33% as was previously shown for other non-depolarizing NMBAs.[1] While the hypoxic ventilatory response relative to baseline values was still impaired following placebo reversal (hypoxic ventilatory response 76 ± 16% of control, p < 0.01), a full return of the hypoxic ventilatory response was observed following neostigmine (87 ± 27% of control, p = 0.074) and sugammadex (95 ± 29% of control, p = 0.241) reversal (see figure 1). Hypercapnic breathing was restored after all three reversal strategies. Despite the return of the train-of-four-ratio to 1.0 in all subjects, some subjects had persistent reduced ventilatory responses to hypoxia.
Conclusions: Recovery of rocuronium induced impairment of the hypoxic ventilatory response was dependent on the reversal strategy. Recovery of HVR was improved after reversal with neostigmine and sugammadex. Impairment of the peripheral chemoreflex may persist in some subjects even at TOF ratio's>0.9
References:

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01AP06-10
ED_{50} and ED_{95} of remifentanil for tracheal intubation as determined by a monitor of nociception (NOL index)

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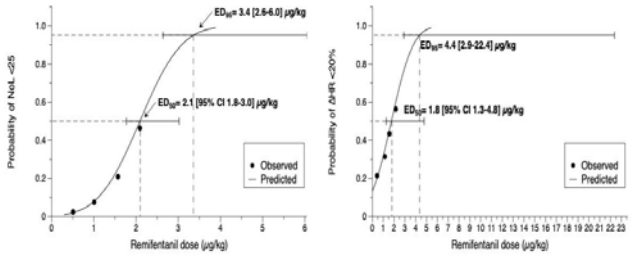
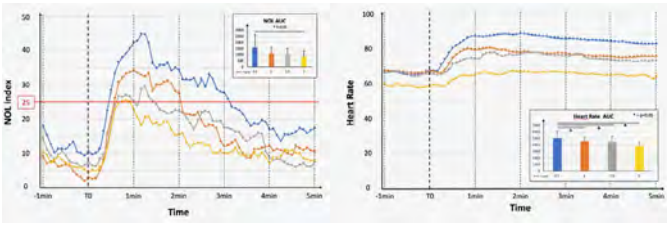
Background & Study Goal: The use of heart rate (HR) and blood pressure as proxies for nociception is common but imperfect as they have poor sensitivity and specificity. This study used a novel nociception monitoring device, the PMD200, to determine the ED_{50} and ED_{95} of remifentanil for the abolition of nociception during intubation.
Materials & Methods: 80 patients with normal airway criteria undergoing surgery requiring intubation received 0.5, 1, 1.5, or 2 µg/kg of remifentanil as part of a standardized induction regimen. Standard anesthetic monitoring as well as the PMD200's NOL index (generated by analyzing parameters associated with autonomic tone) and HR were recorded every 5 seconds before and after intubation. Using a NOL value of 25 (based on previous studies), we determined via probit regression the ED_{50} and ED_{95}, i.e., the dose needed to avoid nociception in 50% and 95% of patients, respectively. ED_{50} and ED_{95} were also calculated based on HR increase of >20%.
Results and Discussion: Data for 74 patients were fully analyzed. ED_{50} and ED_{95} were similar for NOL and HR. However, the confidence interval for HR was much wider (Fig 1). 5 minutes after intubation, NOL values had returned to pre-stimulus baseline values whereas HR remained elevated despite the absence of further nociceptive stimuli (Fig 2). Area under the curve (AUC) of NOL variation after intubation as well as AUC of HR were significantly smaller after a 2 µg/kg remifentanil bolus vs 0.5 µg/kg (p <0.05). Receiver operating characteristic (ROC) curves for sensitivity and specificity showed higher ROC AUC for NOL (0.97[0.95-0.99];p<0.001) vs HR (0.82[0.76 0.88];p<0.001).





Conclusion: The NOL and HR yielded similar ED_{50} and ED_{95}. However, the NOL appeared to have greater sensitivity and specificity for detecting nociception.

01AP07-1
Pharmacodynamics of remimazolam after continuous infusion in volunteers.

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Background and Goal of Study: Remimazolam (CNS7056) is a new ultra-short acting benzodiazepine for intravenous sedation and anaesthesia (1,2). It was the aim of this study to investigate its pharmacodynamics after continuous infusion.
Materials and Methods: After ERB approval and written informed consent, 20 healthy male volunteers (20-38 yrs) 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. Remimazolam plasma concentrations were determined from arterial blood samples. Sedation was assessed by the Modified observer's assessment of alertness and sedation scale (MOAA/S) with 6 levels from 0 (no response to painful trapezius squeeze) to 5 (alert) and was modelled using a sigmoid probability model with effect site compartment. The EEG effect was assessed using the Narcotrend® index (NCT) and was modelled using sigmoid E_{max} models with effect site compartment. In addition, hemodynamic, the QT interval of the ECG and side effects were investigated.
Results and Discussion: Loss of consciousness occurred 4.6±1.1 min after start, full alertness was regained 19.4±6.7 min after stop of infusion. The MOAA/S score stayed between 0 and 2 during remimazolam infusion. The EC_{50} for a MOAAS/score≤1 was 695±239 ng/ml. The equilibration half-time between central and effect compartment was 2.7±0.6 min. The simulated time for a 50% decrease of remimazolam effect site concentration (context-sensitive halftime) after an infusion of 4 h was 12.1±1.8 min. The NCT decreased from 96±4 to 75±7 within the first 15 min, and reached a minimum of 51±15 shortly after end of the infusion. This behavior could be modelled by an extended model with two sigmoid terms and two effect site concentrations with equilibration half-lives of 2.5±1.8 and 36.5±14.5 min, resp. Mean arterial blood pressure decreased by 24±6%, heart rate increased by 28±15%. The subjects kept spontaneous breathing. The QT interval was slightly prolonged by 3.7 ms (90% CI: 1.2-8.5 ms). The main side effect was involuntary muscle movements.
Conclusion: Remimazolam showed a fast onset, fast recovery, moderate hemodynamic effects, and no clinically significant prolongation of the QT interval.
References:

1. Antonik et al. Anesth Analg 2012;115:274-283
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Acknowledgements: ECG analysis was performed by ERT Ltd (Peterborough, UK). The study was supported by a grant of Paion UK, Cambridge, UK

01AP07-2
The Use of Mast Cell Tryptase as a Biomarker of Perioperative Anaphylaxis

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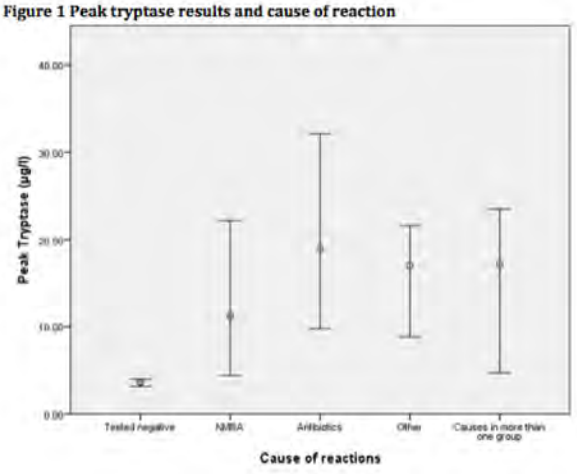
Background and Goal of Study: Perioperative Anaphylaxis (POA) is a rare complication of anaesthesia. Presentation, causes and treatment of POA differs from community anaphylaxis, which may alter mast cell degranulation and tryptase results. We reviewed mast cell tryptase (MCT) results from 40 patients with POA to determine what factors affect MCT in this group.
Materials and Methods: We used non-parametric Mann-Whitney U test and Spearman Co-efficient to assess for differences between MCT results and grade of anaphylaxis, route and dose of adrenaline and causitive agent in 40 patients who had completed allergy testing for POA in NHS Lothian between 2014-17.
Results : Timings and completion of MCT was suboptimal (table 1). Peak tryptase (Tp) was typically captured on 1st sampling. Median Tp was 9.8 mcg/l, but increased significantly with grade of anaphylaxis: 7.3mcg/l Grade III vs 63mcg/l Grade IV (p 0.021). Those who were negative at testing had significantly lower Tp than those who tested positive to any other agent (fig 1, p 0.002). There were no other statistical differences observed.

Tryptase Measurement	Frequency completed	Median time to collection mins (range)	Median tryptase value mcg/l (IQR)	Median tryptase in positive cases mcg/l (IQR)
T1	83%	30 (0-380)	9.8 (3.8-24)	15 (5-24)
T2	90%	160 (22-520)	9.7 (3.8-21)	13 (6.1-21)
T3	83%	1400 (280-1800)	3.8 (2.5-6.7)	4.2 (2.7-6.5)

Figure 1 Peak tryptase results and cause of reaction



Conclusions: MCT levels were lower than expected and median TP levels were below normal reference values. Higher levels of Tp were associated with increased severity but no other factors examined in this series. There is currently no agreed threshold value for MCT results in POA, however the dynamic tryptase release algorithm has been suggested to increase detection especially at levels within normal reference range (1). For this to be adopted more compliant sampling, especially with regards to baseline levels is required.
References :
1. RCOA 2018: 6th National Audit project Perioperative anaphylaxis.

01AP07-3
Comparison of the changes in cerebral oxygenation during one-lung ventilation when using propofol with desflurane.

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Background and Goal of Study: Propofol has been thought to be an appropriate anesthetic agent during one-lung ventilation (OLV) because inhalation anesthetics suppress hypoxic pulmonary vasoconstriction. However, a recent study1) showed that cerebral oxygenation during inhalation of isoflurane was higher than that by propofol in general surgery. The purpose of our study was to compare the changes in cerebral oxygenation during OLV when using propofol and when using desflurane.
Materials and Methods: This study was approved by the institutional review board and registered in the UMIN clinical registry (UMIN #000030135). 40 patients who were aged 20 to 90 years, had ASA-PS □or □, weighed 40 kg or more, and were scheduled to undergo thoracic surgery were enrolled. Root with O3™ and SedLine® (Masimo Co. Irvine, CA, USA) was used. We put a SedLine®EEG sensor for measurement of the degree of sedation and an O3™ sensor for measurement of cerebral oxygenation on the forehead of each patient before induction of anesthesia. The patients were randomized a group in which anesthesia was maintained with remifentanil and propofol (P group: n=20) and a group in which anesthesia was maintained with remifentanil and desflurane (D group: n=20) regardless of the combination of epidural anesthesia. The degree of sedation, that is patient state index (PSI), was kept between 25 to 50. The supply gas was constantly maintained oxygen of 1 L/min and air of 2 L/min before OLV and only oxygen of 2 L/min during OLV. Mean arterial pressure was kept above 60 mmHg and end-tidal carbon dioxide concentration was kept at 35 to 45. The primary outcome was the change in cerebral oxygenation during OLV for 30 minutes (every 5 minutes). The Mann-Whitney U test and one-way ANOVA were used□for analysis of data. P values less than 0.05 were considered statistically significant.
Results and Discussion: The heights of patients were the only significant difference in the two groups. The 30-minute changes in cerebral oxygenation on the operation side were almost the same in the two groups (P group: 0.000 ± 0.070 vs D group: -0.005 ± 0.061, p=0.857). The changes on the opposite side were 0.030 ± 0.082 (P group) and -0.013 ± 0.068 (D group) (p=0.095).
Conclusion: Our study showed that propofol was similar to desflurane in terms of the change in cerebral oxygenation during OLV.
References:
1. Anesth Analg. 2004; 98: 471-6

01AP07-4
Downscaling validation of a pharmacodynamics response surface model in high-risk patients

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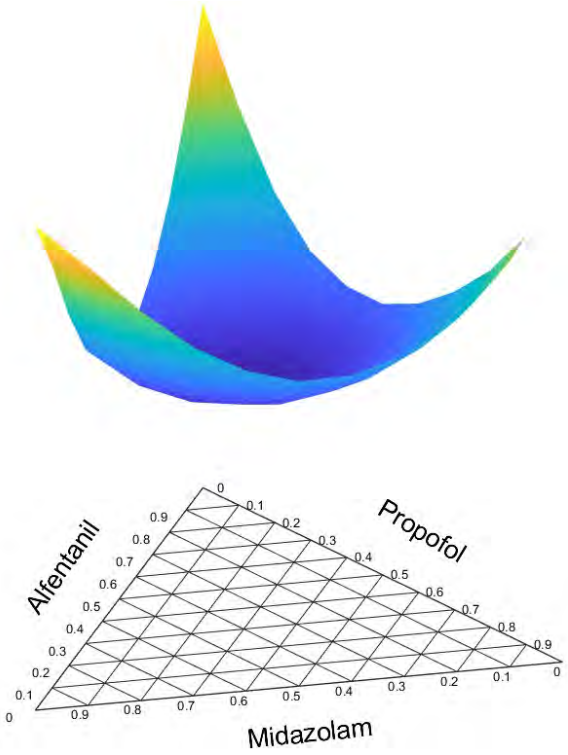
Background: MOAA/S (Modified Observer's Assessment/Alertness Scale) offer real-time pharmacodynamic indices, which can be aided by mathematic models to estimate and predict drug effects. A subgroup of the response surface mathematic models called NLMAZ (non-linear mixed effect with zero effect) has been developed to work with three-drugs. One feature of a multi-drug model is to downscale to accommodate lesser drugs. In this study we adjusted modelling conditions and validated with two anesthetics in high risk patients.
Methods: The study was divided into modelling and validation. NLMAZ was modelled with patients who received sedation for gastrointestinal endoscopies under midazolam, alfentanil and propofol anesthesia. Downparameterization focused on the γ parameter and it was compared with the full form of the NLMAZ using OFV (objective function value). In validation we chart-reviewed adult patients that underwent sedation for transoesophageal echocardiography (TEE). Propofol and alfentanil were given in intermittent boluses. The MOAA/S was scored every minute and on key events such as loss and return of consciousness.
Results: Twenty patients were available in the TEE validation group. The average age and BMI was 61.9±11.9 years and 25.0±3.2 kg/m². The indications for TEE examinations were valvular heart disease (25%), arrhythmias (65%) and adult congenital heart disease (10%). The patients received alfentanil and propofol doses in the range of 200~600 mcg and 20~100 mg respectively. Recorded MOAA/S ranged from 2~5. We constructed a full NLMAZ and reduced NLMAZ model with 56 patients using MOAA/S < 3 as cut-off. The parameters for γ was reduced from 10 to 1. OFV for the full and reduced NLMAZ were 110.36 and 110.23. The validation accuracy was 87.9% and the ROC AUC was 0.75.
Conclusion: NLMAZ downparameterization is feasible with comparable performance with the full NLMAZ form. The MOAA/S < 3 model successfully

downscaled to two-drugs and matched patient responses in the TEE high risk population. However, this study only validated the propofol-alfentanil arm of the triple drug NLMAZ model. Further studies are required for the validation of the other arms.



01AP07-5
Efficacy and safety of Remimazolam in patients undergoing elective surgical procedures under general anesthesia.

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Background and Goal of Study: Remimazolam - is a new benzodiazepine designed to deliver fast onset and short duration sedation, with a more rapid recovery than currently available drugs in class, such as midazolam.
Materials and Methods: We performed a multicenter single blind randomized clinical study to compare efficacy and safety of Remimazolam and Propofol in patients undergoing elective surgical procedures under general anesthesia. This study enrolled a total of 150 patients (75 patients per group) 18 to 65 years of age in whom surgical procedures under general anesthesia ASA I – ASA II. Primary efficacy endpoints: “Action as a general anesthetic”, which is a compound evaluation criterion, consisting of the following criteria: intraoperative awakening/ preservation of memories of surgery; the need for additional sedatives.
Results and Discussion: In all patients, in the group of remiamazolam and in the group of propofol, the study drug, according to the criteria, was effective: no patient had intraoperative awakening or memories of surgery, did not need for additional sedatives. Extubation time was 10 min in the group of remiamazolam and 8,5 min propofol group (p=0,0003). Eye opening time was 9,5 min remiamazolam group and 7,7 min propofol group (p=0,0008). Time from the onset of administration of the test drug/comparator to unconsciousness was 2 min remiamazolam group and 1 min propofol group (p<0,0001). (BIS) in both groups was characteristic of the condition of the patients during surgery under general anesthesia. Time when the patient will be able to say the date of his birth was 16,3 min in the group of remiamazolam and 12,0 min propofol group (p<0,0001). Time when the patient is transferred from the operating room was 25 min remiamazolam group and 20 min propofol group (p=0,0012). The total recovery time was 14,4 min remiamazolam group and 11,0 min propofol group (p<0,0001). In the study, there were no cases of dose changes, suspension or withdrawal of the study therapy due to adverse events, as well as serious adverse events.
Conclusions: Despite remimazolam expectedly demonstrated more slowly onset to unconsciousness and more slowly recovery remimazolam was non-inferior to propofol in terms of efficacy, and showed no significant difference in terms of safety.

01AP07-6
Manual and automated infusion system control of intraoperative propofol administration: a comparison

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Background: The authors have developed an automated system able to determine in real-time the estimated target-effect-site concentration (esTEC) of propofol necessary to achieve the target bispectral index (BIS), based on real-time estimation of propofol effect-site concentration (ESCp) and BIS regression curves. The system uses these constantly varying curves to administer a target-controlled infusion (TCI) and achieve esTEC45, the target concentration required for a BIS of 45. The present study compared the percentage of time during which adequate intraoperative sedation was maintained when using this system versus when propofol administration was manually controlled by an anesthesiologist.
Materials and Methods: The present study was approved by the Ethical Review Committee of our institution and written informed consent for participation was obtained from patients. Scheduled surgical patients, ASA grade 1–3, were randomly allocated to either the automated (n=14) or manual (n=13) group. In the automated group, anesthesia was induced with propofol TCI at a target concentration of 3 μg/ml and then automatically and continuously adjusted once BIS was ≤55, to maintain a target concentration of esTEC45. In the manual group, the anesthesiologist adjusted the target concentration to maintain BIS at 45 by controlling propofol TCI based on experience and instinct. Intraoperative analgesia was provided with 0.1–1 μg/kg/min remifentanil. The percentage of intraoperative time during which BIS was in the range of 35 to 55 (BIS35–55) was compared between the groups.
Results: The percentage of time of BIS35–55 was significantly higher in the automated group than the manual group (93±6% vs. 87±9, respectively; p□0.0374).
Conclusion: Greater stability of BIS within the target range was maintained with the automated infusion system using esTEC as the marker than with manual control by an anesthesiologist based directly on BIS.

01AP07-7
De novo atrial fibrillation after meperidine: a case-report.

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Background: Meperidine is a μ receptor agonist structurally similar to atropine, which may condition a transient increase in blood pressure, peripheral vascular resistance and heart rate. However, its arrhythmogenic potential is yet to be established[1,2]. We describe a case report of “de novo” atrial fibrillation (AF) associated with the administration of meperidine.
Case Report: A 52-year-old female, ASA I, 65 kg, with in situ breast carcinoma scheduled for unilateral mastectomy. Anesthetic induction was performed with fentanyl (0.2mg), propofol (120mg) and rocuronium (50mg). Intraoperative analgesia with paracetamol (1000mg), tramadol (100mg) and ketorolac (30mg). Reversal of neuromuscular blockade with sugammadex (130mg), according to neuromuscular blockade monitoring. The anesthetic and surgical procedures went uneventful. In the PACU the patient remained stable, and a meperidine bolus (20mg) was given for mild pain (VAS 3). After about 5 minutes, “de novo” AF with rapid ventricular response was detected, with no signs of severity. After discarding predisposing factors that could be corrected, we decided to perform an amiodarone bolus (300mg), followed by an infusion (900mg / 24h). Due to hemodynamic instability, we decided to suspend amiodarone and perform a synchronized electrical cardioversion (150 J) under sedation and anticoagulation. After, the patient remained in the PACU for 2 hours (total of 6h) clinically and hemodynamically stable. During hospitalization, no new cardiac events occurred, being discharged 3 days later and referred to Cardiology department for further evaluation.
Discussion: For non-cardiac surgery, AF has an incidence of 0.4% to 12% in the perioperative period and is associated with precipitating and predictive perioperative risk factors. In this case-report, the absence of risk factors as well as the temporal relationship between the administration of meperidine and the onset of AF, account for a probable adverse pharmacological effect. The lack of reports in the literature makes this clinical case worthy of special attention.
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Learning points: In an anesthetic and analgesic approach it’s important to always consider the possibility of adverse drug effects and interactions. Early recognition and treatment is key to favorable outcome.

01AP07-8
The effects of dexmedetomidine on postoperative sore throat after thyroid surgery

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Background and Goal of Study: Postoperative sore throat (POST) after thyroidectomy is common complaint. Movement of endotracheal tube by position change and mass manipulation during thyroid surgery can cause this unpleasant symptom. Dexmedetomidine, selective α2-adrenoreceptor (AR) agonist, has been used as sedatives, analgesics, and anxiolysis. Recently, anti-inflammatory effect of dexmedetomidine has also been found, mediated by α2-AR. Here, we focused the inflammation in the pathophysiology of POST. In this study, we hypothesized that use of dexmedetomidine as anesthetic adjuvant during surgery would have favorable in reducing POST, thus we assessed effects of dexmedetomidine on POST compared to remifentanil in patients undergoing thyroidectomy.
Materials and Methods: Anesthesia was maintained with 1.5-2.5% end-tidal sevoflurane in order to target a bispectral index value of 40-60. Patients were assigned either to remifentanil group (group R, N=37) or dexmedetomidine group (group D, N=37). Patients in the group R received 1.0-2.0 ng/ml target concentration of remifentanil using target-controlled infusion, whereas patients in the group D received dexmedetomidine (loading dose of 1 □/kg over 10 min and continuous infusion of 0.3-0.5 □/kg/hr) during the surgery. At 1, 6, and 24 hours after surgery, incidence of POST at rest and swallowing was assessed, and severity of it was checked using a 4-point scale (0=none; 1=mild; 2=moderate; 3=severe). Hoarseness was also assessed using a 4-point scale (0=none; 1=mild; 2=severe; 3=aphonia). Postoperative pain score using a visual analogue scale (VAS) at the same time point and total dose of rescue analgesics during 24 hours were recorded.
Results and Discussion: Incidence and severity of POST at rest and during swallowing at 1, 6, and 24 hours after surgery were significantly lower in the group D than in the group R ($P < 0.05$). Incidence of hoarseness was also lower in the group D than in the group R (at 6, 24 hours) ($P < 0.05$). VAS scores for postoperative pain were higher in the group R at all time points than in the group D ($P < 0.05$). Incidence of nausea was lower in the group D than in the group R at 1 hour after surgery.
Conclusions: Dexmedetomidine infusion as anesthetic adjuvant during surgery reduces the incidence and severity of POST at rest and swallowing during 24 hours after thyroidectomy.
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01AP07-9
Breath-by-breath exhaled propofol monitoring: Influence of ventilator setting

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Background and Goal of Study: Exhaled propofol monitoring are currently available for clinical practice. However, ventilator setting with a rebreathing circuit can influence the exhaled concentration of propofol. The goal of the study was to examine the influence of fresh gas flow rate, tidal volume, and inspiration/expiration (I/E) ratio using in vitro conditions.
Materials and Methods: A breath-by-breath exhaled propofol monitor, which we recently developed, was used for this in vitro study. The equipment for breathing circuit was connected in the following order; a test lung, an endotracheal tube, a basic Y-piece circuit, and an anaesthesia machine. An artificial nose was connected between the inspiratory or expiratory limb of the Y-piece circuit and the anaesthesia machine. Under volume-controlled ventilation, volatile propofol was supplied as exhaled propofol from a liquid calibration unit (LCU, Ionicon Analytik GmbH, Austria) into the breathing circuit between the test lung and the endotracheal tube. The exhaled propofol was measured a part between the endotracheal tube and the Y-piece circuit. The respiratory rate was fixed at 10 breaths/min and basic ventilator setting were determined as 6 L/min of the fresh gas flow, 300 mL/breath of the tidal volume, and 1:2 of I/E ratio. We varied the fresh gas flow at 1, 3, or 6 L/min, the tidal volume at 300, 450, or 600 mL/breath, and I/E ratio at 1:1.5, 1:2, or 1:3. End-tidal propofol concentrations under various ventilator settings were compared. For the comparison, an index was calculated as the exhaled propofol concentration from LCU divided by measured propofol concentration by the breath-by-breath exhaled propofol monitor. Tukey multiple comparison test was used to compare 50 breaths at steady state in various settings. Data was expressed as mean ± SD. $P<0.05$ was regarded as significant.
Results: The index was 76 ± 4% for the basic setting. The indices were 85 ± 4% for 3 L/min ($P<0.001$), 93 ± 4% for 1 L/min ($P<0.001$) of the fresh gas flow, 90 ± 5% for 450 mL/breath ($P<0.001$), 108 ± 5% for 600 mL/breath ($P<0.001$) of the tidal volume, 76 ± 4% for 1:1.5 ($P=0.818$), and 72 ± 4% for 1:3 ($P<0.001$) of the I:E ratio.
Conclusions: Breath-by-breath exhaled propofol monitoring clarified that tested settings especially fresh gas flow and tidal volume had significant impact on the measurement of exhaled propofol concentration. An in vivo study is necessary for clinical use of breath-by-breath monitoring.

01AP07-10
Sedation with propofol TCI during ERCP: is the adjunct of esketamine more effective and safer than alfentanil? (SPEKA study)

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Background and Goal of Study: Endoscopic retrograde cholangiopancreatography (ERCP) is one of the most complex gastrointestinal endoscopic procedures. Currently it is still unclear which sedation regime bests facilitates an ERCP. This study aims to assess the effectiveness and safety of a sedation regime for ERCP with the adjunct of esketamine.
Materials and Methods: Adult, ASA physical status I and II patients who underwent ERCP were randomly assigned to sedation with propofol/alfentanil versus propofol/esketamine. The primary outcome was efficacy of the sedation regime reflected in total dose propofol, recovery time and satisfaction of the patient and interventionalist. The secondary outcome measure, safety, is the occurrence of respiratory or haemodynamic incidents.
Results and Discussion: Data from 162 patients was analysed, 79 patients received propofol/alfentanil (standard care) and 83 patients received the propofol/esketamine (intervention group). The median total dose of propofol used was 8,3 mg/kg/h (IQR 6.2-10) in the intervention and 10,5 mg/kg/h (IQR 7.9-12.5) in the standard care group ($p=<0,001$) There were no statistically differences in recovery time. Also, no differences in patient or interventionalist satisfaction were observed. No significantly differences were noted in the occurrence of sedation related adverse events between the two groups. The effect on sedation related adverse effects may be understated by the inclusion of patients with only ASA physical status I and II.
Conclusions: The sedation regime propofol and esketamine reduces the total amount of propofol used without compromising on the duration of recovery or patient and interventionalist satisfaction compared to a sedation regime of propofol and alfentanil.

01AP08-1
Sodalime absorber versus membrane CO_2 filter performance during automated closed-circuit anesthesia: a case-report

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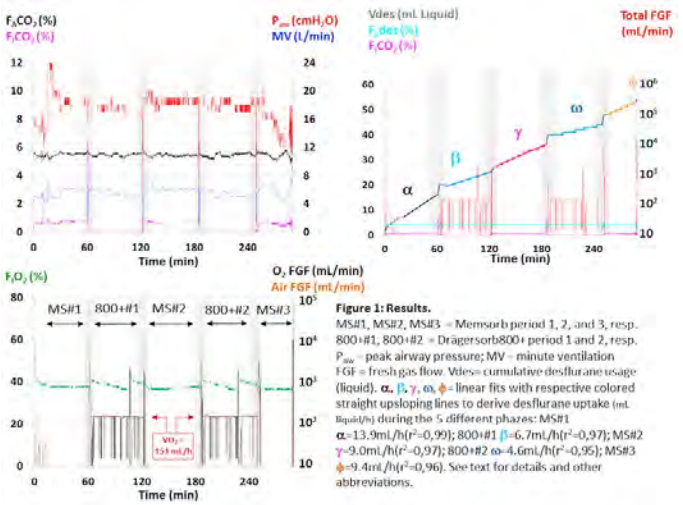
Introduction: Memsorb™ [MS](DMF Medical, Halifax, NS, Canada) is a new CO_2 removal device that uses cardiopulmonary bypass oxygenator technology, i.e. gas transfer across hollow fiber walls that depend on sweep flow rate and concentration gradients. We describe the effects of switching [MS] to Drägersorb 800+ sodalime [D800] and back (4 swicthes) during target-controlled closed-circuit anesthesia (TCCCA) with desflurane in O_2/air with the Zeus (Dräger, Lübeck, Germany).
Materials and methods: IRB approval and written informed consent were obtained from a 80 year old ASA PS III patient (70 kg, 167 cm) undergoing robotic Bricker derivation. Targets were 39% inspired O_2 (F_IO_2), 4.0% end-expired desflurane ($F_A$des) and F_ACO_2 5.2-5.8% (by adjusting ventilation). An O_2/air blender delivered 40% O_2 (= target F_IO_2 + 1%) to the [MS] with the sweep flow titrated to $F_ICO_2 \leq$ 0.8%. [MS] and [D800] were switched every 1h (Fig.1). We analyzed F_IO_2, $F_A$des, F_ICO_2, F_ACO_2, minute ventilation (MV), O_2 and air FGF (Fresh Gas Flow), sweep flow and cumulative desflurane usage (Vdes). A linear fit to Vdes during every 1h period (except first 15 min) yielded uptake in mL/min. O_2, CO_2, desflurane and N_2 (balance gas) losses from the Zeus were calculated from measured exhausted gas volume and its gas content.



Results: Fig. 1. F_ICO_2 was 0 with [D800] and 0.5-0.8% with [MS] (sweep flow 15-23 L/min). FGF was 0 with [MS] and 151 mL/min O_2 with [D800]. Zeus losses (148 mL/min) consisted of 54 mL/min O_2, 2.0 mL/min CO_2, 87 mL/min N_2, and 5.4 mL/min desflurane vapor (= 1.5 mL liquid/h). Thus, 205 mL/min O_2 (151+54) was transferred from [MS] to the breathing system (assuming no leaks). Liquid desflurane use during the [MS][D800][MS][D800][MS] sequence was 13.9, 6.7, 9.0, 4.6, and 9.4 mL/h of which 1.9, 0.1, 1.7, 0.1 and 0.8 mL/h were lost via the Zeus exhaust, respectively. [MS] used 1.8, 0.6, 1.1, and 1.2 mL/h per 1% $F_A$des more than [D800].
Discussion: Per 1% $F_A$des [MS] loses ±1 mL liquid. Because O_2 and N_2 transfer from [MS] to the circle system is in excess of patient uptake, another small amount is lost via the Zeus exhaust.

01AP08-2
Latex pollution in the operating room: an environmental study

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Background and Goal of Study: Latex is one of the main triggering agent for perioperative anaphylaxis. Among other measures, it is recommended to schedule latex allergic patients at the beginning of the operating list. This recommendation is based on the assumption that latex aeroallergens levels are lower at the beginning of the day. However, these levels have never been investigated to ensure that this measure would be effective. The goal of this study was to assess latex aeroallergens levels changes versus time in the operating room.
Materials and Methods: Operating room air samples were collected using a suction pump in an ISO 7 operating room during ten open days. A polytetrafluoroethylene (PTFE) membrane was placed at the entrance of the pump to catch aeroallergens. Four 2-hours periods of measure were defined: before the beginning of the operating program (5:30 to 7:30 am), between 7:30 and 9:30 am, between 11:30 am and 1:30 pm and finally between 3:30 and 5:30 pm. The number of latex gloves used, the number of patients operated and the number of persons present in the operating room (OR) were also recorded. Major latex aeroallergens (Hev b1, Hev b3, Hev b5 and Hev b6.02) concentrations adsorbed on PTFE membranes were analyzed using Elisa kit.
Results and Discussion: Hev b3, Hev b5 and Hev b6.02 were undetectable in all our samples. Hev b1 median concentration was less than 10 ng/m3 during the first period, then respectively 75, 68 and 208 ng/m3 in the second, third and fourth period. There was no correlation between Hev b1 concentrations and surgical activity in the OR. Despite a median concentration at less than 10 ng/m3 for Hev b1 during the first period, three measures showed persisting high concentrations of Hev b1 prior to any surgical activity suggesting that room air renewal was not sufficient to ensure constant full extraction of latex aeroallergens. Gloves were the only source of latex identified in our study. No gloves were used during the first period of measurement or during the night before.
Conclusion:Considering our results, scheduling a latex allergic patient at the beginning of the operating list does not prevent latex aeroallergens exposure. Further guidelines should take these results in consideration.

01AP08-3
Improving recycling in the OR, small changes can make big differences

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Background and Goal of Study: A great amount (20-70%) of medical waste derives from the operating rooms. More than 50% may be recyclable, but often disposed of incorrectly[1]. Our study evaluated how the waste produced in low complexity surgeries has a potential for recycling as well as team's adhesion rate during a voluntary project.
Materials and Methods: The project was developed by the Anesthesiology team of the Surgical Expedition, a volunteer project in Brazil, which performs low complexity surgeries in low-income cities. Sixty-three surgeries were carried on four days: 17 herniorrhaphies, 11 vaginal hysterectomies, 23 cholecystectomies and 12 gynaecological surgeries (hysterectomies or endometriosis resection), both videolaparoscopic. We separated and weighted the waste produced from anesthesia and surgical teams on digital scales (error in 5g) at the end of the surgeries. The possibility of recycling was presented to each surgical team seeking voluntary adhesion to the project. Red bags were destined for plastic, blue bags for paper and white bags for infectious waste. Inappropriate discard assessed the adherence. Patient data, type of procedure and anesthesia, anesthetic and surgical time were all registered.
Results and Discussion: In our project, 34.4% of the waste was recyclable. We found a correlation with total recyclable waste and anesthesia duration (P<0.0001). The adhesion to recycling rate was 56.45%, with no difference between teams, ($\chi2$ = 1.84, P=0.175), and no difference along the days ($\chi2$ = 1.76, P = 0.62). Even though the option to recycle was readily available, it was not the common effort in this study. Education measures are still needed. We developed this study in a setting of limited resources to perform simple surgeries, using mostly non disposable material which could account for less waste generation. Since it was a small team, the workload was high and besides performing the procedures, the project also had an educational purpose, with medical students being present all the time. The overload of work could compromise the effort to separate the waste.
Conclusions: In this study, with small resources, 34.4% of total waste was recyclable, proper management could account for diminishing the carbon footprint and costs with waste disposal. Educational measures are necessary to improve adhesion.
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01AP08-4
Safety and reliability of a novel membrane technology instead of chemical absorbents for carbon dioxide removal – clinical data

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Background and Goal of Study: Fresh gas flow (FGF) rates in anesthesia circuits directly determine the level of anesthetic vapour vented to the atmosphere. (a) saving cost and (b) decreasing the environmental footprint of anesthesia practice require the need of lower FGFs. The reduction of FGF has long been technically feasible using chemical absorbents, however, membrane technology promises a host of advantages including improved simplicity, reliability, safety, environmental stewardship and cost. In addition, concerns that have resulted in vapor manufacturers' recommended minimum FGF rates of 1-2 Lpm (country dependent) are eliminated using an inert membrane. Goal of the study was to investigate the safety and feasibility of a membrane filter, (memsorb™, DMF Medical Inc., Halifax, Canada) under low(≤1.0 Lpm),minimal (≤0. 5 Lpm), and metabolic FGF(≤0.35 Lpm) conditions for CO_2 removal. Memsorb™ is designed to replace 300-500 absorbers/year, therefore significantly reducing (i) absorber waste, (ii) carbon footprint from absorber transportation, (iii) cost of storage and disposal, and (iv) safety concerns associated with dust and other chemical reactions.
Materials and Methods: After local REB approval, 129 patients received standard general anesthesia with vapour using memsorb™ on Fabius® machines (Dräger, Lübeck, Germany). Memsorb™ was flushed with 15 Lpm with the Air:O_2 ratio adapted to match the target oxygen concentration of the anaesthesia system. Cases were selected by FGF group. A control group of 100 patients using Drägersorb 800+® (Dräger, Lübeck, Germany) was included.
Results: All FGF groups using memsorb™ showed physiologically safe median $etCO_2$ values. No adverse events were reported. Age, Gender, Length of surgery and ventilation parameters did not differ significantly from the control group.
Conclusions: Memsorb™ showed physiologically safe $etCO_2$ data under all studied conditions. This confirms that memsorb™ provides a safe and valid alternative to chemical-based absorbents, while also reducing the environmental impact of anesthesia.

01AP08-5
Ecological cost of overage from anesthesia equipment and drugs: an exemple from a French Hospital

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Background and Goal of Study: Anesthesia equipment and drugs have a high environmental cost. Overage is defined by the total amount of opened and discarded supplies that were not used. The aim of the study was to determine the ecological cost of all anesthesia supplies including the wasted ones
Materials and Methods: We conducted an observational prospective clinical study on 15 surgical interventions : 5 of short duration (SD) (<1h), 5 of average duration (AD) (1-2h) and 5 of long duration (LD) (>2h) in February 2018 at Libourne General Hospital. We determined the generated amount of waste and calculated the carbon cost of each procedure taking in consideration product's and drug's life-cycle from manufacturing to removal
Results and Discussion: When all anesthesia supplies were included, the carbon cost of SD procedures was 14,8kgEqC02, 17,9 kgEqC02 for AD and 26,6 kgEqC02 for LD. Among all procedures, inhaled anesthesics represented 88.4% of the ecological cost, airway management equipment 6,3%, infusion set 2,2%, other drugs 2% (excluding anesthesia gaz) and single use devices 1,1%. Global overage (excluding inhaled gaz) was responsible for 18,9% of the total ecological cost. Among wasted supplies anesthetic drugs represented 4% of the ecological cost, infusion set 20,4%, airway managment equipment 35,9% and single use devices 38,7%. The wasted supplies weighed 5.7 kg for SD, 6.3 kg for AD and 9.9 kg for LD. The carbon cost related to the removal of the supplies was 3.9 kgEqCO2 for SD, 4.3 kgEqCO2 for AD and 6 kgEqCO2 for LD. In this study none of the supplies were recycled
Conclusions: Inhaled anesthesics were responsible for the most important anesthesia-induced ecological footprint followed by the airway management equipment. Taking overage into account could be helpful to reduce anesthesia induced ecological footprint
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01AP08-6
Distal radial arterial catheterization for temporary monitoring in anesthetized patients

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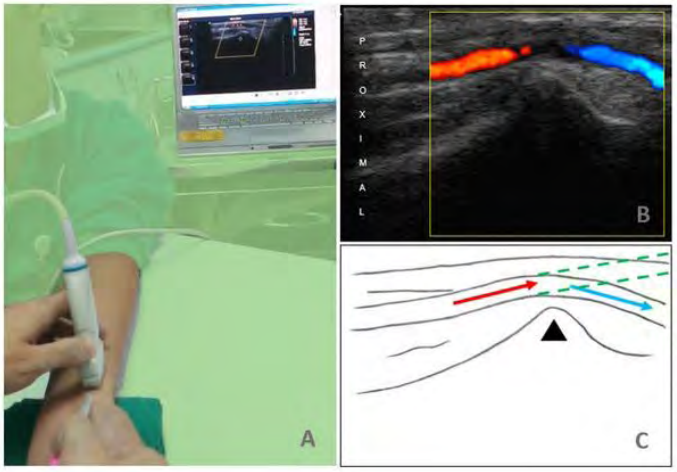
Background and Goal of Study: Arterial line insertion is usually performed for temporary intraoperative monitoring if patients are not planned for intensive care postoperatively. Therefore, the best insertion method is arguably different from that for prolonged monitoring.
Materials and Methods: We review and modify the ultrasound-guided technique for temporary radial arterial catheterization, offering a comprehensive guide for operators.
Results and Discussion: Firstly, for paralyzed patients that spontaneous wrist movement does not exist, more distal insertion than previously suggested [1] should be allowed. Moreover, out-of-plane approach inherently carries the risk of kinks because of needle angling at 45-60 degrees [1]. The solution to avoid catheter kinking is to puncture at the most superficial part of the radial artery along the natural courses of both the artery and catheter itself (Fig. 1A). At the bulging edge, color Doppler may further help identification in cases of typical pattern (Fig. 1B), and the needle is inserted along the extended line (Fig. 1C). Secondly, routinely rotating 90 degrees after transverse scan [1] cannot always easily obtain the optimal view. To facilitate its longitudinal imaging, palpation often helps define the direction [2] that the probe needed to be rotated. Thirdly, the needle is suggested to be advanced "along", instead of "across" [1], the visual axis (Fig. 1A) to facilitate needle visualization by improving ergonomic performance, especially for novices [3].



Conclusions: For ultrasound-guided temporary radial artery cannulation, distal puncture at extended line of the bulging edge was suggested to decrease the needle insertion angle and avoid catheter kinking. Furthermore, the needle should be advanced "along", instead of "across", the visual axis.
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01AP08-8
Compliance to diagnostic exams according to clinical criteria (protocol)

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Background and Goal of Study: The inappropriate request of tests on pre-anesthetic evaluation may lead to undesirable consequences for the clinical outcome. The aim of this study was to analyze the compliance of one institutional protocol for request of complementary exams for non-cardiac surgery. Thirty days respiratory and cardiac morbidity, and also mortality were evaluated.
Materials and Methods: A prospective audit was conducted from March to May 2018, after institutional approval, in patients submitted to elective general surgery procedures. Analyzed variables were sociodemographic data, indications and execution of selective exams, even as observed morbidity and mortality. A descriptive analysis of variables was executed using Microsoft Office Excel®.
Results and Discussion: 431 patients were included, mean age 60 years old (max 93; min 20), 197 (45.7%) male sex, and a higher prevalence of American Society Association(ASA) II e ASA III (94%).There was compliance of protocol in: 89% for Complete Blood Count (CBC),93% for chemistry panel (CP), 88% for coagulation tests (CT), 65% for electrocardiography (ECG), 82% for chest X-ray (CXR), 19% for arterial blood gas (ABG), 80% for pulmonary function test (PFT) and 78% for echocardiogram (ECHO). The 30-day morbidity/mortality observed was 3,9/0,9%. In 4 deaths observed at 30 days after surgery, the protocol was 100% concretized concerning to CBC, CT, ABG and ECHO, except for CP, ECG and PFT. Regarding respiratory and cardiac morbidity, 12 patients had respiratory complications and 5 cardiac events. In these patients, the protocol was fulfilled in all cases for CBC, CT, CXR, except for CP, ECG, ECHO, PFT, ABG.
Conclusions: The authors observed high compliance of institutional protocol for request of preoperative tests in most cases, except in relation to ABG. Regarding to morbi-mortality, the authors reforce the importance of appropriate choice of diagnostic exams in order to optimize the outcome of patients.

01AP08-9
Informed consent for anaesthesia: current practices and weighing of the risks, an international survey of anaesthesiologists in three Baltic countries.

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Background and Goal of Study: The rising prevalence of chronic conditions, aging populations and increasingly challenging surgical procedures raise the importance of well-informed anaesthesia-specific patient consent (PIC). Anaesthesiologists often use their clinical judgment in deciding which anaesthesia risks and complications to discuss with patients. The purpose of this pilot study was to determine practices and opinions of anaesthesiologists of the Baltic countries regarding PIC.
Materials and Methods: A voluntary and anonymous survey was endorsed by Lithuanian, Estonian and Latvian national societies of Anaesthesia and Intensive care. Survey participants received multiple choice questions concerning their daily practice obtaining PIC for anaesthesia. They also chose which possible complications to notify the patient of in five clinical situations. Statistical analysis was performed using SPSS v.18.0.
Results and Discussion: A total of 223 questionnaires were eligible for processing, representing a 25 % response rate of total eligible national society members for the period of the study. 78,6 % of the responders were senior doctors, and 21,4 % junior doctors in training. 24,8 % in their daily practice were using combined PIC for both anaesthesia and surgical procedure. 38,7% of respondents felt that the PIC form is too complex for patients and 86,4 % of doctors thought that patients sign them without even reading. At the same time 82,3% of the responders assumed that PIC acquired less than 1 hour before surgery is legitimate. Half of the responders (52,5%) felt that PIC can protect them from medico-legal issues. There was scarce knowledge of major anaesthesia complications: 66,4% of the respondents were able to indicate mortality rates caused by general anaesthesia of which only 5,4% got close to the actual risk. Clinical scenarios revealed that respondents based their judgment on their experience and were least likely to inform the patients of complications, such as dental damage, failed intubation or awareness.
Conclusions: Considerable differences between knowledge levels regarding various elements of PIC were identified. Neither anaesthesiologists nor patients are fully informed on the risk of anaesthesia-related complications. The anaesthesia consent process should be improved to benefit both groups.

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01AP09-1
Protocol driven fluid therapy during cytoreductive surgery for late-stage ovarian cancer

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Background and Goal of Study: Extensive tumour debulking promotes survival in late-stage ovarian cancer patients. A previous study has shown extensive fluid intake. We performed a prospective study to investigate whether fluid intake met the fluid demand as detected by advanced haemodynamic monitoring.
Materials and Methods: In a prospective analysis, late stage ovarian cancer patients undergoing cytoreductive surgery at our hospital between 2015 and 2018 were analysed. Advanced hemodynamic monitoring was performed (EV-1000 monitor, VolumeView, Edwards Lifesciences Corp.) and recorded along with patient's fluid in- and outtake. Patients received crystalloid and colloidal fluids according to protocol (stroke volume variation < 20%) as well as red blood cells and fresh frozen plasma to substitute blood loss. Total blood and plasma volume was calculated based on haemoglobin measurements taking both blood loss and transfusion into account. Statistical significance was assumed at a $p < 0.05$. Data are shown as mean ± std deviation in case of normal distribution, or as median [25%; 75% percentile] otherwise.
Results and Discussion: 41 patients at an age of 64 ± 11 years were identified. Cytoreductive surgery and anaesthesia lasted for 7:04 ± 1:47 and 9:20 ± 1:56 hours, respectively. It was associated with both a huge fluid intake (10.8 ± 3.9 l) and fluid balance (8.6 ± 3.0 l). Both parameters correlated significantly with the duration of anaesthesia and surgery. Throughout surgery, patients showed a normal cardiac index (between 2 and 3 L/min/m2) but a decreased preload, as indicated by a lowered intrathoracic blood volume index (ITBI < 850 ml/m2). Total plasma volume increased significantly ($p < 0.001$) by 160 ± 56 % from 2.9 [2.6; 3.2] l before surgery to 4.3 [3.5; 5.6] l after surgery. Serum albumin dropped significantly from 34.3 ± 6.1 g/L before surgery to 23.1 ± 5.0 g/L afterwards despite donation of 40 [20; 60] g albumin. A low preoperative serum albumin correlated significantly ($r = - 0.42$, $p = 0.025$) with a high intraoperative fluid intake.
Conclusion: In late stage ovarian cancer patients, surgery aiming at complete cytoreduction is accompanied with long surgery time and high fluid intake. Despite extensive fluid intake, patients remained hypovolemic throughout surgery. A combination of capillary leak and inflammation-induced vasodilation could explain the drop in serum albumin.
Acknowledgements: This abstract contains part of the doctoral thesis of DT

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01AP09-2
Perioperative management of a patient with hereditary nephrogenic diabetes insipidus presenting for spinal surgery for cauda equina syndrome

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Background: Hereditary nephrogenic diabetes insipidus (NDI) is an uncommon disorder resulting in variable degrees of resistance to arginine vasopressin (AVP) and large amounts of dilute urine.(1) There is limited information in the literature regarding the perioperative management of NDI. (2,3) We present the case of an adult patient with hereditary NDI, which presented in our hospital on an urgent basis, for cauda equina syndrome surgery.
Case Report : A 29 year –old male patient with hereditary NDI and clinical manifestations of cauda equina syndrome –urinary retention for 24h-presented for urgent spinal surgery. His daily fluid intake was 7-8 liters to offset the urinary losses. Laboratory testing was normal except for plasma sodium levels ($N\alpha^+$= 170 mEq/l). No clinical signs of hypernatremia were present. Preoperatively, estimated water deficit was 7500ml and an intravenous infusion of dextrose 5% at 150 ml/h was initiated to replace this deficit over 48h. Intraoperatively, dextrose 5% was combined with normal saline to replace isotonic fluid deficit and urinary output. A total of 10 liters of normal saline were administered during the 3-hour –surgical procedure. Intraoperative plasma sodium levels remained abnormally elevated, at 155-165 mEq/l. Intravenous insulin was given to correct hyperglycemia (max 450mg/dl). Perioperative course was otherwise uneventful. One hour after surgery oral intake was started.
Discussion: Our case serves as a reminder of the perioperative management of water and sodium imbalance in the surgical patient with congenital NDI. Fluid management with dextrose 5% and normal saline guided by fluid deficit, maintenance and ongoing losses seems an effective treatment option. Hyperglycemia although uncommon in NDI can complicate anesthetic handling.
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Learning points: 1)Management of water and sodium disturbances can be challenging in patients with congenital NDI. 2)Oral intake should be started as soon as possible in the postoperative period.

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01AP09-3
Plethysmography Variability Index and Stroke Volume Variation Changes in Relation to Central Venous Pressure Changes during Live Donor Right Hepatotomy

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Background and goal of work: Non-invasive monitoring technology can improve donor safety. Primary goal is to investigate Plethysmography Variability Index (PVI) (%) and Stroke Volume Variation (SVV) (%) of Electric Bioimpedance Cardiometery (EC) intraoperative ability to monitor changes and to study their inter-relationship and agreement with each other and with the Central Venous Pressure (CVP) (mmHg).
Methods: A Diagnostic Test Accuracy (DTA). Donors ASA I. Mean Invasive arterial blood pressure (IBP) (mmHg). Central venous pressure (CVP) (mmHg), PVI (%) (Masimo, Irvine, USA) and SVV (%) (EC, Osypka Germany) recorded: 10 min after anaesthesia induction. (T0), Dissection phase: 1 h after opening fascia and 2 hourly (T1-3), following resection. (T4), end of surgery before muscle relaxant reversal. (T5). Monitored Anaesthesia depth and PEEP 5 cmH2O. Crystalloids 6 ml/kg/h,

increased to 10 ml/kg/h following resection to maintain UOP (0.5 ml/kg/h) and mean blood pressure (>60 mmHg).
Results: Data (Median [IQ]. 34 donors (2017-2018) age 26.0 [21.0-34.0] y, 64.7% Males, Weight 72.0 [70.0-80.0] kg, Body Mass Index 25.9 [24.0-27.1 kg/m2, Anaesthesia time 7.5 [7.0-8.0] h, Blood Loss 400.0 [400.0-500.0] ml, Intraoperative Ringers Acetate 4000.0 [3500.0-4500.0] ml, Colloids 250.0 [0-500.0] ml, Urine Output 1.4 [1.30-1.7] ml/kg/h. No blood products. PVI, SVV and CVP significantly represented intraoperative changes with different fluid infusion rates (repeated measure analysis; c2=35.4, p<0.001[O1] and c2=46.8, p<0.001[O2] and c2=46.88, p<0.000[O3] , respectively). PVI (%) T0: 9.0[7.0-10.0], T3: 12.0[10.0-13.0], T5: 8.0[(7.0-9.0], SVV (%) T0: 7.0[6.0-8.0], T3: 10.0[8.0-10.0], T5: 6.0[5.0-7.0] and CVP (mmHg) T0: 11.0[10.0-12.0], T3: 8.0[7.0-10.0], T5:10.5[10.0-12.0]. Negligible negative correlations (n=[O4] 204) existed between CVP and both PVI (Kendall's tau b correlation -0.173, p=0.001)and SVV (-0[O5] .180, p=0.001). A positive negligible correlation (n=204) and poor agreement between PVI and SVV (0.248, p<0.001 and ICC = 0.213 with a relatively wide bias 95% CI 0.03-0.374)
Conclusions: Non-invasive PVI and SVV were able to monitor intraoperative trend changes as CVP, but negligible correlations and poor agreements exited between all three

01AP09-4
Comparison of intraoperative hemodynamic parameters in elderly versus young patients undergoing cytoreductive surgery and hyperthermic intraperitoneal chemotherapy

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Background and Goal of Study: Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is an aggressive approach with either a curative or life-prolonging purpose. The procedure is associated with important morbimortality. Consequently, criticism have been raised concerning its safety in at-risk populations, such as the elderly patient. The aim of this study was to compare the perioperative hemodynamic parameters according to age (<65 versus ≥65 years).
Materials and Methods: After IRB approval, eighty-four consecutive patients that had undergone CRS-HIPEC were prospectively enrolled, out of which 29 were elderly patients. Goal-directed haemodynamic management was applied in all patients with the endpoints based on cardiac index (CI), stroke volume index (SVI), central venous oxygen saturation (ScvO2) and mean arterial pressure (MAP). Invasive haemodynamic measurements were performed using a transpulmonary thermodilution and a central venous oxygen saturation catheter. Thermodilution cardiac output was undertaken at predefined time points (baseline, before HIPEC, 30 min post-HIPEC; 60 min post-HIPEC and at the end of surgery) and haemodynamic parameters were recorded. Statistical analysis included Student t-test, Chi-square test and repeated measures ANOVA
Results and Discussion: The mean age in elderly patients was 69±3 vs 53±9 years in the group of young patients, p=0.0001. There was no statistical difference in gender, ASA status, anaesthesia time and peritoneal cancer index (PCI) between both age groups. At baseline, CI and SVI were lower (2.1±0.4 vs. 2.5±0.75, p= 0.007; 33±7 vs. 37±8, p=0,04); and the systemic vascular resistance index (SVRI) higher (2601±605 vs. 2315±575) in the elderly vs. the younger group. However, during the rest of the procedure (before HIPEC, 30 min post-HIPEC, 60 min post-HIPEC and at the end of surgery) there were no statistical differences in haemodynamic parameters between both groups. Furthermore there was no difference in the administration of intraoperative fluid therapy or in the need for vasopressors in both groups. Finally, there were no differences in postoperative complications (10% vs. 15%, p=0.6)
Conclusions: This study has shown that advanced age has not been a determining factor in haemodynamic response during CRS-HIPEC. In addition, in our series advanced age has not been a risk factor for the presence of postoperative complications.

01AP09-5
Comparison of hemodynamic profile during general anesthesia with sevoflurane and desflurane in ophthalmic surgery

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Background and Goal of Study: In ophthalmic surgery, the choice of anesthesia method mostly depends not on the patient's eye disease and nature of the operation, but on the patient's concomitant somatic diseases. The main task of the anesthesiologist in the intraoperative period is to maintain in the myocardium a balance between delivery and oxygen demand, for which it is necessary to avoid an increase in heart rate and maintain an optimal MAP[1,2]. The aim of the study was to compare the hemodynamic profile during general combined anesthesia with desflurane or sevorane as the main anesthetics in ophthalmosurgery.
Materials and Methods: A prospective study during laryngeal mask combined anesthesia using desflurane – the gr.1 (Des), n=25, or sevoflurane - the gr.2 (Sev), n=29 in ophthalmic surgery there was carried out. There were investigated: the indications of hemodynamics and oxygenation (the initial data, after the induction, in 20,40,60 min), infusion volume, recovery time, frequency of undesirable incidents. The data are presented in the form of a Me and quartiles(25%;75%); the Mann-Whitney U-cr.
Results and Discussion: An average age of patients - 33(29;48) and 43(29;49) years, concomitant pathology, duration and character of the operations (keratoplasty, vitrectomy, strabismus correction, blepharoplasty) in the groups were comparable.

Researched hemodynamic indicators, Me (quartile 25%; 75%)

	Stages of the study	Group 1 (Des), n=45	Group 2 (Sev), n=49
Mean arterial pressure (MAP), mm Hg	Initial data	99(87;108)	97(89;106)
	Induction	88(81;103)	76(69;101)
	20 min	78(69;85)	67(61;77)
	40 min	73(69;77)	65(60;70)*
	60 min	72(66;77)	63(60;72)*
Heart rate (HR), min^{-1}	Initial data	78(76;87)	85(69;92)
	Induction	83(77;110)	89(83;104)
	20 min	97(83;101)	91(80;96)
	40 min	87(82;103)	84(80;92)
	60 min	91(80;103)	83(77;92)
Total peripheral vascular resistance (TPR), dyn•s•cm−5	Initial data	1359(1046;1809)	1383(1077;1831)
	Induction	1184(914;1463)	1051(691;1407)
	20 min	783(684;860)	843(578;999)
	40 min	1345(1182;1581)	983(866;1162)*
	60 min	1453(1157;2200)	1010(948;1138)*
Intravenous infusion volume NaCl 0.9%, l		1000(875;1000)	1300(1000;1500)*

* - reliability of differences $p_{1,2}<0.05$

In 20-40min of anesthesia, MAP and TPR significantly decreases in groups 2, respectively (p <0.05). To stabilize hemodynamics in groups 2, a relatively larger amount of infusion was required than in the group 1. The recovery time of consciousness in the gr.1 was 8(7;10)min, in the gr.2 - 16(14;18)min (p<0.01). The number of unwanted incidents (PONV) was insignificant and did not differ in groups.
Conclusions: Anesthesia with desflurane was characterized by more stable hemodynamics than with sevoflurane. The recovery from anesthesia with desflurane is quick and comfortable.
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01AP09-6
Comparison of central venous pressure or pulse contour analysis for intraoperative fluid management during cytoreductive surgery with hyperthermic intraperitoneal chemotherapy: a preliminary prospective randomized study

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Background and Goal of Study: The present study assessed two methods of intraoperative fluid management on patients undergoing cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC). This complex surgical intervention is associated with significant fluid turnover, metabolic perturbations and potentially significant blood and protein loss.
Materials and Methods: Following Ethics Committee approval, 30 patients scheduled to undergo CRS with HIPEC were prospectively randomly allocated into 2 intervention groups: Group VG: intraoperative fluid management guided by pulse contour analysis with FloTrac/Vigileo system and Group CVP where intraoperative

fluid management was guided by CVP values. The following data were recorded every 30min from an anesthesiologist blinded to the patient's allocation group: Stroke volume variation (SVV), Cardiac output (CO), stroke volume (SV), central venous pressure (CVP), mean arterial pressure (MAP), heart rate (HR), systemic vascular resistance (SVR), systemic vascular resistance index (SVRI), arterial oxygen partial pressure (PaO_2), Pulse Oxymetry (SpO_2), hemoglobin (Hgb), oxygen delivery (DO_2), lactate, HCO_3-, urine output, oesophageal temperature. The administered amounts of crystalloids, colloids, blood and plasma were also recorded.

Results and Discussion: During the HIPEC phase, CVP values were significantly lower in Group VG when compared to those of Group CVP (10.7±2.7 vs 13.3±2.5mmHg, p=0.014). At the end of the surgery significantly lower SVV values were observed in Group VG whne compared to Group CVP (7.6%±1.9 vs 10.3%±3, p=0.009). DO_2 values were higher during the HIPEC phase (1097±279ml/min vs 877±264ml/min, p=0.034) in the VG Group.

Conclusions: Pulse contour analysis-guided fluid management may provide improved tissue oxygenation and circulatory status during HIPEC in CRS.

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01AP09-8
What about compressing the esophagus with an ultrasound probe?

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Background and Goal of Study: Cricoid pressure is often applied during rapid sequence induction of general anaesthesia to prevent regurgitation of gastric contents, first described in the 1960s by Sellick, which he believed resulted in the occlusion of the esophagus between the cricoid cartilage and the body of the fifth cervical vertebra aligned in the axial plane. Few studies have evaluated the mechanism and efficacy of cricoid pressure with advanced imaging technologies. Computed tomography and magnetic resonance imaging studies show that the esophagus commonly lies laterally in its relation to the cricoid cartilage and vertebral bodies. Bedside ultrasound used to assess the anatomy related to the application of cricoid pressure. Collapse of the upper esophagus when firm pressure was applied by the transducer sited paralaryngeally at the level of cricoid has been reported. To our knowledge, the relationship between body mass index or neck circumference with esophagus diameter has not previously been evaluated using ultrasound.

Materials and Methods: Fifty healthy adult volunteers recruited among the staff in the operating theatre were enrolled in the study. The physician performing airway imaging during paralaryngeal pressure with the ultrasound transducer and data storage had expertise in the point-of-care and airway ultrasound and did not himself perform any measurement during the examination. To standardize the compression force, he performed over 50 compressions of a weighing scale during the pre-study preparation phase. An independent physician with expertise in airway ultrasound examination later performed the measurements of outer diameter on the basis of images acquired.

Results and Discussion: Fifty healthy volunteers were included in the study (46% women). The mean (SD) age was 33,8 (8,4), body mass index 25,3 (4,5) $kg.m^2$. Among the 50 volunteers, in seven of them (14%) the esophagus was not visualised during examination. In the remaining 42 participants the esophagus was visualized as lying to the left and in only 1 to the right of midline. The mean (SD) diameter of the outer esophagus was 0,76 (0,11) cm in the neutral position and 5,6 (0,96) with pressure with transducer. In the absence of pressure the esophagus lay lateral to the larynx in almost 86% of subjects.

Conclusions: Paralaryngeal pressure decreases the diameter and has the potential to occlude the esophagus.

01AP09-9
Anaesthetic considerations in Alagille's syndrome: a case report

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Background: Alagille's syndrome is a rare genetic disorder that can affect multiple organ systems. It's characterized by a paucity of intrahepatic bile ducts, congenital cardiovascular anomalies, retarded growth, dysmorphic face, ocular anomalies, mental retardation, skeletal malformation and xanthomata[1]. The anaesthetic plan for these patients should focus on careful preoperative evaluation of hepatobiliary, cardiac, neurodevelopment, nutritional, haematological, ocular and facial abnormalities[1]. The authors report the case of a 33-year-old woman with Alagille's syndrome scheduled to laparoscopic tubal ligation. Relevant anaesthetic issues are discussed.

Case Report: A 33-year-old woman with Alagille's syndrome presented for laparoscopic tubal ligation. Her past medical history was significant for cholestasis and mild pulmonary stenosis. Her physical examination revealed prominent forehead, deep set eyes, prognathism and Mallampati 2 classification. Cardiovascular examination revealed a systolic murmur consistent with pulmonary stenosis, which had previously been evaluated by a cardiologist. The patient laboratory examination revealed alterations in the hepatic enzymes. Anesthesia was induced, under standard ASA monitoring, with fentanyl 2 mcg/Kg, propofol 2 mg/Kg and atracurium 0,5 mg/kg and maintained with desflurane 5-6% in 50% air and oxygen. Pain relief was delivered with paracetamol and parecoxib. The procedure was performed without complications and the patient remained hemodynamically stable.

Discussion: Liver and heart dysfunction will play key roles in the course of the Alagille's syndrome and its prognosis[2]. Peripheral pulmonary stenosis is the most common cardiovascular abnormality seen in the syndrome[2]. In this case report, ventricular function was normal and no specialized hemodynamic monitoring or preoperative cardiac interventions were indicated. To avoid altering liver perfusion, inhalation anesthetic agents associated with less myocardial depression and better preservation of hepatic blood flow, are preferred[1]. Atracurium was used as a muscle relaxant because its metabolism does not directly depend on the kidneys or liver.

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Learning points: The anesthesia plan should be based on the careful preoperative assessment of the airway and the multiple organ systems of the body that can be affected, including the liver, heart, skeleton, eyes and kidneys.

01AP10-2
Removal of the guidewire following insertion of central venous catheters, at Nottingham City Hospital (NCH), UK: a retrospective patient safety audit

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Background and Goals of Audit: A retained guidewire after insertion of a central venous catheter (CVC), is categorised as a Never Event in the UK[1]; a serious, yet entirely preventable error. The incidence of a retained guidewire is rising and occurs approximately every two weeks in the National Health Service.[2] A retained guidewire is associated with significant morbidity and mortality.[3]

Human factors such as distraction and staff fatigue have been attributed to the increasing occurrence of these events[3]; checklists have been employed to minimise the risk of this. The Association of Anaesthetists' guidelines suggest second observer confirmation of removal reduces the incidence of this event.[4] Our local guidance is to adhere to this practice, using a sticker as an aid to easily document confirmation of guidewire removal, by both the proceduralist and the observer.

Materials and Methods: We undertook a retrospective audit of 75 patients who had CVCs inserted in theatre, between 21/06/18 and 20/09/18 at NCH. Medical records were examined to confirm documentation of the two-person check.

Results and Discussion: All 75 records demonstrated that the inserting practitioner signed to confirm removal of the guidewire. Only 75% of these records had the signature of the witness confirming removal. No guidewires are thought to have been retained during this period.

Conclusion: Local and national guidelines were implemented to improve patient safety. However the results of this audit demonstrate only 75% compliance with these guidelines. An email has been distributed to all anaesthetists at Nottingham University Hospitals, raising awareness of the recommended practice, and its importance. A re-assessment of adherence to the guideline will be made in 3 months.

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01AP10-3
Right unilateral mydriasis after administration of atropine during spinal anesthesia

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Background: Anisocoria is an alarm symptom for severe neurological pathology like tumors or aneurisms. A diagnosis of exclusion is benign episodic mydriasis [1]. However, drugs are one of the most common causes of mydriasis, so it is one of the first causes to rule out. Atropine and phenylephrine are an habitual cause of mydriasis [2]. We should not forget that mydriasis could be caused by a cranial nerve injury which is a complication, although extremely rare, of neuraxial anesthesia.
Case Report: We report a case of a 62-year-old man scheduled for bilateral ambulatory varicectomy procedure. During the ultrasound scan prior to surgery, the patient presented vasovagal symptoms that required treatment with fluid therapy and the injection of 1mg of atropine. Spinal anesthesia was performed without incident so the pacient was transferred to the PACU and later to his hospital room. Once there, he presented right mydriasis. The patient was evaluated and no other neurological alterations were found. Hospital admission was decided for assessment by neurology and ophthalmology services. After the completion of complementary tests reported within normal and perform clinical examinations where mydriasis has disappeared it was concluded that the cause was the administration of atropine. The patient was discharged 72 hours after surgery. Three days later, he went to emergency services due to unilateral mydriasis and was diagnosed with benign episodic mydriasis.
Discussion: Neurological complications after locoregional anesthesia are infrequent, however, they are one of the key points during differential diagnosis when a patient presents neurological symptoms and among the antecedents is a recent locoregional anesthesia. Due to the potential severe damage that locoregional anesthesia can cause, we should never overlook any symptom and if a complication is suspected complementary test must be perform as soon as possible. Once any complication related to the anesthetic technique and/or the appearance of a neurological lesion has been ruled out, we must rule out other possible causes.
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Learning points: When we consider a differential diagnosis, the first thing we must do is to discard the most urgent complications, then the most frequent ones.

01AP10-4
Association between ASA, Arozullah and ARISCAT scores and Postoperative Pulmonary Complications (PPCs) in elective general surgery procedures

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Background and Goal of Study: Preoperative assessment of a patient who is going to have surgery includes history of present complaint and known diseases/ past surgeries, clinical examination and calculation of a suitable score to help in decision-making. ARISCAT and Arozullah risk scores predict PPCs. Our goal was to determine the degree of association between these scores and PPCs.
Materials and Methods: Permission for collecting data as part of a clinical audit was granted by the audit department of our institution. Data was collected from March to May of 2018 from patients who had elective general surgery procedures. Demographic and surgical variables were obtained through electronic records and scores were calculated through available online calculators and classified as low, intermediate and high risk for the ARISCAT score and as classes 1 – 5 for the Arozullah score with each class corresponding to a percentage of risk. Statistical analysis was performed for categorical data (Chi square or Fisher's Exact test if expected count less than 5 in >20% of the cells). Significance level was set at 0,05. Due to a small number of patients with the desired outcome, grouping for the variables used in the analysis was performed.
Results and Discussion: Total number of patients was 431. After excluding missing values for both scores the final sample had 331 cases. Of these 179 were female (54,1%). Mean age was 61 y.o. (SD 15,3; range 21 – 92), mean BMI was 26,8 kg/m2 (SD 5,2) and ASA range 1 – 4 (56% ≥ ASA 2). Most procedures were laparoscopic gallbladder removal with or w/o bile duct exploration (25,7%), hernioplasty (19%), thyroid or parathyroid removal (11,5%), colorectal surgery (8,8%) and gastric surgery (5,1%). In our sample 12 (3,6%) patients developed postoperative pulmonary complications and 4 (1,2%) patients have died within 30 days postop. Association with PPCs was found for the Arozullah score (p=0,003) but not for ARISCAT (p=0,152) or ASA (p=0,141). Association with mortality at 30 days postop was found for the Arozullah (p=0,004) and ARISCAT (p=0,002) scores but not for ASA classification (p=0,325).
Conclusion: In our sample of patients, the Arozullah score was the only one with a significant association with postoperative pulmonary complications and mortality at 30 days postop. However, caution must be taken with these conclusions since the frequency of outcome was low.

01AP10-5
Tooth loss and obesity among oral-surgical patients

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Background and Goal of Study: Obese patients undergoing oral surgery may provide a unique set of anesthestic challenges associated with airway management. The aim of the study was to evaluate if differences according to tooth loss exist in the association between the teeth number and obesity.
Materials and Methods: This was an explorative single-center prospective observational study, part of clinical research registrated at Clinical Trials.gov (NCT03144609). Following ethical approval (protocol 05-PA-26-1/2016) and signed written informed consent, 75 obese patients (30-65 year old) undergoing oral surgery were enrolled. The total number of natural teeth, front teeth number, BMI and waist-to-hip (W/H) ratio was assessed. Interaction between tooth loss and BMI was further assessed. Receiver operating curve (ROC) analyses were performed to identify predictors of difficult intubation.
Results and Discussion: The mean BMI was 35.6 (±5.6) kg/m2, with 42 males. Out of a total of 75 patients, 3 participants were edentate (4%). The average number of front teeth and total teeth was 9 (±3) and 22 (±4), respectively. Increasing tooth loss was not positively associated with increased BMI (r=0,048 P=0,679; Figure 3) or W/H ratio (r=-0,0003, P=0,997). Any correlation between difficult intubation and the front teeth number or BMI (r=0.023, p=0.97), could not be found. W/H ratio above 1 had 80% sensitivity and 50% specificity in the prediction of difficult intubation (Figure 6).
Conclusions:In our population of obese patients undergoing oral surgery we did not observe any association between general obesity, difficult intubation and tooth loss. Further research of obese population designed on the cultural and demographic context are required.
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01AP10-6
Carbon Dioxide Embolism during Laparoscopic Adrenalectomy: Case Report

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Background: Clinically significant carbon dioxide (CO_2) embolism is a rare occurrence that can be a fatal complication of anesthesia during laparoscopic surgery. In this presentation we aimed to share a case of a men developed a gas embolism during laparoscopic adrenalectomy.
Case Report: A 69-year-old male patient, who was diagnosed with known, atrial fibrillation and Obstructive Sleep Apnea was planned to have a laparoscopic adrenalectomy because of a adrenal mass. Urine hormone excretion was measured within normal ranges. The operation was performed under general anaesthesia using fentanyl, propofol and rocuronium for induction, 60% O_2, and sevoflurane with volume controlled ventilation for maintenance. In addittion to monitoring the standard parameters, (heart rate, blood pressure, pulse oxymeter) an arterial line

was inserted into the radial artery to monitor blood pressure. After 5 minutes of pneumoperitoneum his oxygen saturations fell from 99% to 80% but cardiac rate and arterial pressure were unchanged. Airway pressures and electrocardiography trace remained normal and there were no problems with the anaesthetic equipment or breathing circuit. Inspired oxygen concentration was increased to 100%. Auscultation of the lung fields and heart sounds were normal. After that end tidal CO_2 ($ETCO_2$) was down from 38 to 24 mmHg and his oxygen saturation was 93%. We took a blood sample were we could see partial pressure of carbon dioxide (pCO_2) 82.6 mmHg. The surgery temporarily halted, and the patient's observations returned to normal within ten minutes and the operation then completed uneventfully. He was discharged form hospital five days later without any adverse sequelae.

Discussion: It is very important that both surgeons and anesthesiologists be aware that carbon dioxide embolism can occur during laparoscopic surgery. They have to know of the risks, signs, and management of this complication allows for rapid detection and response. Increased monitoring could be employed in some cases to quickly respond to a complication should it occur.

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01AP10-7
Syndrome of malignant hyperthermia in a patient with acute surgical pathology

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Background: Present a case of successful treatment of a patient with a fulminant form of malignant hyperthermia.

Case Report: Patient S., 18 years old, 02/11/2017 was taken to the operating room (OR) for emergency with the diagnosis: Perforated ulcer of the duodenal bulb, for carrying out a laparotomy, suturing the perforation. Based on the objective examination data, the degree of anesthetic risk I E according to ASA is set. Induction of anesthesia: fentanyl - 200 mcg, ketamine - 50 mg, propofol - 150 mg, with the purpose of precursorization - pipecuronium bromide - 2 mg, for the purpose of myoplegia - suxamethonia chloride - 100 mg. After induction, tracheal intubation was performed, mechanical ventilation was started. After saturation of the circuit with sevoflurane, transfer to low-flow anesthesia with a flow of 1 l/min. After the induction of anesthesia, hemodynamic and gas exchange indices are at a stable level: BP - 125/85 mmHg , HR - 84 beats/min, SpO_2 - 100%, $PetCO_2$ - 38 mmHg, etSev - 1.2%. One hour after the induction of anesthesia, in view of the myoplegia insufficient for suturing the surgical wound, suxametonium chloride was reintroduced in a dose of 100 mg. After 2-3 minutes, a sharp increase in PetCO2 to 92 -120 mmHg, body temperature up to 39 ° C, microcirculation disturbance, muscle hypertonia, profuse sweating appeared (see tab). Diagnosed with malignant hyperthermia, symptomatic therapy started. After 1 hour and 20 minutes after the diagnosis, the OR delivered dantrolen, the administration of dantrolene was immediately started in a total dose of 2.5 mg / kg, and after administration, the patient's condition was stabilized.

Parameter	At the peak of the crisis	30 minutes after the first dose of dantrolene	70 minutes after dantrolene administration
BP, mmHg	70/32	100/34	125/44
HR, beats / min	123-125	98	96
SpO_2, %	98	100	100
$PetCO_2$, mmHg	120	70	39
Body temperature, C	42.0	41.5	38.9

The onset of malignant hyperthermia was arrested, the patient was transferred to the ICU.

Conclusion: Analyzing the situation, the authors associate the development of malignant hypertermia with the repeated administration of succinylcholine.

01AP10-8
Short-term complications after hyperthermic intraperitoneal chemotherapy for treatment of peritoneal carcinomatosis. A prospective observational study.

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Background and Goal of Study: Cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (CRS-HIPEC) is an effective but potentially morbid treatment option for peritoneal carcinomatosis. It is associated with intense hemodynamic and metabolic changes related with the thermal stress induced by intraperitoneal instillation of heated chemotherapy. The aim of this study was to identify perioperative risk factors associated with short-term complications in patients undergoing CRS-HIPEC.

Materials and Methods: After IRB approval, consecutive patients undergoing CRS-HIPEC were enrolled from May 2016 to November 2018. All patients were managed with the same pattern based on local guidelines. We evaluated demographic information, ASA score, comorbidities, peritoneal cancer index (PCI), procedure duration, hemodynamic monitoring and intraoperative fluid management. At the end of surgery all patients were admitted in a postoperative intensive care unit (ICU). Relevant postoperative data as mechanical ventilation duration (MVD), vasopressors, blood transfusion, renal failure, haematological and surgical complications were recorded. Statistical analysis: student t-test; Chi-square test.

Results and Discussion: 84 ASA I-III patients (58±11years) were studied. Anaesthesia time was 10.5±2h, HIPEC time was 30, 60 and 90 min in 12%, 79% and 9% respectively. PCI was 14.7±10.8. Combined epidural and general anaesthesia was used in 95% of patients. Transpulmonary thermodilution and a central venous oxygen saturation catheter were used in 95% and 93% respectively. Complications (compl.) presented in 48% of patients, being serious in 13%. Abdominal compl. were recorded in 18% of patients (6% required reoperation); respiratory compl. in 11%; haematological toxicity in 14%; renal toxicity in 18% and vasopressor use in 13% of patients. One patient died. Factors related with compl. where: PCI≥15 (70% vs. 30%; p=0.003, compl. vs. no compl.); lactate levels at the end of surgery (3.3±1.7 vs. 2.4±1.1mmol/L; p=0.01, compl. vs. no compl.); total fluid therapy (5622±1510 vs. 4971±1217mL; p=0.03, compl. vs. no compl.); MVD: 4.4±5.8 vs. 1.9±4h; p=0.025, compl. vs. no compl.) and the need for vasopressors in the OR and ICU (p=0.03).

Conclusions: CRS-HIPEC is associated with high rates of morbidity. PCI over 15, higher lactate levels together with high fluid requirements and the need for vasopressors should alert us to the possibility of early postoperative complications.

01AP10-9
Optical coherence tomography in elderly patients after elective orthopaedic surgery

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Background and Goal of Study: It has been suggested that major noncardiac surgery may induce visual dysfunction.[1] Therefore, we decided to perform a clinical study to evaluate whether knee replacement surgery is associated with any structural retinal damage.

Materials and Methods: We realized prospective observational study in patients undergoing elective knee replacement surgery. Each patient underwent optical coherence tomography (OCT) of the eyes one day before surgery. Five days after the surgery, OCT evaluation was repeated. Macula total volume (MTV), macula center thickness (MCT) and macula center volume (MCV) were measured for the left eye (LE) and right eye (RE) separately and the values were compared between both measurements.

Results and Discussion: Eighteen patients (6 males and 12 females) at the age of 70.8±7.1 years were enrolled in the study. Surgery was realized under combined general and epidural anaesthesia. We did not identify any significant differences between the 1st and the 2nd OCT evaluation in MTV, MCT and MCV (Table 1).

Table 1

		OCT 1 day before surgery	OCT 5 days after surgery	p
MTV (mm^3±SD)	left eye	8.380±0.627	8.373±0.615	0.969
	right eye	8.401±0.607	8.382±0.596	0.925
MCT (mm±SD)	left eye	273,9±30,4	272,7±28,4	0,9
	right eye	273,8±31,9	270,7±31,1	0,766
MCV (mm^3±SD)	left eye	0,214±0,023	0,213±0,021	0,89
	right eye	0,221±0,036	0,213±0,025	0,444

Conclusions: In our cohort of the patients undergoing knee replacement surgery, we did not identify any structural changes of the macula of retina induced by surgery detectable by OCT.
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01AP10-10
Unexpected sudden cardiac arrest during a prolonged liposuction operation.

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Background: Liposuction is a popular cosmetic procedure. It is the second most common cosmetic plastic surgery performed in 2017. Diagnosis of fat embolism syndrome (FES) is challenging due to lacking any specific diagnostic test. It occurs mainly with long bone and pelvic fractures. Its incidence during liposuction is not reported but seems to be rare.
Case Report: A 29 years old lady was admitted for liposuction of her abdomen, back, thighs and upper arms with lipoinjection of breast and buttocks. She was medically free. Preoperative evaluation was unremarkable. Pneumatic compression device was applied. The operation was performed under general anaesthesia. The operation continued smoothly for 180 minutes. While on prone position, the capnogram readings showed a sudden drop from 36 to 8 mmHg. Immediately, cardiac arrest occurred with pulseless electrical activity (PEA) rhythm. The position was reversed to supine position and two cycles of cardiopulmonary resuscitation were performed before return of spontaneous circulation. The operation was aborted and the patient was transferred to surgical intensive care. Her arterial blood gases test showed severe hypoxia of 62 mmHg on 100% oxygen. The chest radiograph showed a picture suggestive of acute respiratory distress syndrome. The echocardiogram showed global hypokinesia with ejection fraction 38 %. Despite supportive measures, progressive hypoxia continued for two days with PO2 of 28 mmHg on 100 % oxygen. Inflammatory markers were elevated. Then, she showed a promising improvement in hypoxic index and weaning off ventilatory and inotropic support was successful. After 5 days, she was discharged to the ward then discharged home 3 days later in a good condition.
Discussion: FES is a rare complication occurs during lipoinjection rather than liposuction. It is diagnosed based on score of 10 points according to fat embolism index proposed by Schonfeld et al. Alveolar infiltrates (4), hypoxemia (3), fever (1), tachycardia (1), and tachypnea (1) point. The first theory postulates that fat droplets released during tissue injury enter the nearby injured vessels. Large droplets are responsible for mechanical obstruction leading to sudden cardiac arrest. The second theory explains FES as an inflammatory response to glycerol and fatty acids. This theory can explain the progressively elevated CRP results.
Learning points: High index of suspicious for FES during liposuction as differential diagnosis of cardiac arrest

01AP11-1
General Anaesthesia for robotic surgery in a patient with Kennedy's Disease

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Background: Kennedy's disease (KD) is a rare lower motor neuron disease with multiple anaesthetic challenges. We report a case of a patient with KD undergoing general anaesthesia (GA) for elective robotic ultra-low anterior resection (ULAR). Medline search for this rare X-linked disorder from 1966 to 2003 revealed limited anaesthesia publications. We will discuss its implications and recommendations for safe anaesthetic management.
Case Report: A 70 year-old, 78kg male presented for robotic ULAR for rectal adenocarcinoma. He was wheelchair dependent due to progressive upper and lower limb weakness secondary to KD, confirmed on genetic testing. He had restrictive lung disease, cardiomyopathy and past myocardial infarctions with ejection fraction 30%. Multidisciplinary discussions were conducted pre-operatively. Invasive lines were placed before rapid sequence induction (RSI) with propofol 2mg/kg and rocuronium 0.5mg/kg. We maintained total intravenous anaesthesia (TIVA) with propofol and remifentanil. Surgery was uneventful and patient had no worsening of neurological symptoms.
Discussion: KD affects 1:400,000 males, with cardiac and respiratory abnormalities, weakness and atrophy of facial, limb, and bulbar muscles. Our major concerns were: GA-induced rhabdomyolysis and high risk of malignant hyperthermia (MH), bulbar muscle weakness with high risk of aspiration, increased sensitivity to muscle relaxants (MR), haemodynamic instability secondary to cardiomyopathy, respiratory muscle weakness postoperatively due to anaesthesia/opioids. Issues surrounding anaesthesia in patients with KD are not fully clarified, hence GA technique was modified. RSI dose of rocuronium used was 50% less than recommended. There is no clear guideline on muscle relaxant dose reduction though Takeuchi et al. [1] reported that 0.6mg/kg rocuronium achieved intubating conditions in 120 seconds. We achieved intubation conditions in 60 seconds.
References:
1. Takeuchi R. et al. Saudi J Anaesth 2014;8:418–20.
Learning points: Regional technique is frequently preferred over GA for patients with KD. However we provided GA successfully with good outcome. Some of our recommendations: RSI to reduce aspiration risk, reduction of MR by 50% appeared to have optimal effects, opioid sparing techniques minimise respiratory side effects, TIVA technique to avoid risk of rhabdomyolysis and MH, goal-directed fluid therapy, close haemodynamic monitoring postoperatively and a multidisciplinary approach.

01AP11-2
Anesthetic management and outcomes of robot-assisted laparoscopic radical prostatectomy: two year of experience

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Background and Goal of Study: Robotic prostatectomy is becoming more common because of the many advantages offered to patients and the minimally invasive nature of the procedure. The purpose of this study was to evaluate the anesthetic management and determine the safety and adverse outcomes asocciated with this procedure in our centre
Materials and Methods: Retrospective review was performed of all robitic-assisted laparoscopic radical prostatectomy patient between January 2015 and December 2017. Information on patient demographics, type of anesthesia, surgical times, intraoperative fluids and blood products, estimated blood loss, length of stay in the postanesthesia care unit, postoperative complications, and hospital stays was collected
Results and Discussion: Eighty patients were incluyed. The descriptive statistical data showed that the mean age of 61.65 (±5.19 SD) and the median BMI (kg/sqm) of 28,08 (±2.70 SD). The mean preoperative and postoperative hemoglobin levels were 15,02 (±0,98SD) and 13,84 (±1,38SD) respectively and the estimated blood loss was 60 (±3,12SD). All patient had orotraqueal intubation and a combined general anesthesia regimen (44% sevoflorane and 66% desflurane) with remifentanil (98%). In only 3 patients (3,7%) invasive hemodynamic monitoring was used and in 5 patients (6.2%) a central venous access was channelled. Volume controlled mechanical ventilation was the preferred (87%) and in most patients PEEP was used (97%), mean 8 (±3,27SD). The mean crystalloid administration was 1251 ml (±393,92SD). No patient received colloids or transfusion of blood products in the operating room, although 3 of them (3.7%) required transfusion in the hospitalization plant. The mean surgical time was 335, 37 min (± 59.87SD). All patients were extubated in the operating room and transferred to the post anesthesia recovery unit. The mean post anesthesia recovery unit stays was 167 min (± 37.81SD) and hospital stays was 3,79 days (± 1.57SD). 5 patients were admitted for more than 1 week and 4 patients required hospital readmission. There was no case of death, need for surgical reoperation or rentubation secondary to laryngeal edema.
Conclusions: This study showed robitic-assisted laparoscopic radical prostatectomy was safe and had low complication and low transfusion of blood products due to combination of surgical and anesthetic factors.

01AP11-3
Functional hemodynamic optimization during kidney transplantation with MOSTCAREup

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Background and Goal of Study: Keeping and maintaining adequate hydration is the main goal of perioperative management during kidney transplantation (KT) in order to assure organ perfusion. Current guidelines recommend adopting maximal hydration protocols to keep high CVP levels (10-15 mmHg). Modern evidences questioned the effective advantage of this kind of hypervolemic protocols which can lead to fluid overload, producing systemic and graft related damages and so highly impairing early graft function and outcomes. Recent evidences suggest a new functional volume infusion approach founded on evaluation of fluid responsiveness predictors such as PPV. We tested the effect of a PPV guided protocol based on a continuous PPV reading provided by the MostcareUp device during KT on early graft function and on postoperative outcome.
Materials and Methods: a randomized controlled prospective explorative trial has been designed to test our hypothesis including 20 adult patients with chronic renal failure undergoing KT from deceased donors. Subjects were randomly assigned for intraoperative hydration with NaCl 0,9% into two groups (n=10). The control group received a standard hydration based on current practice guidelines, otherwise the

PPV-guided one received fluids only if a steadily high PPV (>12%) was detected. Intraoperative hemodynamic values were registered and postoperative renal function indicators (blood urea, creatinine and diuresis) were collected during the 7 days post-surgery until discharge. Requirement for dialysis, length of stay and adverse events were also registered.
Results and Discussion: hemodynamic stability has been maintained in both groups during surgery, despite a larger volume of crystalloid infused in the control group and an increased need for vasopressors infusion in the PPV one. A significant improvement of early graft function in PPV-guided protocol patients, with higher diuresis in the first postoperative day and a strong decrease in blood urea and creatinine values, with a peak of discrepancy detected in 4th-5th postoperative day.
Conclusions: our preliminary results suggest the possible benefit of a PPV-guided hydration protocol to improve early graft function. A larger trial with long-term follow-up of renal function and higher statistical power is warranted to confirm the clinical advantage of a PPV-guided protocol designed to test fluid responsiveness.

01AP11-4
Is normal saline the ideal irrigation fluid during percutaneous nephrolithotomy (PCNL)? A case report

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Background: Percutaneous nephrolithotomy (PCNL) is treatment of choice for renal calculi (larger than 1.5cm),for patients with staghorn calculosis and other complex calculosis.
Case Report: We present a case of 29 year old female without any known medical history. Routine laboratory investigations in preoperative evaluation were within normal ranges. The patient was inducted in GA and standard monitoring was obtained. The patient received intravenously 2 liters of saline. The blood pressure was within normal ranges during surgery without specific deviations. Median duration of irrigation was approximately120 minutes. Normal Saline 0,9% was used as irrigation fluid in quantity of approximately 7 liters. Postoperatively there were notable changes in electrolyte status: Sodium(136 to 128mmol/l),Potassium(4,4 to 3,14mmol/l),Calcium(2,4 to 1,87mmol/l).Additionally, Hemoglobin level significantly decreased after the procedure(from 134g/l to 92g/l). Furthermore the blood pressure dropped, second and third hour postoperatively (109/60vs90/60vs85/40).The patient was treated with: Hypertonic Saline 10%,CaGluconate,KCL,Gelofusine,Furosemide. Due to persistent anemia ultra-sonographic abdominal examination was obtained and It was with normal findings. In the next three postoperative days the serum electrolyte status was normalized and the patient was discharged on the fifth postoperative day.
Discussion: Endoscopic procedure such as PCNL carries a potential risk of irrigation fluid absorption into the systemic circulation, and may lead to hemodilytion and fluid overload. Superior choice for ideal irrigation fluid in PCNL is still an ongoing debate. Normal saline and distilled water are the most commonly used irrigation fluids for PCNL. Some studies show that distilled water is associated with hyponatremia and drop in hematocrit level in renal failure patients. As regards the possibility for significant alteration in serum potassium levels during distilled water irrigation, we can also conclude that It is possible with normal saline as well as with other volume, electrolyte and blood pressure disturbances. With this case we can conclude that although normal saline is considered safe during PCNL procedure It is neither superior nor ideal irrigation fluid and moreover Its absorption may lead to significant hemodynamic changes.
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01AP11-5
Intraocular pressure and medial arterial pressure relationship in a six hours steep Trendelenburg positioning robotic assisted radical cystoprostatectomy

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Background: Ocular perfusion pressure (OPP) is the difference between median arterial pressure (MAP) and intraocular pressure(IOP). Rising IOP will drop OPP , even if MAP is maintained. Therefore, low OPP is a high-risk factor to perioperative optical nerve injury[1].
Case Report: Male patient , 79 years, BMI 23.88 , denies glaucoma , submitted to robotic assisted radical cyst prostatectomy. Monitored with Bispectral index, non-invasive blood pressure, cardio scope, gas analyzer, capnographer ,oximeter, neuromuscular monitor, ocular tonometer. PIO was measured several times during the procedure, as following: T1 -before orotracheal intubation, T2- 5 minutes after orotracheal intubation , T3- 5 minutes after pneumoperitoneum insufflation, 5 minutes after Trendelenburg 30°, T4- 5 minutes after Trendelenburg 30°, T5 1 hour after T4, T5-T10 every hour following surgery positioning hours. PIO lowered after anaesthesia induction, raised after pneumoperitoneum insufflation and raised after Trendelemburg positioning. At the end of surgery, with supine 0° position, T 11 PIO was normal even after 6 hours of cefalodeclive positioning.
Discussion: Such patients sometimes has a delayed awakening from anaesthesia due to a combination of factors such acidosis and raised intracranial pressures [2]. The IOP correlates with the intracranial pressure, so we used the measured IOP as a guide to the extubation time. It should be important to evaluate PIO always in steep Trendelemburg positioning.
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Learning points: Evaluate OPP through IOP measure , as complementary monitoring in Trendelemburg steep robotic assisted surgeries. Therefore, IOP may act as indirect measure of intracranial pressures.

01AP11-6
Anaesthetic management of potential massive blood lose. Retroperitoneal tumour resection case report.

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Background: Massive blood loss (MBL) is one of the most life-threatening complications that can occur in major surgery. Taking measures to prevent and treat it, is crucial part of our job.
Case report: 41-year-old male, with a giant abdominal mass and acute right abdominal pain irradiated to back and right leg. The CT showed a retroperitoneal mass compromising right ureter, right iliac vessels and inferior cava vein (IVC).
Due to the location and size of the mass, we took measures to prevent a possible MBL. After induction of general anaesthesia a large born central catheter was inserted in internal jugular vein with max. flow of 200ml/min. Right radial artery was used for invasive pressure monitoring and ProAQT® system was used for hemodynamic optimization. A rapid fluid infuser and warmer was used.
During tumour resection there was an accidental dissection of right iliac vein and IVC that produced moderate but sudden blood loss and hypotension that required rapid IV fluid administration and transfusion of 4 red blood cells, 2 fresh frozen plasma, 1gr of calcium and norepinephrine (NE) infusion to maintain hemodynamic stability. Transfusion was based on blood gas analysis.
The patient was transferred to PACU intubated and with NE infusion. In the 1st 24h, NE was discontinued and the patient was extubated. He did not require any more transfusion.
Discussion: Patient safety is essential part of our job. When MBL scenario is suspected there have to be means to counterpart it: large borne iv. access, rapid fluid infuser and blood products quickly available. To follow MBL protocols has shown to decrease morbidity and mortality since the blood products are available faster and a more balanced transfusion is achieved (RBC:FFP= 1:1). Adjunctive therapies can be used, ideally guided by point-of-care coagulation tests. It is important to maintain normothermia to prevent coagulopathy, using warming blankets and fluid warmers.
References:
Martinez-Calle et al. Implementation of a management protocol for massive bleeding reduces mortality in non-trauma patients: results from a single centre audit. Med Intensiva. 2016; 40(9):550-559.
Learning points: 1. For surgery of tumours involving main blood vessels the anaesthesiologist must foresee the possibility of MBL scenario and prepare large vein accesses. 2. Rapid blood infuser and invasive hemodynamic monitoring permit rapid reaction in case of MBL. 3. MBL protocols have demonstrated to improve morbidity and mortality.

01AP11-7
Incidence and risk factors for subcutaneous emphysema in general laparoscopic surgery

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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. At Euroanaesthesia 2018, we reported that body weight influenced the incidence of SE in robot-assisted laparoscopic prostatectomy (RALP). The current study was performed to identify risk factors for SE in general laparoscopic surgery.
Materials and Methods: The study was approved by the ethics committee of our university (No. 2998). The subjects were patients who underwent general laparoscopic surgery between January 2015 and December 2016. The presence of SE was examined retrospectively in chest X-rays taken at the end of surgery. Gender, age, height, body weight, BMI, ASA PS, preoperative albumin level, and diabetes as a complication were compared in patients who were and were not affected by SE, using a Mann-Whitney U test or chi-squared test. Multivariate analysis was then performed using multiple logistic regression. $P<0.05$ was considered to be significant in all analyses.
Results and Discussion: The number of ports was less than 6 and intra-abdominal pressure was set at 10 mmHg in all cases. Among 209 patients (gastrectomy 82, colon resection 109, inguinal hernia and others 18), SE occurred in 13 cases (6.2 %). The reported incidence rate of SE ranges from 0.43% to 2.34%. Thus, the incidence of SE in our study is a little higher than those in previous reports, which may be because we checked the postoperative chest X-ray in all cases. However, this incidence of SE is lower than that in our study in RALP (30.3%). The SE group had a significantly lower body weight ($p<0.001$) and lower BMI ($p<0.001$) compared to the non-SE group. Multivariate analysis yielded no factors that were significantly associated with the occurrence of SE. Age has previously been proposed to affect SE, but it was not related to SE in our patients. A further study with more cases may be needed to identify risk factors for SE in general laparoscopic surgery.
Conclusions: The incidence of SE in general laparoscopic surgery was 6.2% in this study. No clinical factors were found that significantly influenced the occurrence of SE in this surgery.

01AP11-9
Anesthetic considerations of renal transplantation surgery in living-donor and receptor patients with glucose-6-phosphate dehydrogenase deficiency: a case report.

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Background: Glucose-6-phosphate dehydrogenase deficiency (G6PD) is an X-linked recessive genetic disease and the most common enzymatic disorder of red blood cells (RBC) in humans. The lack of ability to protect RBC against oxidative stresses can lead to haemolytic crisis. This can be caused by certain drugs, infections, metabolic conditions and ingestion of fava beans. The clinical manifestations of such crisis include hypotension, increase of temperature, cyanosis and hemoglobinuria. Generally anemia is not severe enough to require blood transfusion.
Case Report: A 32 year-old male with G6PD was admitted for living-donor renal transplantation surgery, his 50-year old mother who also had G6PD being the donor. The anesthesiologists in the room decided on two different approaches: balanced general anesthesia was chosen for the receptor and total intravenous anesthesia for the donor. Intra-operative monitoring modalities for both included ASA-standard monitoring, bi-spectral index, TOF ratio and urine output. Both procedures were uneventful. Although difficult to identify intraoperatively, no signs of acute haemolytic crisis were shown, such as sudden rise of temperature, brisk hypotension or dark-brown discoloration of urine.
Discussion: Regarding the anesthesia management of patients with G6PD deficiency, drugs with potential to cause haemolysis must be avoided and surgical stress must be kept to a minimum with adequate analgesia. The safety of inhalational general anesthetic agents is still under discussion, with some studies correlating the use of sevoflurane with increased risk of haemolysis. No documented cases were found to show that propofol, fentanyl or ketamine can cause haemolytic crisis, as re-enforced by our case.
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Learning points: Anesthesia in G6PD-deficient patients is sparsely documented in the literature. There is still a lot of controversy on which drugs are safe to use. We decided to report this case where two different anesthetic approaches were employed with successful outcomes.

01AP11-10
The value of Dopamine infusion in renal function during Robotic-assisted laparoscopic surgery.

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Background and Goal of Study: Studies have documented the negative influence of pneumoperitoneum on renal function. Robotic-assisted laparoscopic surgery deals with prolonged pneumoperitoneum and extreme patient positioning. The aim of this study is to investigate the renal responses to the administration of crystalloid solution, alone or in association with dopamine during Robotic-assisted laparoscopic surgery.
Materials and Methods: Seventy-two ASA I-II patients undergoing Robotic-assisted laparoscopic surgery for colorectal malignancy and duration of surgery >4 hours were randomly assigned to three groups. Group A was given Ringer's solution at 10 ml/kg/h, Group B received Ringer's solution at 20ml/kg/h, and Group C received 10ml/kg/h and Dopamine 3mcg/kg/min. Renal function was evaluated by assessing total intraoperative diuresis and GFR before and after surgery.
Results and Discussion: Total intraoperative diuresis and postoperative GFR were impaired in 68% of patients in Group A. 65% of patient of Group B had satisfactory diuresis and postoperative GFR was within normal limits, and 35 % of patients had impaired diuresis and impaired postoperative GFR. 92% of Group C patients had satisfactory diuresis and postoperative GFR within normal limits.
Conclusions: A low rate of crystalloid infusion lead to an impaired renal function in prolonged Robotic-assisted laparoscopic surgery for colorectal malignancy. By increasing the amount of crystalloid solutions renal function is improved but not to satisfactory levels. Satisfactory levels of renal function can be achieved by adding dopamine infusion at diuretic levels.

01AP12-1
Gynecological laparoscopic surgery with deep neuromuscular blockade, effect of intravenous or inhalation anesthesia.

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Background and Goal of Study: Deep neuromuscular blockade appears to improve the surgical conditions in laparoscopic procedures. The aim of this study was to assess the effect of total intravenous anesthesia versus inhalational anesthesia in gynecological laparoscopic surgery with deep neuromuscular blockade on respiratory, surgical and neuromuscular parameters.
Materials and Methods: Fifty-four ASA I-II women aged 20-55 years, who have undergone a gynecological laparoscopic surgery, were randomly assigned to receive either propofol at 6 mg/kg/h (group TIVA, n=27) or clinically titrated Desflurane (group Des, n=27). Both groups received 2 mg/kg propofol at induction and were treated intravenously with fentanyl 4 μg/kg and morphine 0.15 mg/kg. Neuromuscular function was measured using an NMT-DATEX® kinemyography. Monitoring of the neuromuscular function continued through a control of the post-tetanic facilitation every 5 min. Rocuronium was administered at an initial dose of 1,2 mg/Kg. A maintenance dose of 0,25 mg/Kg was administered when 2 PTC responses appeared. The outcome measures were the duration of the operations (h), total dose of propofol (mg) and rocuronium (mg), intrapulmonary pressures per 15 minutes, tidal volume, respiratory rate, $ETCO_2$, end-tidal concentration Desflurane (median MAC and MAC*h) and the need to use PEEP.
Results and Discussion: No statistically significant differences were found among TIVA and Des group with respect to age, somatometric measurements and duration of the operations. Intrapulmonary pressures, tidal volume, respiratory rate were similar in the two groups. One patient from group Des and 3 from group TIVA manifested a subcutaneous emphysema ($p = 0.12$), which has not been recorded in the past. In group Des Desflurane was administered at a dose of 2.2 MAC*h (median dose of 1.0 MAC) and propofol was administered at a total of 902 mg. PEEP had to be applied to three patients from each group. Group TIVA consumed 135,1 mg (CI 131,5-138,7),of rocuronium and group Des consumed 111,3 mg (CI108,3-114,2), respectively ($p=0.024$).
Conclusions: Inhalational anesthesia with desflurane reduced the cumulative dose requirements of rocuronium to maintain a post-tetanic count less than two by 21,6% in comparison to propofol. Further studies are needed to study the effect of deep neuromuscular blockade in terms of cost effectiveness and consumption of inhalational and reversal agents.

01AP12-2
Respiratory complications of bariatric surgery under deep neuromuscular blockade

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Introduction: Deep neuromuscular blockade (DNB) was shown to be essential in bariatric surgery however, neuromuscular residual paralysis (NRP) might be associated with adverse respiratory events (AREs), accounting for 18.7% of the observed morbidity. The aim of this study was to evaluate the incidence of AREs after bariatric surgery.
Methods: A prospective audit was conducted, after institutional approval, between May and August 2018. Patients submitted to bariatric surgery, under general anesthesia and DNB were included. Patient's demographic characteristics, intra/postoperative anesthetic variables and complications were analyzed. The primary outcome was to identify AREs occurring within the first 30 days after bariatric surgery. Descriptive analysis of variables was runned using Microsoft Excel.
Results: Data from 26 patients was analyzed, mean age was 43 years (SD±11,12), 74% were female and mean body mass index was 42,56 kg/m2 (SD±4,75). DNB was observed during the procedure (TOFcount 0 and PTC<3); before the administration of Sugammadex, mean TOF count was 2,17 and PTC 16,78. The mean total dose of Rocuronium was 7 mcg/kg/min based on actual body weight (ABW) and 15 mcg/kg/min on ideal body weight (IBW). The mean total dose of Sugammadex based on ABW was 2,28 (SD±0,75) mg/kg and average time of recovery of neuromuscular blockade (TOF ratio >0.9) was 250 seconds. No case of NRP was observed. Overall, 2 patients (7.69%) developed AREs (mild hypoxemia) in the first 24 hours after bariatric surgery. No AREs occured at 48 hours or 30 days postoperative. Intraoperatively, 26.9% patients developed AREs (15.4% broncospasm and 11.5% mild/moderate hypoxemia).
Conclusions: AREs within 30 days of bariatric surgery under DNB were less observed in this study when compared with published data (7.69% vs 18.7%) and none of the patients presented with NRP. Sugammadex has been able to reverse and avoid NRP, independently of the level of neuromuscular blockade.

01AP12-3
Genotoxicity of sevoflurane and the possible ameliorative effect of vitamin C

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Background and Goal of Study: Vitamin C is a well-known anti-oxidant and cellular protective agent, while paradoxically it can increase oxidative stress under certain circumstances. Sevoflurane genotoxicity is supposed, but not yet well established. The aim of this work is to evaluate the genotoxic effect of sevoflurane and that of high dose vitamin C and to study the possible ameliorative effect in this domain using "in vivo mammalian alkaline comet assay".
Materials and Methods: 35 male albino rats aged 6 weeks were divided into 5 groups; Group 1 (normal control), received two doses 24 hours apart, of "50% oxygen and 1ml normal saline" by mouth gavage . Group 2 (positive control), received two doses 24 hours apart, of oral EMS (Ethyl methanesulfonate) 200 mg/kg. Group 3 (sevoflurane treated), received two doses 24 hours apart, of 2.5% sevoflurane for 2 hours. Group 4 (vitamin C treated), received two doses 24 hours apart of, oral 20 mg/kg vitamin C. Group 5 (sevoflurane and vitamin C treated), received two doses 24 hours apart of, both 2.5% sevoflurane anesthesia + 20 mg/kg oral vitamin. Animals were sacrificed 3 hours after the last administration of the test substances. The kidneys were harvested and comet assay was performed and two parameters (% DNA in tail and tail length) were compared in the tested and control groups.
Results and Discussion: Comet assay parameters were significantly higher in sevoflurane treated rats, compared to normal control although these parameters were significantly lower than the +ve control groups, while vitamin C treated group showed no significant change when compared to normal control rats. The level of DNA damage was not significantly different in; sevoflurane + vitamin C treated group and normal control group.
Conclusions: These results suggest that sevoflurane but not vitamin C can result in genotoxic effect in rats kidney. The results also suggest protective effect of vitamin C on DNA damage induced by sevoflurane. In the light of the above data, well nutrition or even vitamin C supplementation before sevoflurane anesthesia should be considered.

01AP12-4
Pulmonary complications after sugammadex versus neostigmine reversal of neuromuscular blockade for patients undergoing surgery: an analysis from the Multicenter Perioperative Outcomes Group

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Background: Residual neuromuscular blockade (NMB) is frequent despite the routine use of anticholinesterases and may be associated with postoperative pulmonary complications (PPCs). Using a national dataset of electronic health records (EHRs) from US hospitals, we evaluated whether sugammadex compared to neostigmine is associated with a decreased incidence of PPCs.
Methods: The observational analysis protocol was approved by the Multicenter Perioperative Outcomes Group (MPOG) publications committee. We extracted data from the central MPOG dataset, a consortium of hospitals that integrate standardized EHR data. Adults undergoing inpatient surgery with general anesthesia using NMB between Jan 1, 2014 and Aug 31, 2018 were included. Exclusion criteria included emergency, cardiac, or transplantation surgery; ASA status 5 or 6; or renal failure. The primary composite outcome was discharge ICD9/10 diagnoses of one or more PPC: pneumonia, respiratory failure, and other pulmonary complications (excluding atelectasis and pulmonary edema). The secondary outcome was prolonged intubation, defined as the population 90th percentile (>17.01 min). Each patient receiving sugammadex between 6 months after its first use at each site until Aug 31, 2018 was matched to a neostigmine patient in the period from Jan 1, 2014 to the first documented sugammadex use using exact match criteria of hospital, age, sex, ASA status, BMI category, COPD, CHF, cardiac arrythmia, liver disease, paralysis, and high-risk surgery. After matching, conditional logistic regression adjusting for imbalanced or salient pre- and intraoperative covariates was performed.
Results & Discussion: Of 23,899 sugammadex patients across 13 US hospitals, 18,086 matched to 18,086 neostigmine patients. Among them, 1,683 (4.7%) experienced the composite PPC primary outcome (3.9% sugammadex vs 5.4% neostigmine), 714 (2.0%) pneumonia (1.4% vs 2.5%), and 539 (1.5%) respiratory failure (1.0% vs 2.0%). In multivariable analysis, compared to neostigmine, sugammadex was associated with 29% reduced risk of PPC (adjusted OR 0.71, 95% CI 0.63, 0.79, p< 0.0001), 45% for pneumonia (0.55 (0.45, 0.66), p< 0.0001), and 57% (0.43 (0.34, 0.54), p< 0.0001) for respiratory failure. There was no statistically significant association between sugammadex and prolonged extubation.
Conclusion: Multicenter US data show sugammadex use is reliably associated with a decreased risk of PPC compared to neostigmine among inpatient surgery patients.

01AP12-5
The effect of diabetes mellitus on the cardiovascular and catecholamine responses to etomidate anaesthesia and endotracheal intubation

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Introduction: Tracheal intubation is associated with altered pressor response in diabetic patients which may be due to increased release or altered sensitivity to catecholamines. We evaluated haemodynamic & catecholamine responses to etomidate induction and intubation in diabetic patients.
Methods: After ethics approval and informed consent, 10 insulin-dependent diabetics(D) and 10 matched controls(C) undergoing eye surgery were recruited. Cardiovascular disease/drugs, hypoglycemia, difficult intubation excluded. Premed-temazepam(20mg);Induction-etomidate(1.5mg/kg)+atracurium(0.5mg/kg)+isoflurane 1.2% in 50:50 N2O/O2. Trachea was intubated at 3 min. Cardiac index(CI), heart rate(HR), mean arterial pressure (MAP), SVR recorded before induction, at 1min intervals after induction until 5min after intubation. Bloods taken prior to anaesthesia(0) and intubation(3), 1min(4) & 5min(8) after intubation for adrenaline (Adr) and noradrenaline (Norad) levels. Statistical analysis using t-test & ANOVA.
Results: No significant differences in baseline(0) between groups C & D for HR, MAP, CI, SVR, Adr and Norad levels. On comparing trends between C and D, HR was found to be increased significantly in C after intubation (102+/-12 vs 80+/-12, p<0.05) but not in group D. MAP and SVR increased in C and D after intubation but without statistical significance. No significant difference in trends of Adr and Norad levels in C and D during study duration. However percentage change in Norad levels following intubation (4) were significantly greater from baseline(0) in D but not in C. Percentage change in Adr was similar among groups C and D.

% change from baseline	3 Vs 0	4 Vs 0	8 Vs 0	4 Vs 3
D(Adr)	459+/-1490	2018+/-5934	639+/-1955	277+/-419
C(Adr)	324+/-1013	2447+/-7206	618+/-2060	707+/-1573
D(Norad)	-10+/-27	52+/-76*	5+/-60	103+/-174
C(Norad)	-1+/-26	-5+/-19	-8+/-27	0.1+/-21

* p<0.05 for diff b/w D and C

Conclusion: Diabetic patients showed greater increase in norad release on intubation compared to control. However, this was not associated with equivalent change in cardiovascular parameters. Further studies to explore the possibility of 'de-sensitization' to the secreted catecholamines are needed to gain full understanding of the observed phenomenon.

01AP12-6
Blended inhaled anesthesia is cheaper and conduces to faster recovery: a computer simulation study

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Background and Goal of Study: Isoflurane was used worldwide clinically in the 1980's but has now been replaced by sevoflurane and desflurane. While isoflurane is cost-effective, it does not conduce to faster waking or recovery compared with sevoflurane and desflurane. We hypothesized that a blend of isoflurane and desflurane would allow faster recovery and be more cost-effective than isoflurane alone. We administered the two inhaled anesthetics simultaneously and by turns with the aim of testing our hypothesis in a computer simulation.
Materials and Methods: We used Gas Man™, a commercially available computer simulation program. The simulated subject was a healthy, 40-year-old, Japanese male (body weight: 70.9 kg, cardiac output: 6.2 L/min, alveolar ventilation: 5.95 L/min). The anesthetics were blended as follows: (1) for the first fifteen minutes we administered desflurane with 4 L/min of fresh gas flow, targeting 1.3 MAC (minimum alveolar concentration); (2) we decreased the fresh gas flow from 4 L/min to 1 L/min 15 minutes after the start of administration; (3) we stopped desflurane 30 minutes from the start of administration and started isoflurane to achieve 1.3 MAC for both anesthetics; (4) we alternated the two drugs every 30 minutes. We then monitored the patient's condition at 1.3 MAC over six hours using isoflurane alone, desflurane alone, and the isoflurane and desflurane blend. The primary outcome was the recovery time from anesthesia, defined as the time until the anesthetic concentration in the vessel-rich group decreased to 0.2 MAC. The secondary outcome was the cost of the anesthetics, which we calculated using the following prices: isoflurane USD 0.20/ml, desflurane USD 0.48/ml.
Results and Discussion: The recovery time for isoflurane, desflurane, and the blend of the anesthetics was 72 minutes, seven minutes, and 24 minutes, respectively. The cost of isoflurane, desflurane, and the blended anesthetics was USD 13.2, 101.6, and 59.3, respectively. The blended anesthetic showed dramatically better recovery time than isoflurane alone and was 40% cheaper than desflurane alone.
Conclusions: A blend of the inhaled anesthetics, isoflurane and desflurane, was more cost effective and allowed faster recovery.

01AP12-7
Postoperative Analgesia Techniques in Pancreatoduodenectomy

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Background and Goal of Study: The incidence of pancreatic disease has been increasing. Pancreatoduodenectomy (PD) is still uncommon and is only performed in high load volume centres. The anaesthesiologist's role is to facilitate the path to recovery. The aim of this study is to evaluate the postoperative analgesia techniques (POAT) and describe the PD anaesthetic management currently used in our centre.
Materials and Methods: After institutional approval, a prospective audit was performed between march and august of 2018. Records from patients submitted to PD were consulted. Demographic data, perioperative variables, POAT and maximum pain scores (scale 1 to 10) were recorded, during the first 48h after surgery. A descriptive analysis of variables was runned using Microsoft Office Excel® software.
Results and Discussion: Data from 21 patients submitted to PD were analysed (16 males and 5 females). Mean age was 65 ± 13 years old and patients were classified as ASA 2 (71%) or 3 (29%). Six anaesthesia techniques were observed: 8 general anaesthesia (GA), 7 GA combined with epidural blocks (EB) [thoracic (3) or lumbar (4)], 4 GA plus subarachnoid blocks (SB) and 2 GA plus TAP blocks [bilateral (1) or unilateral (1)]. Regarding open PD (n=15), authors observed 6 GA, 5 EB and 4 SB. The chosen POAT in 7 patients was intravenous (IV) analgesia, followed by EB (n=5) and Patient Controlled Analgesia morphine (PCAm) (n=3). One GA and 2 EB were performed for 'laparoscopic converted to open' surgery (n=3). In this case, IV analgesia (n=1) and EB (n=2) were the chosen techniques. Concerning patients submitted to open procedures (15 open and 3 'laparoscopic converted to open'), the authors observed pain scores >3 in 5 patients (28%) (4 EB and 1 IV POAT) in the first 24h and in 4 patients (22%) (2 EB and 2 IV POAT) in the 24h-48h period. For laparoscopic PD (n=3), 1 GA followed by PCAm and 2 GA plus TAP blocks (IV POAT with tramadol and paracetamol) were undertaken. The maximum pain score during the first 24h was 2 in 2 patients and, in all other registries till 48h, was 0. In this study, pain scores <4 in 76% of patients during the first 24h and in 81% during the 24-48h period were found.
Conclusions: In our institution, combined anaesthetic and POAT were chosen for most PD, with an adequate level of pain control. These findings cannot be generalized due to a small sample size, although a patient tailored POAT seems to be the most suitable approach.

01AP12-8
Perioperative anaphylaxis: case-report in Anesthesiology

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Background: Anaphylaxis is a potentially fatal severe systemic hypersensitivity reaction[1]. It has serious cardiac and respiratory impact, as well as cutaneous manifestations[2]. Rapid recognition is challenging for its rare incidence. We present a clinical case of our experience.
Case Report: A 59-year-old man, ASA II, with stable arterial hypertension and asthma, was scheduled for inguinal herniorrhaphy. According to patient preference, balanced general anesthesia was performed. Premedication with 2mg of midazolam was given, and anesthetic induction performed with fentanyl(0.2mg) and propofol(140mg). Adaptation of laryngeal mask and antibiotic prophylaxis with cefazolin(2g). Later, we detected hypotension with partial response to vasopressors with no other dysfunctions, that lasted for 30 minutes and aggravated after administration of 10mg of rocuronium to optimize surgical conditions. In this context of cardiovascular dysfunction, intubation was performed to optimize ventilation/oxygenation, with 40 mg of rocuronium. After this administration hypotension worsened, and hypotensive shock was assumed. A bolus of 0.1mg of adrenaline (up to 1mg) was administered, and perfusion of noradrenaline 0.15 µg/kg/min was initiated. At this point, profuse sweating and generalized flushing with eyelid edema was observed, treated with hydrocortisone (300mg) and clemastine(2mg). After stabilization, the patient was transferred to the ICU. He was extubated 6 hours later and discharged on the 3rd day. An increase in tryptase value triggered the referral of the patient to an immuno-allergology consult.
Discussion: The hypothesis of anaphylaxis should be promptly assumed, allowing quick stabilization of the patient. In this case, the unusual presentation of isolated hypotension did not allow an immediate identification. Even in favorable evolution, the patient should be referred to further investigation and definitive diagnosis.
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Learning points: Anaphylactic shock, due to its clinical magnitude and low incidence, should be shared, analyzed and discussed in specialty forums, allowing less experienced professionals to acquire the skills that will allow correct identification and handling.

01AP12-10
When Continuous Spinal Anesthesia Doesn´t Need Continuing: Report of a Carefully Managed Mini-Dose Central Regional Anesthesia in Severe Aortic Stenosis and Chronic Obstructive Pulmonary Disease

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Background: Diaphyseal femur fractures in the elderly remain a challenge for anesthesiologists. Physiological reserve is reduced and co-morbidity is common, making them particularly susceptible to hypotension during spinal anesthesia. The case of severe aortic stenosis poses an additional obstacle due to fixed cardiac output and inability to compensate for a reduction in systemic vascular resistances.
Case Report: A 77-year-old woman with a diaphyseal fracture of the right femur was proposed for reduction and internal fixation. The patient had a history of arterial hypertension, severe aortic stenosis (mean gradient 73 mmHg), O2 dependent chronic obstructive pulmonary disease (COPD), diabetes mellitus type 2 and obesity. The cardiovascular optimization was attempted before surgery with balloon valvuloplasty with no success, and the patient refused endovascular or surgical aortic valve replacement. Given the situation, we planned a continuous spinal anaesthesia (CSA). A spinal catheter (18G) was placed 3 cm into the sub-arachnoid space through a Tuohy needle at the L4-L5 intervertebral space. A mixture of 1mL Levobupicavaine 0,5% and 0,5mL/25µg of Sufentanyl was administered. In five minutes, a T10 sensory level was obtained. Monitorization included ASA standard, urinary debit and EV1000 Edwards FlowTrac Sensor System with arterial line. During the two-hour surgery, the single-shot dosage offered perfect spinal anesthesia and hemodynamics remained stable (Systolic Blood Pressure 116-136 mmHg, Diastolic Blood Pressure 47-55 mmHg, Cardiac Output 4.2-4.8 mL/

min). The intrathecal catheter was removed after the procedure and post-operative analgesia was secured with an echo-guided femoral block and intravenous continuous perfusion of Tramadol and Ondansetron. She was later transferred to Cardiac Intensive Care Unit.
Discussion: The use of central regional anesthesia in severe aortic stenosis is traditionally regarded as contraindicated due to its sympatholytic effect, potentially causing loss of vascular tone and ultimately diminished cardiac output. The option of general anesthesia was off the table given the O2 dependent COPD. The main advantage of CSA is that incremental, minimally effective doses can be given in order to minimize cardiovascular effects.
Learning points: The synergism between intrathecal opioids and local anesthetics make it possible to achieve reliable spinal anesthesia with minimal hypotension using a minidose of local anesthetic.

01AP13-1
Discharge within 24 hours after laparoscopic colon 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. Since 2 years 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 < 24h 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 (June2017-December 2018) who could be discharged within 24 hours. Primary outcome measures were NRS 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: 31 patients could be identified (M/F=22/9, ASA II/III=24/7, mean age 63.8y range 21-86y) patients for colon surgery. The NRS scores are shown in table 1. Opioid consumption is shown in table 2. The adherence to the ERAS protocol was > 70%. Only 1 patient showed mild PONV. All patients could be discharged within 24 hours. There were no 30-days readmissions or re-operations reported.
Conclusions: 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 24 hours.
Table 1. NRS scores (mean and range) in colon surgery

N	31
Day 0	1.5 (0-4)
Day 1	1.1 (0-3)

Table 2. Opioid consumption (calculated in morphine equivalents (mg) mean and range)

N	31
Day 0	10.1 (5-15)
Day 1	0.27 (0-8)

01AP13-2
The new era of analgesia in colorectal surgery: a prospective audit

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Background and Goal of Study: In colorectal surgery, the cornerstone of analgesia remains a procedure-specific multimodal regimen, which avoids opioids usage and their side effects.(1) The aim of this audit was to assess postoperative (PO) analgesic regimens for colorectal surgery.
Materials and Methods: A prospective audit was conducted, between March and August 2018, after institutional approval, including patients undergoing colorectal surgery,. Variables analyzed were pain scores, analgesic regimens and complications in the first 48 hours PO. The primary outcome was to evaluate the highest pain scores in the first 24 and 48 hours PO. A descriptive analysis of variables was performed.
Results and Discussion: 64 patients were included. Mean age was 64 years (SD±13.3); 94% classified ASA II/III. In the open colorectal surgery group (15), epidural analgesia (EA) was used in 12 cases; the average highest pain score was 2.8 in the first 24 hours PO 2.,2 in the 24-48 hours PO. The laparoscopic surgery group (49) included 34 cases with EA and 15 cases with parenteral analgesia (PA). In EA group, the average highest pain score was 2.6 and 1.5 in the first 24 hours PO and in the 24-48 hours PO, respectively; in PA group, it was registered the same average values in both periods (2.5). The most frequent complications were postoperative nausea/vomits (PONV) and obstipation (22%). The incidence of PONV was higher in open surgery than laparoscopic surgery (27% vs 20%). In laparoscopic surgery, the incidence of PONV was more common in PA than EA (33% vs 15%).
Conclusions: In the majority of patients, pain control was effective in the first 48 hours PO in laparoscopic surgery. Both analgesic groups had similar pain control in the first 24 hours PO; however, in 24-48 hours PO period, EA had a better pain control. Pain scores in the no epidural groups, though higher than those in the epidural groups, were within a plausible level. Thus, clinical benefit of EA in laparoscopic colorectal surgery still remains inconsistent.(1) PONV were less observed when compared with published data (22% vs 25-35%).(1) As described in the literature, EA may reduce PO opioids consumption, which could influence the incidence of PONV.(1)
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01AP13-3
Survey of Practice of Enhanced Recovery for Colorectal Surgery

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Background and Goal of Study: Enhanced recovery after surgery (ERAS) for colorectal (CR) surgery is widely practiced in the UK. It is not known how widespread the perioperative components of the ERAS protocol have been implemented in daily practice. We surveyed delegates attending the annual 2017 colorectal anaesthesia meeting organised by the Colorectal Anaesthesia Group-UK (CAG-UK) to investigate current practice of ERAS in their hospitals.
Materials and Methods: A structured paper questionnaire was handed out on the day of meeting. It contained 19 questions about ERAS specific to CR surgery including pre, intra and postoperative components and quality assurance of the ERAS pathway. Completed survey forms were collected on the same day. The forms were analysed using Excel for MAC.
Results and Discussion: 72 forms were returned from 123 participants (58%).92% respondents had ERAS protocols implemented in their hospitals. However patients' attendance at multidisciplinary meeting was 33% and hospitals had a dedicated ERAS nurse in 61%. The results of individual components are summarised in table 1. Only one third who responded had quality assurance process in the form of continuous audit review.
Conclusions: Most hospitals have started using ERAS for colorectal surgery. However, all the specific recommendations of the ERAS protocol are not widely accepted. Of the individual ERAS protocols, compliance with preoperative components of the pathway are more common than postoperative period.

Perioperative ERAS protocol component	% of respondents where protocol used
Preoperative oral intake	74%
Preoperative carbohydrate loading	74%
Preoperative bowel preparation	75%
Intraoperative fluid therapy	35%
Postoperative pain relief	38%
Postoperative oral intake	62%
Postoperative nutrition	54%
Postoperative mobilization	54%
Postoperative stopping fluid therapy	32%
Postoperative physiotherapy	47%
Postoperative removal of urinary catheter	39%
High dose Intrathecal opioids	22%

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01AP13-5
Patient´s perception of their postoperative pain and recovery time: a perspective from Belgium

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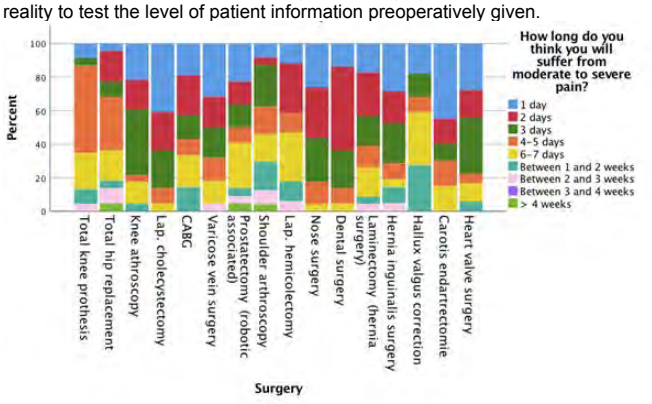
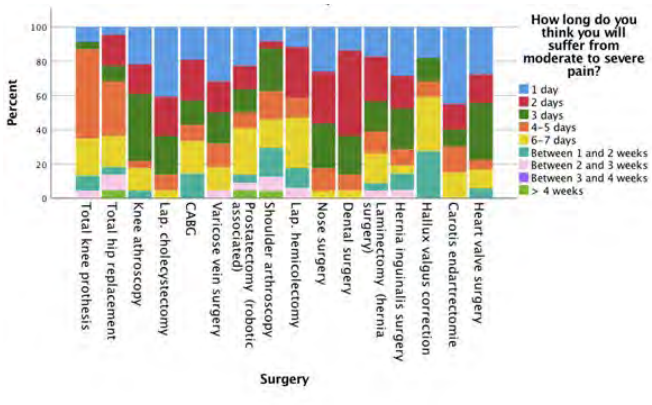
Background and Goal of Study: Some types of surgery are associated with a long recovery time and may elicit prolonged moderate to severe pain. Preoperatively informing patients on these topics is essential to minimize anxiety and dissatisfaction. We wanted to assess patient´s expectations regarding postoperative recovery time and pain as well as the impact of several demographic variables on these expectations.
Materials and Methods: After obtaining informed consent, adult patients undergoing elective surgery in our hospital were enrolled in a survey from 01/2018 to 11/2018. The survey included questions addressing demographic data, number of previous surgical procedures and patients expectations regarding postoperative recovery time and pain. To compare patient´s expectations after various types of surgery, homogenous surgical groups were created, with at least 17 patients per group. Descriptive statistics were used to display numeric responses. Data were analyzed with a Pearson correlation or Spearman's rank correlation test depending on the variable tested. A p-value < 0.05 was considered statistically significant.
Results and Discussion: After enrolling 361 patients, 345 patients grouped in 16 surgical procedures were used for the final analysis. Expectations on recovery time and duration of pain are presented in figure 1 and 2. Older patients expected a longer recovery time (rs= 0.214,p<0.01) and longer duration of pain (rs=0.091,p=0.046). Women also expected longer recovery time (rs= -0.124,p=0,011) and longer duration of pain (rs=-0.171,p=0,001) than men. Educational level was not significantly associated with expectations.
Conclusion: There is a wide variation of patient´s expectations of recovery time and duration of pain after different types of surgery, that should be compared with reality to test the level of patient information preoperatively given.





01AP13-6
Patient-Centric Perioperative Care: an interdisciplinary bundle for expedited recovery after endoprothetic surgery

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Background and Goal of Study: The perioperative surgical home is a patient-centered, team-based model of care developed in the US. Due to a different health system, scientific findings in the US cannot be simply transferred to Germany. Thus, the aim of this preliminary study is to evaluate the effect of an interdisciplinary treatment bundle in a German setting.
Methods: After IRB approval and written informed consent, 34 patients (pt) scheduled for elective endoprothetic surgery were enrolled (PPV group), and compared to historic matched pairs (HMP) for age, ASA-PS, BMI cohort, sex. PPV includes 1) preoperative patient education, 2) atraumatic surgical technique, 3) modified anaesthesia (short-acting drugs, no pre-op sedatives, no pain catheter, local infiltration analgesia and opioid-sparing multimodal postoperative analgesia), 4) start of mobilization on operation day.
Results and Discussion: Primary outcome: reduction of induction time. Secondary outcomes: length of hospital stay (LOS), resting pain and pain with movement (rp, pwm) on postoperative day 1 (d1) on a numeric rating scale , range of extension (ext) and flexion (flex) of the joint on d1, d3, d6, expressed in angular degree, mobilization progress (mp) on d1, d3 , d6 (no mobilization (0mp) -> patient climbs stairs (st)). Group comparison: Wilcoxon-Mann-Whitney-test (WMWT) for inferiority modified to Wellek (1, 2). If so: **additional WMWT for superiority.**
Conclusion: As shown in this study, PPC is entailed by hastened it, reduced LOS and improved mobilization progress.
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01AP13-7
Fear of anesthesia and trust in anesthesiologists: a perspective from Belgian patients.

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Background and Goal of Study: Fear of anesthesia may contribute to preoperative anxiety and consequently to postoperative pain. Surveys have revealed that some population groups have unrealistic concerns of certain risks of anesthesia. Educational level, age and previous surgery may contribute to this fear. Therefore, our goal was to assess the concerns about anesthesia and the level of trust in anesthesiologists in a Belgian population. Furthermore, we wanted to test the impact of several demographic variables and previous surgery on the level of fear of anesthesia.
Materials and Methods: A survey was taken preoperatively from adult patients undergoing elective surgery in the Jessa Hospital, Hasselt, Belgium. All patients gave informed consent. The survey included questions addressing demographic data, number of previous surgeries, fear of certain risks of anesthesia and overall trust in anesthesiologists. Descriptive statistics were used to summarize numeric responses. The data were analyzed by Pearson correlation and Spearman's rank correlation according to the variable investigated. A p-value < 0.05 was considered statistically significant.
Results and Discussion: From 01/2018 until 11/2018, 361 patients were enrolled. In general, 8.3% of all patients were very anxious about anesthesia, 22.7% somewhat anxious and 69% not at all. Almost all patients (98.8%) were confident that the anesthesiologist would take good care for them during general anesthesia. Women had significantly more fear than men (rs= 0,283, p<0,01). Higher education of patients resulted in a lower fear before surgery (rs = 0,092, p<0,05). Regarding fear of specific anesthesiology related risks and side effects, fear of brain damage, fear of waking up during surgery, fear of memory loss and fear of postoperative infections were the highest. There was no significant relationship between the level of fear and independent variables such as age and previous surgery.
Conclusion: Our data suggest that more than 15% of Belgian patients suffer from disproportionate fear of extremely serious but rare complications of anesthesia, despite the safety of modern anesthesia. Female gender and low educational level are associated with higher levels of fear. In contrast, trust in anesthesiologists is very high in Belgium. A thorough patient education on the risks of anesthesia remains pivotal during the preoperative period to limit patient anxiety and increase patient satisfaction.

01AP13-8
Attitudes of anaesthetists attending the funeral of patients they care for: a cross-sectional study amongst Australian and New Zealand anaesthetists

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Background and Goal of Study: A patient's death can pose significant stress upon the family and the treating anaesthetist. The attitudes, benefits and barriers of attending a patient's funeral as perceived by anaesthetists are unknown.
Materials and Methods: We performed a prospective, cross-sectional study ascertaining the frequency of, and facilitators and barriers of anaesthetists attending a patient's funeral. Primary aim: to ascertain the attitudes of anaesthetists towards attending the funeral of a patient they cared for. Secondary aims: to examine the perceived benefits of and barriers to attending the funeral and to explore the rate of formation of bonds between anaesthetists, patients and families.
Results and Discussion: 424 participants completed the survey (response rate 21.2%). 5.9% of anaesthetists had attended a patient's funeral. 364 participants (85.9%) rarely formed special bonds with patients or their families. 233 (55%) anaesthetists believed that formation of a special bond increases the likelihood of their attendance. Showing respect to patients or their families was the most common perceived benefit of attending a funeral. Participants found expression of personal grief and caring for the patient beyond life beneficial to themselves and the family. Fear of their attendance being misinterpreted or not warranted, and time restraints were barriers of anaesthetists' attendance at a patient's funeral.
Conclusions: Most anaesthetists have never attended their patient's funeral. Few anaesthetists form close relationships with patients or their families. Respect, expression of grief and caring beyond life were perceived benefits of attendance. Families misinterpreting the purpose of attendance, or not expecting their attendance, and time restraint were commonly perceived barriers.

01AP13-9
Anesthesia in breast augmentation: Same day flight back home, is it possible? A prospective study

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Background and Goal of Study: Fast-track or enhanced recovery after surgery (ERAS) is a concept that combines sophisticated surgical techniques, preoperative patient optimization, and evidence-based clinical measures in order to minimize complications and fasten recovery. Breast augmentation relies on general anesthesia, while with experience the surgical procedure can be completed in about 30 min. Our anesthesia protocol included the use of laryngeal mask with propofol full sedation and without the use of neuromuscular agents in order to achieve immediate postoperative ambulation and flying back home readiness. We retrospectively examined the outcomes of the protocol.
Materials and Methods:123 female patients who had to fly in less than 24 hours back to their home city underwent cosmetic breast augmentation with the specific anesthesia protocol. Using standard monitoring general anesthesia was induced with propofol (2mg/kg) and fentanyl (2mcg/kg). Anesthetic maintenance was accomplished with total intravenous anesthesia (propofol 4-10 mg/kg/h, remifentanil 0.25 mcg/kg/min) and air with oxygen at 50%. All patients received metoclopramide 10 mg intravenously (iv) and 8 mg of ondasetron iv. The following records were analyzed: vital sign stability during mobilization, duration of surgery, frequency of ambulation needing assistance, Verbal Analog Scores and incidences of pain, orthostatic intolerance events, incidences of postoperative nausea and vomiting and complications at follow-up visits.
Results and Discussion: The mean duration of surgery was 45,94 min. No adverse postoperative events were observed. During postoperative mobilization no statistically significant fluctuations in hemodynamics or orthostatic intolerance requiring interventions, were observed. All patients tolerated immediate postoperative ambulation well.4.1 % reported postoperative pain over 5. Nausea and emesis occurred with an overall frequency of 4.9% and 2.8% respectively. All 123 patients were able to fly and the mean time of travelling after the surgery was 10.5 hours. One patient developed infection. There was no incidence of hematoma or complaints at follow-up.
Conclusions:This anesthesia protocol can be safely and effectively used for breast augmentation with the specific surgical technique, for immediate postoperative ambulation and early readiness to fly back home without a decrease in quality and safety

01AP13-10
Anesthetic considerations in a patient with MELAS syndrome. Anesthetic management. A case report.

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Background: MELAS syndrome (myopathy, mitochondrial encephalopathy, lactic acidosis and stroke-like episodes) is a multisystemic disorder due to a mitochondrial function alteration. It's a maternal inherited genetic disorder in which a mitochondrial DNA mutation affects to MTTL1 gen, producing an oxygen consumption ability reduction. Common symptoms are: neurological; ischemic lesions, cardiac: preexcitation, WPW, auriculoventricular blocks, diabetes, ionic alterations, hyperlactacidemia, neurosensorial deaf, GI dysfunction, malnutrition, muscle atrophy and hypothermia[1]. During anesthetic procedures special care is needed to avoid hypothermia, electrolyte disbalance and pharmacological secondary effects.
Case Report: 49 YO female scheduled for total thyroidectomy (papillary tumor). She was 38 kg and 150 cm. She had chronic desnutrition, brain ischemic disease, insulin-dependent diabetes, and neurosensorial deaf. She had suffered a bowel obstruction episode 17 years ago. TTE and ECG were normal. Itwas described use of Tyopental, fentanyl, atracurium and sevoflurane without incidences in previous surgery.
Pre-anesthetic consult didn't show contraindications for surgery. Usual monitorization was used; ECG, non-invasive BP, SpO2, EtCO2, BIS, central temperature and laryngeal recurrent nerve monitorization. Air and fluids heating systems were used. Glucose level was 145 mg/dL. Induction was performed with lidocain 1.31 mg/kg, propofol 2.10 mg/ kg, fentanyl 2.63 mg/kg and rocuronium 1.05 mg/kg. Anaesthesia was maintained with Sevoflurane.
PO analgesia protocol included paracetamol and dexketoprofen.
Intraoperative central temperature raised from 35.5ºc to 37.6ºC.
Arterial gasometries didnt show hydroelectrolitic disturbances or hyperlactacidemia. There was not intraoperative events. Neuromuscular blockade recovery was checked with TOF. Extubated without incidences, she was transferred to the PACU and 4 hours later to the surgery ward. She was discharged home 2 days later.
Discussion: Management of this patients requires extensive pre-operative evaluation for a safer surgery. Additional care must be taken choosing fluid therapy, muscle relaxant agents (due to interpersonal variability). Warming systems and temperature monitoring are highly recommended.
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01AP14-1
Marginal Livers for Transplantation. When is Marginal too Marginal?

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Background and Goal of Study: There is increasing demand for organ transplantation: due to growing populations, more indications for organs and fewer donors, resulting in a mortality of 10.2% on the liver transplant waiting list. More organs are bring procured via the DCD (Direct Cardiac Death) pathway, resulting in fewer suitable livers. There is increased motivation to use a 'marginal' organ, in order to address this supply and demand mismatch. A 'marginal' liver is considered one that is procured from a donor >55 years old, >100kg in weight, having had an ICU stay >5 days, known steatosis >15%, CIT (cold ischaemic time) >8 hours, organs procured from the DCD pathway and any split livers. We conducted a retrospective cohort study to look at the quality of our orthotopic liver transplants (OLT), over a 48 week period. The primary end-point was the number of OLTs from marginal donors. The secondary end points were: PNF (primary non function) rate, EAD (early allograft dysfunction, day 1 AST), INR, incidence of RRT (renal replacement therapy), ICU LOS (length of stay) and hospital LOS
Materials and Methods: The data was obtained from a liver transplant database and stored securely on a hospital computer. Analysis was achieved via Prism for statistics. We examined data from the OLTs performed between Jan-Nov 2018. Ethical approval was obtained.
Results and Discussion: 86 OLTs was performed Jan-Nov 2018. 68 were procured from marginal donors (79%) and 18 (21%) non-marginal. The MELD (Model for End Stage Liver Disease) scores for the 2 groups were comparable (18.6 versus 17.3). 68 of OLTs (79%) were marginal. 18 (21%) were non-marginal. Marginal livers did perform well, but 3.5% of OLTs experienced PNF (all marginal). The marginal group did have some statistically significant differences from the non-marginal group: older donor age, (49 versus 39), donor weight larger (79kg versus 67kg) and older recipient (55.7 versus 49.7). No other differences were statistically significant, but the CIT was 23 minutes longer in the marginal group, AST on day 1 was higher by 751, ICU LOS was longer in by 1.15 days, hospital LOS was longer by 4.43 days and 12 patients in the marginal group needed renal support compared to 1 in the other group.
Conclusion: Despite our institution's use of marginal liver donors, the results are reassuring that the clinical differences between recipients are not significant.

01AP14-2
Simultaneous combined liver and kidney transplantation in pediatric patient with primer hyperoxaluria: case report

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Background: Simultaneous combined liver-kidney transplantation (SCLKT) is rare in pediatric cases and requires careful perioperative management.
Case Report: 1 year 2-month-old, 8 kg girl patient. She had a history of end-stage kidney failure at the age of 5 months after diagnosis of medullary nephrocalcinosis after urinary tract infection. Peritoneal dialysis therapy was started after diagnosis. In addition, SCLKT operation was performed because of liver cirrhosis due to primary hyperoxaluria.
Standard monitoring was performed in the operation room. Invasive arterial pressure, central venous blood pressure (BP) measurement was performed after induction with 3 mg/kg pentothal, 1 mcg/kg fentanyl, 0.6 mg/kg rocuronium. In the maintenance of anesthesia, desflurane (4-6 MAC) with 40% O2/60% air mixture and remifentanil (1µg/kg) infusion were applied. Norepinephrine infusion was started at 0.1 mcg/kg/min IV due to a hypotensive level of BP in the second hour of operation. Besides there was no reperfusion syndrome, cross-clamping of the inferior vena cava was stable hemodynamically. A kidney graft from the father of the patient was placed in the right iliac fossa while the liver was transplanted from another living donor. A total of 200 ml of erythrocyte suspension, 180 ml of fresh frozen plasma and 700 ml of crystalloid solution (isolyte -1/3 isomix) were used during the 12-hour operation. A total of 170 ml urine output was observed 1 hour after renal graft reperfusion. The inotropic treatment was continued to the intubated patient during in the intensive care unit follow-ups. The hepatic veins had a triphasic and hepatic artery flow was normal in ultrasound imaging. The patient's urine output was recorded as 9 cc/ kg/ hour. She was extubated on the postoperative 3rd day and transferred to the gastroenterology department on the 8th day of follow-up.
Discussion: In addition to the long and difficult surgery processing of SCLKT, it has the advantages of decreasing the dose of immunosuppressants used and resulting in better survival rates. We emphasized that the use of appropriate fluid and blood products is crucial for the recovery of graft function, especially in the pediatric age group [1].
References:
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Learning points: Balanced fluid management in SCLKT operations provides satisfactory results.

01AP14-3
Numeric pain scores in cholecystectomy with and without common duct exploration: a prospective audit

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Background and Goal of Study: Although laparoscopic cholecystectomy is minimally invasive surgery, pain is one of the main reasons why discharge from hospital can be delayed. The main objective of this prospective audit is to assess the analgesic requirements and the efficacy of postoperative analgesia in patients undergoing cholecystectomies with and without choledochotomy.
Materials and Methods: A prospective audit carried out between March and August 2018, after institutional approval. Multiple variables including demographic characteristics, numeric pain score, performed analgesia and complications in the first 48 hours were analyzed. A descriptive analysis of the variables was performed.
Results and Discussion: A total of 132 patients undergoing cholecystectomy were included, of whom 45 (34%) underwent common duct exploration. In the group submitted to cholecystectomy without exploration (87), the mean age was 53; 78% of patients were classified as ASA II; 70% BMI ≥ 25 kg/m². The mean duration of the surgery was 58 minutes, mostly laparoscopic without conversion (97%). In the group submitted to cholecystectomy with exploration (45), the mean age was 62; 93% ASA II / III; 78% BMI ≥ 25 Kg/m². The mean duration of surgery was 90 minutes, mostly laparoscopic without conversion (96%). All patients underwent general balanced anesthesia. Conventional analgesia (Paracetamol + Tramadol + Ketorolac / Parecoxib) was performed in all cases of laparoscopic surgery. In the first 24h, 19% and 15% of cases had pain scores ≥ 4 in the groups submitted to cholecystectomy with exploration and without exploration, respectively. On the other hand, in the period between 24 and 48h, 24% and 1% of cases had pain scores ≥ 4 in the groups submitted to cholecystectomy with exploration and without exploration, respectively. Thus, the postoperative analgesic efficacy was similar in the first 24h and it was less effective in the group submitted to common duct exploration in the period between 24 and 48h.
Conclusions: The conventional analgesia appeared to be effective in most cases of cholecystectomies with and without common duct exploration. In contrast, in the period between 24 and 48h postoperative analgesia must be reviewed in the cases where the choledochotomy is performed. However, it was not possible to establish a direct correlation between the two variables.

01AP14-4
Transfusional saving in Liver transplantation surgery

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Introduction: Orthotopic liver transplantation (OLT) is the main treatment for those patients who are in the end-stage liver disease (ESLD). Hemorrhage due to coagulopathy is a very common complication with a high blood transfusion index. There are many adverse effects related to blood transfusion, which are widely described. Among them, infection incidence, lung injury (TRALI) and fluid overload (TACO) are known to get increased. For these reasons, it is necessary to identify how to reduce hemoderivative therapy. PBM (Patient Blood Management) programs have been developed in order to detect and treat preoperative anemia, minimize blood loss and accomplish a rational use of blood products. The goal of this paper is to evaluate the transfusional incidence between anemic and non-anemic patients.
Methods: We recollected 76 OLT patients between 2015 and 2018. All our patients suffered an ESLD. Demographics are shown in figure 1 and table 1. During the surgery, 65 patients (85.5%) were transfused; and 53 (69.7%) during first 24h after the surgery. Only 5 patients (6.6%) were not transfused. Among anemic patients, 93% of them were transfused during the surgical intervention, and 45 (75%) needed at least two different hemoderivatives. There were 16 patients who were not anemic before the surgery, and 7 of them (43.75%) did not need intraoperative transfusion.
Conclusions: In our hospital, the mean waiting time is 68 days, which is enough to optimize preoperative hemoglobin rate. Among patients waiting for a liver transplant, 78.9% of them get anemic to the OLT. In those patients classified as non-anemic, 56.25% were transfused (9 out of 16) during the surgery. On the other hand, patients in the anemic group were transfused 93%, and 86% of them needed at least 2 different hemoderivatives. Hemoderivative consumption is lower in non-anemic group, that it is why is necessary to institute PBM programs in order to reduce blood transfusion. Hemoglobin rates increase in those who are in a PBM program compared with those who receive blood transfusions only or those who are in a PBM program transfusions or those without support.

01AP14-5
Incidence of post-operative acute renal impairment and anaemia in hip fracture patients.
A service evaluation study.

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Background and Goal of Study: Hip fractures are a common injury in the elderly population in Scotland. These patients are at a high risk for perioperative morbidity and mortality and reduction in the quality of life. The development of the acute kidney injury and anaemia in the post-operative period have an increased length of stay in the hospital. We did a pilot retrospective study for 1 month in our hospital to know the incidence of post-operative acute renal impairment and anaemia in patients who had hip fracture surgery.
Materials and Methods: The peri operative care pathway document for the hip fracture patient , surgical notes, anaesthetic chart, pre-operative and post-operative blood results, blood transfusion document were analysed for 1 month in all patients who had a hip fracture surgery. We also noted all patients died within the 30 days after the surgery. We noted how many patients had acute renal impairment and anaemia in the post-operative period.
Results and Discussion: We had 36 patients who had hip fracture surgery in 1 month. 26 patients had a general anaesthetic and 10 patients had a spinal anaesthetic. Age range was (51-97) years. The median age of the patients was 78.5 years. The median drop in the heamoglobin was 2 gm/dl, range was(0.7 - 4.7) gm/dl. 3/36 patients had pre-operative blood transfusion and 15/36 patients had post-operative transfusion. 1/36 patients had post-operative acute renal impairment in the 2 post-operative day and was treated with intravenous fluids. The patient did not require the renal replacement therapy. 5/36 patients died within the 30 days after the surgery.

ASA 3	ASA 4
23	13
Male	Female
15	21

Conclusions: The short retrospective study showed that 50% of our hip fracture patients had perioperative blood transfusion to correct pre-existing or post-operative anaemia. The incidence of acute renal impairment is minimal and did not need renal replacement therapy. 13% of patients died in the perioperative period. A majority (72%) of patients had a general anaesthetic for their hip fracture surgery. We are planning to conduct a prospective study to analyse the peri operative care for the hip fracture patients aiming to rationalise the blood transfusion.

01AP14-6
The effect of subanesthetic dose of Ketamine Hydrochloride on Hemodynamics and Reperfusion injury, monitored by Tumor Necrosis Factor alpha (TNFα) and Interleukin 6 (IL6) in recipient of Adult Living Donor Liver Transplant (ALDLT). A Randomized Controlled Study.

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Background and Goal of Study: Reperfusion injury is responsible for hemodynamic instability and postoperative complications during and after ALDLT. Ketamine has anti-inflammatory effects.Aim: Is to assess preconditioning effect of Subanesthetic dose of ketamine hydrochloride at end of anhepatic phase, by tumor necrosis factor (TNFα) and Interleukin 6 (IL6), as markers of acute inflammatory response. Secondarily its impact on hemodynamics during reperfusion and postoperative complications (POC).
Materials and Methods: Local Ethical Committee approval , (PACTR201512001367808) ,43 recipients (2016-2018), one excluded. All received balanced anesthesia depth monitor. K gp (*n*=21) received Ketamine IV bolus (0.5-0.7mg/kg), Control C gp (*n*=21) received (5 ml saline), both at end of anhepatic phase. Data collected hemodynamics (MAP, Cardiac output CO, Systemic Vascular Resistance SVR) transcutaneous electrocardiometry (Osypka Berlin, Germany). Reperfusion injury (pH, bicarbonates HCO_3, AST, ALT) at (T_1) base line, (T_2) 5 min post reperfusion, (T_3) 1 h post reperfusion, (T_4) 24 h Postoperative (PO), Inflammatory mediators (TNFα, IL6) at ($T_{1,3,4}$). POC by Clavien-Dindo Classifcation (CDC) score and ICU stay. Data collector and statistician were blinded.
Results and Discussion: Data median [IQ].Comparable(age, sex, MELD) p=0.35. In spite of significant less number of patients needed inotropic support in K gp vs. C gp at (T2) (norepinephrine, epinephrine) infusion (47%, 28% vs. 66%, 52%) and (ephedrine boluses p=0.013) respectively, there were a significant increased for both (MAP, SVR) , at T2 K gp MAP (67[58-73]vs. 48[44-52]mmHg) P=0.014. SVR (940[756-946]vs (487[435-576]dyn/sec/cm)p=0.01. This effect lost at (T3, 4) for (MAP, SVR) P=0.5,P=0.1. No significant change in K gp regarded (PH, HCO3, ALT, AST) p=0.45. Comparable TNFα at T1, while at (T3) TNFα was significantly decreased in Kgp vs. C gp (49[36-63] vs. 99[67-176] pg/ml) p=0.003 and continue at T4 (101[94-178]p=0.002 vs. Cg p(299[230-342]pg/ml). ketamine also decreases IL6 at T4 (110[85-161]p=0.02) vs. C gp (276[239-325] pg/ml). Significant less CDC (II, IIIb, IV) score in K gp for POC (38, 9.5, 19) % vs. C gp(42,23,43)% respectively ,6 month survival K gp 80.9% vs. C gp 57.6%
Conclusions: Ketamine has immediate effect on hemodynamics at post reperfusion periods,but losses its effect 24h PO, It helps in decreasing inflamtory reaction respoSible for POC.

01AP14-7
Robotic-assisted Right Hepatectomy. A new era for Robotic Surgery in Greece, a new challenge for the anaesthetist.

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Background: Liver surgery is considered a challenge for surgeon and anaesthetist due to its technical difficulties and high morbidity. Major perioperative blood loss, fluid restriction technique, duration of surgery and potential postoperative liver failure are some of the challenges the anaesthetist has to face. Over the recent years' implementation of Robotic Surgery in Hepatic Resections has been increasingly reported. We aim to describe a case where for the very first time in Greece, Robotic-assisted Right Hepatectomy performed in a patient with HCC and tumor size >6cm.
Case Report: The patient is a 71 years old female with a HCC and tumor size 6.6 cm, cirrhotic liver, ASA III, Child-Pugh score A and co-morbidities low BMI, anaemia, hypertension and anxiety. Preoperative optimization included cardiorespiratory, nutritional and psychological support. The anaesthetic management intraoperatively included GA and Thoracic epidural (for postoperative pain management), U/S guided insertion CVC, arterial line, urinary catheter, nasogastric tube and warming devices. The team was prepared for massive bleeding and conversion to open surgery scenario. Resection took place cautiously, sacrificing a substantial volume of liver parenchyma.
Discussion: The operative time was 720 minutes and we didn't experience massive bleeding (blood loss – 680ml). During liver resection, restriction fluid technique performed (CVP<4 cm H2O) to minimize blood loss. Patient tolerated well surgical manoeuvres, anaesthetic protocol for liver resection and prolonged pneumoperitoneum. Had most of the time C/V stability, satisfying blood gases and good urinary output. Patient stayed overnight in the ICU and returned to the ward the first postoperative day. Thoracic epidural offered good postoperative analgesia and early mobilization. We didn't experience any postoperative morbidity including liver failure, bile leak, pleural effusion, kidney injury. Some mild coagulopathy treated according to our protocol. Early mobilization and nutrition helped for early recovery and patient was ready for discharge on the 5th postoperative day.
References:
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Learning points: Perioperative patient optimization, experienced hands in Robotic Surgery, knowledge of liver anatomy and physiology and are the key elements for successful outcome. Patient is disease-free in one-year after surgery follow-up.

01AP14-8
Liver transplantation in a patient with Rendu-Osler-Weber disease and severe portopulmonary hypertension: a case report

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Background: Rendu-Osler-Weber disease (ROWD) presents hepatic arteriovenous malformations (HAVMs) in up to 75% of cases, and approximately 8% are complicated with high-output cardiac failure (HOCF), pulmonary hypertension (PH), portal hypertension (PoH), etc. [1]. The associated PH is most frequently post capillary, followed by precapillary and mixed; each has a different treatment and prognosis. HOCF is mainly treated with diuretics, salt restriction, and bevacizumab; refractory cases are candidates for liver transplant. We present the case of a patient with ROWD, HOCF, and severe PH who underwent successful liver transplant with subsequent improvement of cardiac and pulmonary functions.
Case Report: A 46-year-old man with ROWD presented with HAVMs that generated PoH, HOCF, and severe pre- and postcapillary PH, which improved with diuretics and prostaglandins. The estimated shunt through the HAVMs was 24% of the cardiac output. Anesthesia included fentanyl 250 mcg, midazolam 2 mcg/kg/min, remifentanil 0.2 mcg/kg/min, and vecuronium 10 mg. After orotracheal intubation, Swan-Ganz catheter was placed, confirming the pressures shown in Table 1. It was interpreted as HOCF with severe PH, being treated with furosemide 40 mg and milrinone (load and maintenance between 0.75 and 0.5 mg/kg/min). Nitric oxide, though available, was not necessary. Systemic arterial hypotension was treated with norepinephrine. Surgery lasted 6 h; piggyback technique was performed, and ischemia time was 6 h and 20 min. The patient was discharged a month later, with moderate PH, and there was no further hospitalization for HOCF.
Discussion: Although severe portopulmonary hypertension has 100% perioperative mortality and is contraindicated for liver transplant [2], good response to diuretics and prostaglandins and intraoperative treatment with diuretics and inodilators contribute to successful transplantation, which improves the cardiac and pulmonary functions 1 year after surgery.
References:
1. Dupuis-Girod S, et al. The lung in hereditary hemorrhagic telangiectasia. Respiration 2017;94:315-30.
2. Krowka MJ, et al. Pulmonary hemodynamics and perioperative cardiopulmonary-related mortality in patients with portopulmonary hypertension undergoing liver transplantation. Liver Transpl 2000;6:443-50
Learning points: The post capillary component associated with high flow improves both HOCF and severe PH with liver transplant in patients with ROWD and HAVMs, before fixed precapillary PH occurs.

01AP15-1
Lung ultrasonography for the assessment of perioperative atelectasis after laparoscopic gynecologic oncologic surgery

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Background and Goal of Study: Approximately 50% of patients undergoing general anaesthesia (GA) are hypoxemic[1]. Anaesthesia, paralysis, high concentrations of oxygen, inadequate level of PEEP, capnoperitoneum, Trendelenburg position all

result in persistent atelectasis[2,3]. Lung ultrasound (LUS) is a safe and accurate bedside tool useful to study lung aeration[4]. The aim of our study was to assess the impact of GA and laparoscopic minimally invasive gynecologic oncologic surgery (MIS) on post-operative atelectasis and related oxygenation changes using LUS examinations.
Materials and Methods: In this prospective observational study, 50 consecutive patients scheduled for MIS were recruited. After 3 minutes of pre-oxygenation (FiO2=100%), Propofol-Sufentanil-Rocuronium-Sevoflurane GA was administered. Mechanical ventilation through endotracheal tube was delivered in Pressure Regulated Volume Controlled modality (tidal volume 8 ml/kg of PBW, FiO2 40%, I/E ratio1:2, PEEP 5 cmH2O). LUS was performed before induction of GA (T1) and on arrival in recovery room (T2). For each echographic examination 12 pulmonary quadrants were considered. A LUS score to assess lung aeration[4] was calculated, and arterial blood gas analysis at each time point was checked.
Results and Discussion: T test for normally distributed data, Wilcoxon and Mann-Whitney tests for non-normally distributed data, Pearson's and Spearman's correlations for the relationship between ΔLUS score and the other parameters were used. Changes in the LUS score between T1 and T2 were significative (total LUS score at T1 1.64±1.87 vs 11.65±4.22 at T2, $p<0.05$) and correlated with worsening in oxygenation (PaO2/FiO2 436.0±77.9 at T1 vs 374.4±86.5, $p<0.05$). This increase was significantly worse (ΔLUS >2) in the basal and dependent lung zones. No correlation was found with duration of pneumoperitoneum and Trendelenburg angle.
Conclusions: Anesthesia-induced aeration loss after MIS are detectable using LUS and correlates with changes in oxygenation.
References:

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4. Anesth Analg. 2017 Feb;124(2):494-504.

01AP15-2
Comparison of patient's comfort between low and high oxygen flow rate during preoxygenation

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Background: Preoxygenation is routinely performed before induction of general anesthesia with the aim of increasing the oxygen reserve and prolonging the duration of apnea without desaturation. The aim of this study was the patient's comfort and the effectiveness (F_EO2 > 90%) during preoxygenation with the anesthetic breathing circuit. Also, this study attempted to prove the hypothesis that the fresh gas flow (FGF) rate has an effect on the patient's comfort and effectiveness of preoxygenation.
Method: Thirty healthy adult volunteers, ASA physical status I, were preoxygenated in the supine position for 5-min with 100% oxygen tidal volume breathing. Three different FGF rates were used in a randomized order (3, 6, 10 L/min) using circle absorber system with completely sealed mask. F_IO2 and F_EO2 were recorded at 30-s intervals during 5-min of oxygen administration. At the end of study, five-point scale was used for the evaluation of volunteer's comfort (5=strongly comfortable to 1=strongly uncomfortable) and breathing difficulty (1=strongly easy to 5=strongly hard). Survival analysis and repeated-measures analysis of variance were used in this study.
Result: The volunteer's comfort > 3 for FGF rates 3, 6 and 10 L/min were 63.3%, 56.7% and 56.7% respectively, and there was no significant difference (P = 0.705). 46.6%, 50% and 46.6% of volunteers reported the breathing difficulty score > 4 for FGF rates 3, 6 and 10 L/min respectively, and the score was not significantly different between three FGF rates (P = 0.75). The time to target F_EO2 90% analyzed by median survival time was fastest with FGF rate 10 L/min (134 sec), compared to 6 L/min (174 sec) and 3 L/min (> 300 sec) (P <0.001). Number of volunteers reaching target F_EO2 > 90% with FGF rate 10, 6 and 3 L/min at 5-min was 30 (100%), 22 (73.3%), and 10 (33.3%), respectively (P <0.001). Likewise, at 5-min, F_EO2 of FGF rate 10 L/min (94.37 ± 1.79%) was higher than 6 L/min (91.27 ± 4.73%) and 3 L/min (83.30 ± 11.47%(P<0.001).
Conclusion: This study found that about half of volunteers using high FGF rate as well as low FGF rate were comfortable during preoxygenation with the anesthetic breathing circuit. As a result, the different FGF rate had no effect on the volunteer's comfort. The investigator suggests that using high FGF rate (10 L/min) with completely sealed mask during preoxygenation is more effective and achieved preoxygenation goal (F_EO2 > 90%) faster than low FGF rate.

01AP15-3
Carbon dioxide embolism during laparoscopic sigmoidectomy: case report

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Background: Laparoscopic procedures are well known to be related to possible complications such as damage of blood vessels, visceral perforation or venous air embolism and these events are potentially fatal.
Case Report: A 75 years old woman with hypertension and diabetes was scheduled for laparoscopic sigmoid resection. Under general anaesthesia, the surgeon inserted the Verres needle and pneumoperitoneum was insufflated. After few seconds there was a suddenly decrease in end-tidal CO2 from 36 to 18 mmHg and the SpO2 collapsed from 99 to 80%. At the same time blood filled the urinary catheter (about 250 ml). We decided to remove the trocar from the abdomen, to release pneumoperitoneum and to ventilate the patient with 100% oxygen. The hemodynamic was stable (BP 120/65, HR 74, normal EKG), both chest auscultation and x-ray were negative. We placed a central venous line (the aspiration of gas from right atrium was negative) and a radial arterial catheter. EtCO2 and SpO2 normalized within fifteen minutes (EtCO2 36 mmHg and SpO2 99%). The A.B.G. showed pH 7.35, pCO2 53 and pO2 84 with these ventilation setting: VT 450x10, PEEP 5, FiO2 60%. In forty minutes new A.B.G. showed pH 7.37, pCO2 47 and pO2 97. We calculated a reduction of the dead space from 0.66 to 0.23. The bleeding from the bladder didn't stop during our procedures and the haemoglobin decreased from 10,9 to 9,5 g/dl. The urologist, after a cystoscopy, asked for an abdomen CT scan. The imaging showed a large number of clots in the bladder, a small sub capsular haematoma in the left kidney with gas bubbles inside and an active bleeding spot. So we went to angiography unit where the bleeding was stopped by embolization. Finally the patient was transferred to ICU and the day after she came back to surgical ward where was rescheduled for elective surgery.
Discussion: Embolism and bleeding could not be easily recognized as problems deriving from the same cause. A step by step systematic approach had proved to be essential for the early recognition of embolism and to avoid using more invasive technique (i.e. converting laparoscopic to laparotomic surgery for the bleeding).
Learning Points: There are evident benefits in using laparoscopic surgery but it needs to be kept in mind that complications may occur and they can be serious. The early recognition of simultaneous events and the use of the appropriate treatments have proven to be pivotal for the patient survival.

01AP15-4
SafetyNet system for the evaluation of postoperative respiratory status: a pre-and-post survey study

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Background and Goal of Study: Hypopnea and desaturation are common complications during the early postoperative period. The Patient SafetyNet (Masimo, Irvine, CA, USA) is the central/remote and continuous respiratory rate and oxygen saturation monitoring system. Questionnaire survey for nurses was conducted before and after using SafetyNet to postoperative patients in general wards. The purpose of this study was to get an overview of postoperative respiratory monitoring in nurses.
Materials and Methods: The before-time frame consisted of a month in October 2014, and the after-time frame of a month in May 2015. During the study period, all patients after general anesthesia, 1156 patients, were connected to SafetyNet. The questionnaire included information about the way and frequency of postoperative respiratory evaluation, the reliability of SafetyNet as respiratory rate monitoring, the usefulness of central/remote or continuous monitoring, and free comments.
Results and Discussion: A total 75 questionnaires were distributed, and all of them were completed and returned. Nurses evaluated respiratory status of about 80% patients for more than 6 hours with physical examination and oxygen saturation monitoring in the pre-questionnaire. But 28% of them had doubts about the reliability of physical examination. They assessed SafetyNet (65.9%) was the most reliable way of respiratory rate evaluation in the post-questionnaire (physical examination: 23.7%, ECG impedance: 10.4%). Although there was no significant difference between both questionnaires, the ratios of evaluation that central/remote (78.7% vs 89.3%, P=0.677) or continuous (pre vs post, 88.0% vs 98.7%, n.s.) monitoring were useful increased. Moreover, SafetyNet could lead to a reduction of workload in 61.3%. On the other hand, the problems of false alarms by movement and hindrances of early ambulation were revealed. In free comments, SafetyNet was needed to the patients with risks of postoperative respiratory failure, cardiac decompensation, decreased level of consciousness, and continuous opioids administration.
Conclusions: SafetyNet for postoperative patients in the general wards was evaluated as highly reliable and useful. In addition, it could lead to a reduction of nurse's workload when used for the high-risk cases not only general anesthesia patients.

01AP15-5
The impact of health care professionals training on endotracheal cuff pressure evaluation: a prospective semi experimental study

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Background and Goal of Study: High volume - low pressure cuffed endotracheal tubes (ETT) are routinely used in operating rooms (OR). Cuff pressure between 20-30 cmH_2O is accepted as safe[1] but very little importance is being given to its regular intraoperative assessment[2]. Our purposes were to evaluate EET cuff pressure measurement and the impact of health care professionals' training on the consistency and methodology of cuffs inflation. We also aimed to assess manometers availability in our OR.
Materials and Methods: Prospective semi experimental study, including 114 adult patients admitted for elective surgery in the OR, submitted to General Anaesthesia (GA) and mechanically ventilated using EET were analyzed regarding personal demographics, cuff pressure and inflation methodology before (phase I) and after (phase III) health care professionals training (phase II). The obtained data were analyzed with SPSS and the Mann-Whitney U Test was used.
Results and Discussion: Phase I and III patients were mainly 18 to 60 years-old, ASA 2, submitted to Balanced GA. 3 manometers were accessible to 8 OR. During phase I, in 98,2% of the cases nurses inflated the cuff and in 84,2% there was no monitoring with a manometer. 88,8% of values monitored by the investigators were out of the normal range (55,5% above 30cmH_2O and 33,3% below 20cmH2O). Regarding phase III, in 91,2% of the cases nurses inflated the cuff and in 33,3% monitoring was routinely performed. 68,7% of the values were different from the normal range (58,1% above 30cmH2O and 10,6% below 20cmH2O). There was no significant difference (p=0,159) between cuff pressure values before and after coaching periods of anesthesiologists and nurses nor between medians of the differences related to accepted normal cuff pressure values.
Conclusions: Although there was a slight improvement in cuff pressure values and measurement consistency comparing phase I and III, we concluded that professionals training is insufficient for the improvement we aim. The existence of a manometer in each OR is mandatory. The shortage of equipment discourages measurement as a regular procedure and increases the probability of intubation-related injury mainly by over-inflation of the cuff.

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01AP15-6
Rapp Hodgkin syndrome: a case report in anesthesia

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Background: Ectodermal dysplasia comprise a heterogeneous group of disorders resulting from abnormalities of structures derived from embryonic ectoderm. Rapp Hodgkin Syndrome is a type of anhidrotic ectodermal dysplasia, characterized by ectodermal dysplasia, cleft lip, cleft palate and impaired thermoregulation. Other features include coarse and wiry hairs, small mouth, narrow nose, cleft uvula, velopharyngeal incompetence, dry vocal cords, oligodontia or anodontia, conical teeth, dystrophic nails, lacrimal duct abnormalities and ear and ear canal abnormalities [1]. There are 4 cases of Rapp-Hodgkin syndrome reported in Portugal. We present a case report of a 40 year old male.
Case Report: Male, 40 years old, ASA II, proposed for septoplasty and turbinectomy. The patient referred altered thermo-regulation and skin manifestations with alopecia, as well as oligodontia and dystrophic nails. We evaluated for upper airway obstruction or defects. The patient presented micrognathia, but cleft lip and cleft palate were not present. Monitorization followed ASA standards, with tympanic temperature. Depth of anesthesia with BIS index and neuromuscular block were also monitored. A balanced general anesthesia was performed, with fentanyl (0,2mg), propofol (140mg) and rocuronium (40mg). We requested the videolaryngoscopy device to be available in the operating room, however intubation was achieved with 4-blade laryngoscope and orotracheal tube, gently placed, with no complications. We avoided using anticholinergic drugs and hyperthermia, choosing not to warm up the patient while monitoring his temperature. Time of surgery was 20 min, and 40 min of anesthesia. No complications were observed in all perioperative time, including PACU, with the patient soon being discharged to infirmary.
Discussion: Even in the most routinely procedures such as septoplasty we can come across rare disorders that can influence the way we perform anesthesiology. Ectodermal dysplasia can compromise thermoregulation as well as airway approach, so the anesthesiologist must be aware of drug interactions in thermoregulation as well as prepared to approach a potential difficult airway.
References:
1.Fleisher L. (2012) Anesthesia and Uncommon Diseases. 6th Ed. Elsevier Saunders, Philadelphia.
Learning points: This care report intends to describe the anesthetic procedures given to a patient with a very rare disease, in order to avoid future complications in similar approaches on ectodermal dysplasia.

01AP15-7
Considerations for intraoperative management of the pulmonary hypertension crisis and intraoperative right ventricular failure. Case report

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Background: The perioperative period in a patient with pulmonary hypertension presents a challenge by the increasing of the risk of right ventricular failure and cardio circulatory collapse. Clinical presentation, early diagnosis, monitoring methods and drugs that act through different mechanisms is essential in the management of these patients
Case Report: A 71-year-old patient with a fibroblastic osteosarcoma in the right femur and an associated pathological fracture was scheduled for segmental tumor resection with osteosynthesis. She had a diagnosis of pulmonary thromboembolism. During intraoperative it becomes hypotensive, tachycardic, with signs of right overload, transthoracic echocardiography shows growth of the atrium and right ventricle and displacement of the interventricular septum, a pulmonary hypertension crisis with acute right failure is suspected, treatment with vasopressors and inotropes and a catheter are started of pulmonary artery (Swan Ganz) is inserted for monitoring the mean pulmonary artery pressure. The procedure is completed and the patient is transferred to the ICU.
Discussion: The treatment of acute right ventricular failure or pulmonary hypertensive crisis focuses on early diagnosis, measures to reduce pulmonary vascular resistance, promote perfusion and myocardial contractility with optimization of heart rate. (1). Right ventricular failure should be suspected in a patient with established pulmonary hypertension or at risk of developing, and who have a progressive decrease in syllable artery pressure with a progressive increase in PVC or signs of right ventricular overload and tachycardia The use of intraoperative echocardiography can help the diagnosis. (2) The use of vasopressor and inotropics is indicated to increase SVR and improve myocardial contractility. Inotropics such as milrinone have a pulmonary vasodilator effect. Monitoring with a pulmonary artery catheter is a valid option in the context of a patient with a high risk.
References:
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Learning points: Perioperative management should ensure an early diagnosis and treatment aimed at reducing pulmonary vascular resistance and use of inotropic and vasopressor. Pulmonary artery catheter monitoring is an option to consider in the absence of transesophageal echocardiography.

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01AP15-8
Anesthetic considerations in kidney transplant of a patient with Methyl-malonic acidemia: A Case Report

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Background: Presentation of a case report regarding the anesthetic management of a patient with methyl-malonic acidemia (MMA). MMA is a rare autosomal recessive inborn error of metabolism with a defiecient methylmalonyl-CoA mutase and an estimated incidence of 1:50000 births.
Case Report: 19 year old female, 62kg, with MMA and a history of chronic kidney failure, arterial hypertension and secondary hyperparathyroidism. The patient was scheduled for a living donor kidney transplant. Anesthesia induction was done with sodium pentothal, ketamine, remifentanil and Cisatracurium. Maintenance was achieved with desflurane MAC 0.9 and remifentanyl infusion. Perioperatively, arterial blood gases were collected every half an hour, ammonia levels were targeted to be less than 80mmol/L and bicarbonate levels aimed to be less than 21mmol/. Because of the nature of the disease the patient was advised to stop oral nutrition 6 hours before surgery and immediately started on parenteral nutrition with 10% dextrose, 20% intralipid and L-carnitine. Sliding scale IV insulin infusion was used when needed as halting dextrose infusion was not recommended by the nephrology team. During the nasogastric tube insertion nasal adenoids were traumatized and this caused heme proteins to be absorbed by the intestinal system. Operation lasted for 4.5 hours and the patient was transferred intubated to the ICU with a lactate level of 13mmol/L. Fortunately she was extubated the 2nd postoperative day and transferred to the ward 5 days later.
Discussion: MMA patients can develop severe metabolic acidosis and hyperammonemia especially in cases with increased stress and catecholamine release such as surgery, starvation and sepsis. Our team believes that the traumatic nasogastric tube insestion resulted to further metabolic decompenstion.
References:
1) Stuart, Grant; Ahmad, Nargis. Perioperative care of children with inherited metabolic disorders. Continuing Education in Anaesthesia, Critical Care & Pain, 2011, Vol. 11(2), pp.62-68

2) Baumgartner, Matthias; Hörster, Friederike ; Dionisi-Vici, Carlo et al.Proposed guidelines for the diagnosis and management of methylmalonic and propionic acidemia. Orphanet Journal of Rare Diseases, 2014, Vol.9, p.130

Learning points: The anesthetic management of patients with MMA is challenging. Anesthesiologists should aim deep levels of anesthesia and analgesia to avoid decompensation and prevent events that might lead to acidosis.

01AP15-9
Anaesthetic management of supraglottoplasty in children with laryngomalacia: the experience of a tertiary center.

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Background and Goal of Study: Laryngomalacia (LM) is the most common congenital cause of stridor in new-borns and supraglottoplasty (SGP) is the first-line surgical approach in severe cases. This procedure is frequently performed in very young children, in spontaneous ventilation without an endotracheal tube, which is a challenge for the anaesthesiologist. This study is a review of our experience in the anaesthetic management of SGP.
Materials and Methods: Retrospective study of children with congenital LM that underwent SGP in our center between 2008 and 2018. We analyzed the demographic, the anaesthetic-surgical procedure, the postoperative care and follow-up.
Results and Discussion: LM is characterized by an inspiratory collapse of the supralaryngeal structures leading to obstruction of the airway. Despite the self-limited course of LM in the majority of cases, in about 20% of children severe manifestations require a SGP. In our center, all SGP were performed in spontaneous ventilation without endotracheal intubation. 40 children underwent SGP, at a median age of 6,5 months. Inhalatory induction is performed with sevoflurane at 8% in 100% O2 and dexamethasone i.v.0.15-0,25 mg/kg and atropine i.v.10µg/kg are administrated. The larynx is sprayed with lidocaine (3-5 mg/kg). A suspension laryngoscope is introduced and anaesthesia is maintained with sevoflurane 3-6% in 100% O2 with an orotracheal tube inserted with the tip in the hypopharynx or via the laryngoscope ventilatory canal. Analgesia is done with fentanyl 2µg/kg and paracetamol 15mg/kg. In 20% of the cases SpO2 <90% was observed, with recovery after temporary tracheal intubation through the laryngoscope. After surgery, a nebulization with adrenaline, dexamethasone and saline solution is performed. All children had a 24hr stay at the paediatric intensive care unit, and amoxicillin-clavulanic acid was administered. No child required post-operative ventilatory support. 3 children (7,5%) underwent a revision of SGP and in 3 cases (7,5%) tracheotomy was necessary at a later stage. 2 patients (5%) developed symptoms compatible with respiratory infection, which resolved with antibiotic therapy.
Conclusion: Procedures in which the absence of an endotracheal tube is recommended can be challenging for the anaesthesiologist. However, this study shows that SGP for the treatment of LM can be safely performed without endotracheal intubation if a solid team work between the anaesthesiologist and surgeon is granted.

01AP15-10
Sturge-Weber Syndrome and a difficult airway management: a case report

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Background: Sturge-Weber Syndrome (SWS) is a rare congenital vascular disorder characterized by vascular malformations including a facial port wine stain associated with leptomeningeal angioma and other neurological and ocular features.[1]
Case Report: A 17-year-old male with SWS diagnosed at childbirth was admitted to gingivoplasty. He presented a cutaneous capillary malformation involving the right hemiface with extension to the orbit which led to amaurosis. Gingival thickening and dental abnormalities were also observed. The airway assessment revealed predictors of difficult ventilation and intubation, such as gingival hypertrophy, ogival palate, retrognatism, Mallampati score III and mandibular protrusion test class C. He had a history of childhood epilepsy controlled with carbamazepine since his last absence seizure 14 years ago. The pre-operative MRI scan showed leptomeningeal angiomatosis with right hemispherical atrophy. The remaining preanesthetic evaluation didn't identify other issues.
Discussion: Our main concern was the airway management considering the features described above. Face mask ventilation was uncomplicated but direct laryngoscopy was unsuccessfully attempted. Therefore, videolaringoscopy was performed and intubation was achieved after two approaches. Total intravenous anesthesia of propofol was chosen due to its neuroprotective effect and the patient was advised to take his anti-convulsant therapy in the morning of the surgery. Intra-operative monitoring included ASA-standard monitoring and bispectral index to prevent awareness. Regarding the risk of a shared airway with the surgeons, the patient was accidentally extubated during the surgery. However, its early detection allowed an uncomplicated intubation with videolaringoscopy. The rest of the procedure and extubation were uneventful. The aim was a smooth induction and extubation in order to avoid increase in intraocular and intracranial pressure.[2]
References:

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Learning points: This case report revealed the importance of perioperative management of an anticipated difficult airway, considering an anesthetic approach in a rare disorder proposed to a head and neck surgery.

01AP16-1
The inspiratory pause: A small step for ventilator, a giant leap for ventilation.

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Background: Up to now, the effect of different inspiratory pauses has been exclusively studied in the gas exchange area and mostly in critical care patients. There are no data about its effect on the respiratory mechanics during the intraoperative period of healthy patients under open lung approach (OLA) ventilation strategies.
Methods: Study performed on 32 surgical patients under mechanical ventilation (MV) at the Virgen del Rocío University Hospital. Ventilatory parameters were standardized (Vt 7 ml/kg, FR 13 rpm, PEEP 5 cmH20, FiO2 0.7) and randomized in two groups based on the initial inspiratory pause that was set (10% vs 30%). Data were collected in 5 moments: 1) Baseline 2) recruitment maneuver with the initial pause 3) crossing the two different inspiratory pauses 4) recruitment maneuver with the new inspiratory pause 5) return to the initial inspiratory pause.
Results: With equal ventilatory parameters, when using a bigger Pinsp we found lower Pplat (15.06 +/- 1.77 vs 12.31 +/- 1.58 cmH2O; p<0.001) and DP (10.06 +/- 1.77 vs 7.31 +/- 1.58 cmH2O; p<0.001) and bigger Crs (42.54 +/- 8.91 vs 56.44 +/- 13.98 ml/cmH2O; p=0.02). By grouping the data according to the Pinsp used, OLA + Pinsp 30% showed the best results: lower Pplat (3.19 +/- 2.61 cmH2O; p<0.001), PEEP (1.69 +/- 2.16 cmH2O; p<0.001), DP (1.5 +/- 1.02 cmH2O) and PTP (1.62 +/- 3.71; p=0.019) and bigger Crs (16.24 +/- 8.56; p<0.001). No differences were found in blood gases.
Conclusions: Combination of OLA strategies and bigger Pinsp shows advantages when comparing with smaller Pinsp, resulting in lower levels of Pplat, DP, PTP and smaller needed PEEP levels. In addition, it shows bigger Crs, suggesting less over distension and less dynamic strain.

01AP16-2
Efficacy of guideline using PaO2/FiO2 ratio < 300 mmHg as criteria to retain endotracheal tube in patient after percutaneous nephrolithotomy

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Background and Goal of Study: Percutaneous nephrolithotomy (PCNL) is a minimal invasive surgery for treatment of renal calculi. It has the advantage of small incisions which leads to less postoperative pain and shorter hospital stay. However, it can cause pleural cavity injury, i.e., pneumothorax, hydrothorax, or hemothorax, which mostly occurs in supracostal access of trocar puncture and can cause serious morbidity and mortality. Previously, for safety these patients had endotracheal tube retained at the end of surgery into PACU leading to patient discomfort and agitation. They were extubated after portable CXR was done to rule out pleural cavity injury. To reduce patient discomfort, we setup a guideline using PaO2/FiO2 ratio < 300 mmHg as criteria to retain endotracheal tube in these patients.
Materials and Methods: This was a prospective study. We included all adults undergoing elective PCNL at Srinagarind Hospital, Khon Kaen University between July 2017 and November 2018. We identified the incidence of endotracheal tube retention and pleural cavity injury, and risk factor.
Results and Discussion: Forty seven patients were included. There were 17 cases (36.2%) with supracostal access of trocar puncture. There were 9 cases (19.2%) with PaO2/FiO2 ratio < 300 mmHg and 2 cases (4.3%) with hydrothorax. Among

other 30 cases (63.8%) with infracostal access, 5 cases (10.6%) had PaO2/FiO2 ratio < 300 mmHg with no case of pleural cavity injury.
Conclusions: The guideline using PaO2/FiO2 ratio < 300 mmHg as criteria to retain endotracheal tube in patients undergoing PCNL with supracostal access of trocar puncture can reduce incidence of endotracheal tube retention from 100% to 19.2% without harm. The incidence of pleural cavity injury was 4.3% and the risk factor was supracostal access of trocar puncture.
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01AP16-3
The effect of Betamethasone gel application to endotracheal tube (ETT) on postoperative sore-throat (POST) in smokers versus nonsmokers.

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Background : Post is a common complication of general anesthesia. The incidence is highest after tracheal intubation. The aim of this work is to study the effect of betamethasone gel application to endotracheal tube on POST after endotracheal intubation in smokers versus non-smokers.
Methods: The present study was done in Alexandria University Hospital on 120 male patients; aged between 21 and 48 years, scheduled for superficial abdominal surgeries that needed profound muscle relaxation and controlled ventilation by endotracheal intubation.Pre-operative evaluation was carried on during a visit the day before surgery and consent was taken from the patient to perform the study. Patients were randomly divided into four equal groups; thirty patients each. Group SG: Smokers group were the ETT was lubricated from the distal end of the cuff to a distance of 15 cm from the tip using 2.5ml of betamethasone gel (0.05%) spread uniformly with sterile precautions. Group NG: Nonsmokers group were the ETT was lubricated as SG group. Group SN: Smokers were placebo gel application to endotracheal tube was done. Group NN: Non-smokers were placebo gel application to endotracheal was done. The degree of POST for each patient was assessed in a subjective manner using a four point scale (0=no POST) on arrival at the post–anesthesia care unit at 1h and at 6, 12 and 24 h.
Results and Discussion: This study demonstrated that betamethasone gel effectively attenuated POST as it decreases from 90% to 23.3% in smokers. It also decreases from 76.7% to13.3% in the non-smokers. There was no significant difference when comparing between the two betamethasone groups or the two control groups. Preoperative smoking habits are known to facilitate postoperative respiratory complications. This is probably due to the hyperactive airway state associated with smoking which in turn is associated with increased incidences of bucking on the ETT during emergence from anesthesia. This will lead to increase in the trauma and inflammation of the larynx and will lead to increase in the incidence of POST. The efficacy of Betamethasone gel in decreasing POST is its strong anti-inflammatory effect reducing the inflammation produced by Intubation. In addition to, an analgesic action of Betamethasone due to inhibition of prostaglandin production by blockade of phospholipase A2 activity.

01AP16-4
The use of videolaryngoscopy decreases the rate of unintended endobronchial intubation

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Background and Goal of Study: Any difficulty during a direct laryngoscopy and suboptimal visualisation of laryngeal structures could be associated with improper tracheal tube position or local airway trauma. The goal of this study was to compare the initial depth of tracheal tube insertion, rates of unintended endobronchial intubation, and postoperative patient discomfort after tracheal intubation using videolaryngoscopy (GlideScope) or direct laryngoscopy (Macintosh blade).
Materials and Methods: 90 adult ASA I – III patients scheduled for elective neurosurgical procedures were randomized into the videolaryngoscopy (V) and conventional direct laryngoscopy (C) groups. Exclusion criteria included cervical spine surgery, planned postoperative ventilation, laryngeal tumors, history of tracheal, laryngeal and cervical spine surgery. Induction and intraoperative management of anaesthesia followed a strict protocol. Intubation time, initial depth of tracheal tube insertion, difference between the initial and calculated optimal insertion depth[1], number of tube position corrections due to signs of endobronchial intubation and postoperative throat pain and hoarseness were recorded. Results are expressed as mean ± SD, or as a rate (%).
Results and Discussion: There were no differences between the V and C groups in the intubation time (20 ± 6 s vs 18 ± 7 s, P = 0,095), postoperative rates of throat pain (17.8 vs 20.0%, P = 1.000) and hoarseness (24.4 ± 31.1, P = 0.488). There was higher initial depth of tube placement (21.90 ± 1.4 cm vs 21.0 ± 1.3 cm, P = 0.037), higher difference between the initial and calculated optimal insertion depth (1.22 ± 1.25 cm vs 0.48 ± 1.01 cm, P = 0.003), and higher rate of tube position corrections due to signs of endobronchial intubation (15.6% vs 0.0%, P = 0.012) in the C group in comparison to V group.
Conclusions: The use of videolaryngoscopy is associated with a lower initial depth of tracheal tube insertion and a lower rate of unintended endobronchial intubation.
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01AP16-5
Unexpected oropharyngeal lesion: case report in Anesthesiology

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Background: In daily routine, the Anesthesiologist may face unexpected difficulties in airway approach. Also, the detection of potentially malignant lesions during laryngoscopy may constitute an inaugural finding that should motivate the patient's referral for specialized consultation[1]. We report a case where we faced a "de novo" oropharynx lesion.
Case Report: A 36-year-old woman, ASA I, was scheduled for left laparoscopic unilateral annexectomy. The pre-anesthetic airway evaluation reported no warning signs. After manual ventilation (without any difficulties) classic laryngoscopy was performed, and a multinodular lesion partially occupying the supraglottic region was detected. Due to this finding, we decided for orotracheal intubation with videolaryngoscopy, allowing image record. The intraoperative period went uneventful, specifically the extubation period. The visualization of the lesion triggered the referral to an otorhinolaryngology consultation where a nasopharyngolaryngoscopy was performed, detecting hypertrophic lymphoid follicles occupying both valleculae. Due to increased volume of the lesion, excision surgery was scheduled, nevertheless the patient reported no signs of respiratory distress or dysphagia. In this subsequent surgical intervention, a videolaryngoscopy intubation strategy was successfully maintained. The anatomopathological study of the lesion was conclusive for reactive lymphoid tissue and the patient was discharged.
Discussion: Videolaryngoscopy significantly improved the success rate of airway approach, offering a better visual and instrumentational setting. Besides, the Anesthesiologist may play a role in documenting some upper airway lesions after unexpected detection during routine laryngoscopy. This documentation through image record, supported by videolaryngoscope devices, can be of great relevance.
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Learning points: Laryngoscopy can be seen as a privileged way of detecting potentially malignant lesions. This can be the first step in interdisciplinary gathering efforts in order to properly handle and treat these lesions. Also, the knowledge and ability to react when facing unexpected difficult airway remains an essential part of our practice.

01AP16-6
Difficult airway anesthetic management in pacients with thyroid carcinomas.

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Background and Goal of Study: In the last 30 years the thyroid cancer incidence has been increased in a dramatic way in Albania, as over the world. That's increased the difficulty of managing the intubation of the surgery and obligated us to safe airway management. Thyroid carcinoma carries a 1-13% chance of complication with tracheal invasion. It had been reported incidence of difficult tracheal intubation between 5.3%-12.7%. We decided to investigate effectiveness of the video laryngoscope (VL) for tracheal intubation of thyroid carcinomas patients with a difficult airway.
Materials and Methods: In that retrospective study we enrolled 106 patients ASA III, from January 2017 to September 2018. All patients treated for thyroid neoplasm diagnosis with FNA in elective surgery received general anesthesia. Routine monitoring was done before induction. For induction anesthesia all patients received fentanyl 5µg/kg , profolol 4.0µg/ml via target controlled infusion and vecuronium 0.1 mg/kg after 5 minutes of oxigenation. Female/male report was 90.5% vs 9.5%. The age of patients were 38-78 years with a mean ± SD age of 51.6 ± 14.7 years. We investigated the incidence of difficult endotracheal intubation. The patients were randomly divided into two groups who underwent in direct laryngoscopy (DL) or VL. We recorded stage of tumor, the first attempt success rate, mean artery pressure (MAP), heart rate(HR) and incidence of complications.
Results and Discussion: The trachea was intubated in all cases. The percentage of very difficult intubation was 10.3%(11 patients), 5 patients stage IV, 3 pts stage III, 3 pts stage II. The first attempt success rate in group VL (94,3%) was higher than in group DL (78.5%:p<0.05), the HR and MAP were almost the same. The incidence of mucosal or lips trauma, postoperative sore throat or hoarseness was lower in group VL than the group DL.
Conclusions: The patients with an advance stage of thyroid cancer, with compressive signs present, have difficult endotracheal intubation caused by tracheal invasion and tissue infiltration by the carcinoma associated with fibrosis. The presence of thyroid cancer is a major factor predicting default intubation of endotracheal tube. The video laryngoscope had some advantages over the direct laryngoscopy as a higher first attempt success and a reduced incidence of complications .

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01AP16-7
Difficult airway management: laryngeal mask aura-gain versus laryngeal tube (ilts-d) vbm.

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Background and Goal of Study: The unforeseen difficult airway (DA) situation is one of the worst scenarios we can find in the daily practice of anesthesiology. The new supraglottic devices (SGA), third generation, are characterized by allowing ventilation and some intubate through them. The main objective of the study was to assess the ease of insertion of the two devices(laryngeal mask Aura-Gain and laryngeal tube iLTS-D) and the ability to ventilate properly the patient. As a secondary objective is to evaluate the relation between the difficulty of inserting the devices and the anatomical and demographic factors.
Materials and Methods: We present results of an observational, prospective, descriptive study. It is composed of 40 patients undergoing general anesthesia with SGA as an instrument of airway management. The patients were divided into two groups, according to the criteria of the anesthesiologist. The inclusion in each group was consecutive, meeting the criteria of: being over 18 years old, ASA I-III, undergoing general anesthesia with SGA: laryngeal mask and laryngeal tube. Intraoperatively, the variables were: number of attempts to insert the devices, the need to rescue with another device, the sealing pressure and the subjective assessment of use by the anesthesiologist. For the analysis of study data, the statistical package SPSS® for Windows, version 21 will be used.
Results and Discussion: Women represented 45% of the sample, with a slightly higher frequency in the laryngeal mask group (LM). The presence of comorbidity and predictors of difficulty airway was similar in both groups. Table I. According Han scale (LM: I 50% and II 50% and LT I 50% - II 40% - III 10%) none of the patients presented problems for ventilation, a circumstance that allowed the use of SGA as a device for intraoperative airway control and not as rescue of the airway. The parameters measured to assess the ease of insertion and the qualities of the SGA are presented in Table II.
Conclusions: Study do not show a clear association between the predictors of difficulty airway and the difficulty inserting the SGA, nor in the fibroscopic visualization.
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01AP16-8
Videolaparoscopic cholecystectomy in a patient with Crigler-Najjar type II and susceptibility to malignant hyperthermia: a case report

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Background: Crigler-Najjar syndrome is a rare hereditary condition of unconjugated hyperbilirubinemia due to uridine diphosphate glucuronosyltransferase (UDPGT) enzyme deficiency which can be associated with brain damage and encephalopathy.
Case Report: A 27-year-old male patient diagnosed with Crigler-Najjar syndrome type II hospitalized due to rhabdomyolysis induced by usual and non-strenuous physical exercises leading to suspected susceptibility to malignant hyperthermia. He was presented for video laparoscopic cholecystectomy due to cholelithiasis. He was in use of oral phenobarbital 100 mg daily. On preoperative examination, the patient was awake and alert and had no signs of hyperbilirubinemia. His laboratory preoperative data showed high levels of total serum bilirubin, AST and ALT with normal liver function tests and serum electrolytes. Malignant hyperthermia protocol was initiated and anaesthesia was induced with midazolam 5 mg, fentanyl 250 mcg, propofol 200 mg and cisatracurium 10 mg. Endotracheal intubation was performed and total intravenous anaesthesia (TIVA) with propofol and remifentanil was chosen. Patient received 600 cc of Sodium Chloride 0.9% solution, ondansetron 4 mg, dexamethasone 10 mg, hyoscine 20 mg and dypirone 2.5 g. He was discharged from the ward to home a day after in stable condition, without significant increase in serum bilirubin levels and with normal renal and liver function tests.
Discussion: Free serum bilirubin can increase during states of physiological stress or after use of drugs that displace bilirubin from albumin, for example: propofol. However, due to the risk of malignant hyperthermia, halogenated inhalational anesthetics could not be used and TIVA with propofol had to be chosen. Drugs known to induce the UDPGT enzyme, as phenobarbital and dexamethasone were administered and drugs and physiologic states that displace bilirubin from albumin such as: sulfonamides, ceftriaxone, ampicillin, salicylates, furosemide, dehydration, hypercarbia, and acidosis were avoided. Fentanyl and cisatracurium have minimal effects on plasma bilirubin levels.
Conclusion: Both Crigler-Najjar syndrome and Malignant Hyperthermia are uncommon and potentially severe, requiring careful anesthetic management and knowledge about the pathophysiology of those conditions.

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01AP16-9
Current practice of rapid sequence induction of anaesthesia in Catalonia: preliminary study

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Background and Goal of Study: Rapid sequence induction of anaesthesia (RSI) is a widely used technique to protect the airway from aspiration of gastric content. Since 1970, when it was described for the first time, new drugs and procedures have been proposed. Aim of the study was to analyse the current practice of RSI in tertiary hospitals of Catalonia.
Materials and Methods: An anonymous and voluntary on-line survey was sent by email to anaesthetists (staff and trainees) of all tertiary hospitals in Catalonia. Following items regarding RSI were recorded: premedication, use of neuromuscular blocking agents and sugammadex, application of cricoid pressure, patient positioning, handling of nasogastric tube (NT), ultrasound assessment of gastric content and preoxygenation. Data are presented as absolute numbers and/or percentages.
Results and Discussion: A total of 126 completed questionnaires were analysed (37 trainees and 89 attendings). 30.2% of the anaesthesiologists premedicates the patient in some cases, 19% never do it. 74% administrates first the opioid, then the hypnotic drug and finally the neuromuscular blocking agent (35.7% with succinylcholine IV and 45.2% always with rocuronium IV at a dose of 1 or 1.2 mg·Kg-1). Additionally, 30.3% of the anaesthesiologists only check to have enough sugammadex available in case of anticipate difficult airway. A total of 49 participants (38.9%) declares to apply every time cricoid pressure during RSI while 40 (31.7%) do it only if there is a high risk of regurgitation (75.2% always or almost always makes sure their assistants are trained in cricoid pressure technique). Most of anaesthesiologists (61.8%) use head up or reverse Trendelenburg position for RSI; head down 5.6%. 61.9% would insert a NT at high risk of regurgitation and 76.5% of them leave it in place during induction. The vast majority (98,6%) never asses gastric content using ultrasound and 99.2% uses different preoxygenation techniques.
Conclusions: Our survey showed a wide persisting variation in the current practice of RSI among anaesthesiologists in tertiary hospitals of Catalonia. Deep knowledge of this variability will help us to redefine RSI protocols in order to increase patient safety in our daily work.

01AP17-1
Cardiac Arrest during orthopedic surgery: could Bone Cement Implantation Syndrome (BCIS) be the cause?

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Background: Despite being a well-known orthopedic complication, BCIS is not fully understood due to lack of clear diagnostic criteria. Pulmonary embolization, complement activation and histamine releaseare are possible causes for increased pulmonary vascular resistance, which may cause a ventilation/perfusion mismatch with hypoxia, right ventricular failure and eventually cardiogenic shock (1).
Case Report: An 86-year-old male patient, with pneumoconiosis and severe chronic respiratory insufficiency, pulmonary and arterial hypertension and poor cardiorespiratory fitness was proposed to urgent cemented left hip hemiarthroplasty. Pre-operative evaluation showed anemia, low GFR, hypoxemia and hypercapnia. The EKG showed HR 71bpm on a pacemaker-dependent rhythm. The chest radiograph showed bilateral pleural effusion. ASA IV classification. Spinal anesthesia was performed with levobupivacaine 8 mg and sufentanil 2.5 mcg. Spontaneous ventilation was kept with supplemental oxygen. Ten minutes after the cementation, the patient became restless and hypotensive, refractory to fluids and ephedrine, with progression to cardiac arrest with PEA and recovery after 12 minutes of ALS. Only the 4th attempt of orotracheal intubation was successful with a new CA in PEA after the 2nd one, managed with 2 minutes of ALS.The surgical procedure was completed with TIVA, under vasopressor support and high FiO2. Common CA causes were excluded. The patient was transferred to ICU.Recovery was uneventful, allowing extubation on day 1 and discharge to the Orthopedics department in 4 days. One week later, the patient was found in CA in the ward and died after 30 minutes of ALS, with no known cause identified.
Discussion: In this case report the identified risk factors for BCIS are ASA classification IV, advanced age, poor pre-existing physical reserve in an individual proposed to cemented hemiarthroplasty without previous instrumentation of the medullary canal. BCIS is an exclusion diagnosis and management should be based on general principles of organ support.
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Learning points: Precaution must be taken when using bone cement in high risk patients. Intraoperative hemodynamic and respiratory monitoring is important to prevent unexpected fatalities

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01AP17-2
Anesthetic considerations for an adult with Wolf-Hirschhorn syndrome: a case report.

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Background: Wolf-Hirschhorn syndrome (WHS) is an inherited disease caused by deletion of the short-arm (4p16.3) of chromosome 4. It includes features such as growth restriction, mental retardation, congenital heart disease, convulsions as well as microcephaly and micrognathia. Thus, the anesthesiologists may have difficulties in airway management, neuromuscular relaxation, and in maintaining hemodynamic stability. However, there are no case reports of anesthetic management in adults with WHS.
Case Report: A 24-year-old man with Wolf-Hirschhorn syndrome (WHS) underwent surgery for closed reduction and internal fixation of the right neck of femur. His face showed features typical of patients with WHS such as a prominent glabella, hypertelorism, micrognathia, low-set malformed ears, and a down-turned mouth. Since difficult airway management was expected, a video-assisted laryngoscope was used for intubation which was successful. The surgery terminated without any problems under total intravenous anesthesia.
Discussion: The most important part of general anesthesia in patients with WHS is the difficulty of airway management. The airway should be carefully evaluated before induction of general anesthesia. If the patient has hypotonia, the anesthesiologists should consider the type and dose of neuromuscular blocking agents (NMBA) used. Malignant hyperthermia (MH) after general anesthesia with inhalation anesthetics in patients with WHS has been reported. Thus, anesthesiologists need to be cautious about MH. WHS is usually accompanied by convulsions. Hence, anticonvulsant should be given on the day of surgery. If physical examination suggests a compromise in the cardiac function of the patient, an echocardiography should be performed.
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Learning points: Knowledge of the anesthetic implications in adults with Wolf-Hirschhorn syndrome is limited. Anesthesiologists can perform a safe general anesthesia in patients with WHS through careful evaluation and an appropriate anesthetic plan.

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01AP17-3
Anesthetic management in a patient with thyroid storm-induced heart failure undergoing emergent abdominal surgery

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Background: It is challenging to perform anesthesia in patients who require emergent surgery concomitant with heart failure due to untreated thyrotoxicosis. Precise anesthesia to maintain the balance between adequate anesthesia depth and minimal cardiovascular depression is critical.
Case Report: A 56 y/o woman was intubated and admitted to ICU due to thyroid storm-induced congestive heart failure (T4: 5.27 ng/dL). She had cardiomegaly with atrial fibrillation (heart rate 239 bpm). In the ICU her thyroid storm was gradually controlled under antithyroid treatment, however, on the day which scheduled extubation was attempted she developed sudden dull abdominal pain and required emergent operation for suspected gastroenteral perforation. The free T4 was still abnormally high (2.44 ng/dL). Before general anesthesia, continuous cardiac output (CO) monitor was set up to obtain her baseline cardiac parameters. General anesthesia was induced and maintained with Sevoflurane. Central venous catheter was inserted and systemic vascular resistance (SVR) was calculated. Esmolol was chosen to control heart rate in 90-110 bpm. The operative finding was duodenal perforation which was repaired by laparoscopic technique. During the whole procedure CO and SVR were controlled in pre-anesthesia level. Oral temperature was maintained within 36.9-37.2 . After the surgery she kept on antithyroid therapy in ICU. She was extubated two days later and discharged to general ward.
Discussion: It is a dilemma to keep our patient stress-free and preserve cardiac function simultaneously. We suggest maintenance of pre-anesthesia CO and SVR to minimize hemodynamic fluctuation. Cardiac output monitor and CVC are useful tools for hemodynamic control. Sevoflurane is a better option than Desflurane for absence of sympathetic hyperactivity. Esmolol is the first choice of beta-blocker to selectively reduce sympathetic stimulation. Bispectral index can be a reference of anesthesia depth. We didn't obtain intravenous methimazole for our patient before surgery, however, parenteral antithyroid medication should be considered in gastroenteral surgery because oral medication is usually not indicated.
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Learning points: To maintain the balance between adequate anesthesia depth and preserved cardiac function is the general principle in anesthesia for patients having thyrotoxicosis concomitant with heart failure.

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01AP17-4
Effect of lateral positioning on the bronchial cuff pressure of a left-sided double-lumen endotracheal tube during thoracic surgery

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Background and Goal of Study: Correct pressure is important when using a double-lumen endotracheal tube (DLT), especially in thoracic surgery. Inadequate bronchial cuff pressure (BCP) can cause air leak and interfere with visualisation of the surgical field, whereas excessive BCP can lead to cuff-related complications. As positional change during endotracheal tube placement could alter cuff pressure, we hypothesized that change from the supine to the lateral decubitus position, which is essential in thoracic surgery, affects the BCP of the DLT.
Materials and Methods: Patients aged 18–70 years who underwent elective lung surgery were recruited. BCP was measured with a cuff manometer at a series of time points in the supine and lateral decubitus positions after confirming the DLT placement, while inflating the cuff with air in 0.5-ml increments from 0 to 3.0 ml. The primary outcome was change in the initial set maximum BCP of <40 cmH2O with no air leak after lateral decubitus positioning. BCP and air leak were assessed in each position during cuff inflation with air in 0.5-ml increments from 0 to 3.0 ml up to a BCP of 40 cmH2O. Secondary outcomes were the initially set maximum

BCP exceeding 40 cmH2O after lateral positioning and change in the minimum bronchial cuff volume (BCV), that is, the smallest BCP without air leak, after lateral positioning. The relationships of airway pressure, compliance, and body mass index to the change in BCP after lateral positioning were evaluated.
Results and Discussion: Thirty patients scheduled for elective lung surgery were enrolled. The initial set maximum BCP increased significantly from a mean (SD) value of 26.0 (9.3) cmH2O in the supine position to 28.3 (11.6) cmH2O in the lateral decubitus position (p=0.040). In 10% (3/30) of the patients, the initial established pressure exceeded 40 cmH2O after lateral positioning. The minimum BCVs were 0, 0.5, and 1 ml for 16 (53%), 10 (33%) and 4 patients (13%) in the supine position, and had no change in 20 (67%), decreased in 6 (20%), and decreased in 4 (13%) after lateral positioning. Change in BCP showed no significant correlations to airway pressure, compliance, and body mass index.
Conclusion: The initial set maximum BCP significantly increased after lateral positioning, although the factors influencing this could not be determined. Therefore, BCP must be managed with caution to avoid overinflating it, and further studies are needed to determine influencing factors.

01AP17-5
Tetralogy of Fallot: a challenging case

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Background: Tetralogy of Fallot (TOF) is the most common form of cyanotic heart disease accounting about 6% of congenital heart disease. The cardinal features are ventricular septal defect, abnormally positioned aortic valve, right ventricular outflow tract obstruction and right ventricular myocardial hypertrophy.[1] As life expectancy increases, it has become more frequent the need to manage these patients outside Cardiac Surgery scope.
Case Report: 23-year-old male patient with known history of uncorrected TOF was admitted for elective mandibular cyst extraction. Patient presented a functional capacity of about 4 METs. Current outpatient medication was aspirin 100mg. The patient evidenced peripheral, central cyanosis (basal SpO2 86% on room air) and clubbed fingers. Cardiac auscultation revealed a grade 3 pansystolic murmur at the pulmonary area. Secondary polycythaemia was documented (hemoglobin 22.0g/dL, hematocrit 58%). Echocardiography showed an extreme TOF with stenotic pulmonary valve and anterograde flow gradient of 80mmHg,large intraventricular communication and overriding dilated aorta. Biventricular function was within normal limits. Major aortopulmonary collateral arteries were identified. ECG showed sinus tachycardia with P pulmonale and Chest X-ray showed boot-shaped heart. Prophylaxis for endocarditis was administered with Ampicilin 2g. After pre-oxygenation with 100% O2,induction was achieved with fentanyl(1mcg/kg), etomidate(0,2 mg/kg) and rocuronium(0,6 mg/kg).General Anesthesia was maintained with Desfluorane(MAC 0,8-1). Monitoring used was the ASA standard, BIS and noninvasive hemodynamic monitoring-Starling SV. Hemodynamic stability was maintained throughout the procedure. After neuromuscular block reversal with sugammadex,the patient was extubated and moved to the post-anesthesia care unit, where he remained stable. He was discharged home 24hours after the procedure.
Discussion: The anesthetic goals as maintaining haemodynamic stability, euvolemia, systemic vascular resistance, avoiding hypoxia and increases in oxygen demand, are crucial for a successful outcome.
References:
1. Stout KK, et al, AHA/ACC Guideline for the Management of Adults with Congenital Heart Disease,2018
Learning points: Anesthesia management of TOF patients requires a thorough understanding of the pathophysiology of this condition and the altered haemodynamics. A detailed preoperative assessment is required to understand the severity of the underlying heart disease and optimization.

01AP17-6
The prevalence of Post-Thoracotomy Pain Syndrome in a cohort of 96 patients who underwent minimally invasive pulmonary resection surgery.

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Background and Goal of Study: Post-Thoracotomy Pain Syndrome (PTPS) is defined as pain along the thoracotomy scar recurring or persisting for more than 2 months after surgery. PTPS is characterized by neuropathic traits and chronic evolution. According to some studies its incidence is higher after thoracotomy than in VATS (33% vs 25%) [1]. The aim of our work is to evaluate the incidence of PTPS and sensory disturbances over a 6-month period.
Materials and Methods: Ninety-six patients after minimally invasive pulmonary resection surgery, treated with multimodal analgesia, were followed up for 6 months. Demographic data, surgical approach and intra- and post-operative antalgic control were recorded. PainDETECT questionnaire (PD-Q) [2] and Numeric Rate Scale (NRS) were evaluated with phone calls 1, 3 and 6 months after surgery.
Results and Discussion: At 3 and 6 months after surgery, the incidence of pain was 28% and 21% respectively. No one met the criteria for neuropathic pain according to the PD-Q. We, therefore, looked for demographic and perioperative factors that could have influenced higher scores (PD-Q ≥ 3), suggesting a higher likelihood of neuropathic symptoms. At 6 months the Video-Assisted Thoracic Surgery (VATS) group showed lower scores compared to the minithoracotomy group (p=0.05). Between female patients, we observed a strong tendency to suffer from sensory disturbances more than males. Finally, patients treated with locoregional analgesia techniques before surgical incision showed a strong tendency to have better scores compared to those treated at the end of the surgery.
Conclusions: Our data are consistent with actual literature about the incidence of chronic pain. The incidence of neuropathic pain instead seems to be lower than in other studies on this topic, maybe due to the fact that we always perform multimodal analgesia and that in our study only minimally invasive surgical approaches were included. In our experience, locoregional techniques may also lower the prevalence of sensory disturbances. Further data are needed to assess if also other factors like perioperative adjuvants could play a role.
References:
1. Bayman EO et Al. A Prospective Study of Chronic Pain after Thoracic Surgery. Anesthesiology. 2017; 126:938–951.
2. Steegers MA et Al. Only half of the chronic pain after thoracic surgery shows a neuropathic component. J Pain. 2008; 9(10):955-961.

01AP17-7
A new algorithm to quantify cardio-pulmonary interaction in patients with atrial fibrillation.

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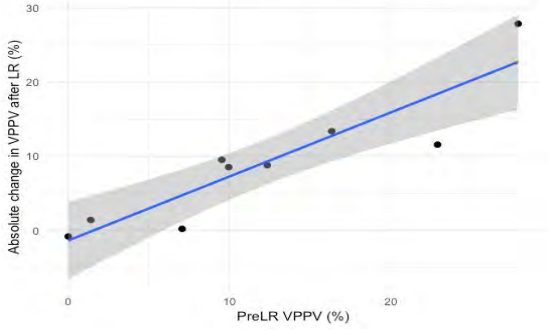
Background and Goal of Study: Traditional formulas to calculate Pulse Pressure Ventilation (PPV) can't be used in patients with Atrial Fibrillation (AF) because of their intrinsic irregular beat-to-beat variation. We developed a new algorithm that is able to mathematically decompose the variation in Pulse Pressure (PP) into its causes. This enable us to quantify venitation induced Pulse Pressure Ventilation (VPPV) in patients with AF. In this study we tested the effect of changing loading conditions on this parameter. Extrapolating from the knowledge of PPV in patients with sinus rythm, we hypothesize a decrease in VPPV after a leg-raising test (LR), especially when the pre-LR value is high.
Materials and Methods: After ethical approval and informed consent, patients with active AF scheduled for an ablation of the pulmonary vein, were included. ECG and invasive arterial waveforms were recorded during general anaesthesia with full mechanical ventilation (TV=8ml/kg). Two observation periods of 60 s were assessed, before and after leg-raising test (pre-LR, post-LR). We constructed a generalized additive model for each patient on each observation period. Based on our earlier findings (1), the impact of AF was modelled on the 2 preceding RR intervals of each beat (RR0, RR-1).The impact of ventilation and long-term PP trends were modelled as separate splines.
Gam: PP ~ Intercept + s(RR0) + s(RR-1) + s(Ventilation) + s(trend)
VPPV was defined as 100 * range (s(Ventilation))/Intercept.
The pre-LR VPPV and the change in VPPV were assessed using a regression model.
Results and Discussion: 9 patients were included. The models showed excellent predictive abilities with a median r^2= 0.92 (range = [0.60 – 0.98]). Pre-LR VPPV values ranged from 0.1 % to 27.9 %. The post-LR VPPV values decreased to 0%-11.3% (p<0.001). The relation between the Pre-LR values and the magnitude of the changes imposed by the LR was statistically significant (p<0.0001).(see fig)



Conclusion: These findings show the ability of this algorithm to quantify ventilation induced PPV in patients with AF along with its load dependent property.
Reference:
1. Wyffels et al. Am J Physiol-Heart Circ Physiol 2016

01AP17-8
An original algorism to choose pacemaker mode for patients with permanent pacemaker intraoperatively in non-cardiac surgery

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Background and Goal of Study: Although The Heart Rhythm Society and American Society of Anesthesiologists have recommended their intraoperative guideline for patients with permanent pacemakers, it have been unknown how anesthesiologists should choose the most appropriate modes during operative period. We made a prototype of an original algorism to choose the most appropriate mode for patients with permanent pacemakers during non-cardiac operative periods. In this retrospective study, we reviewed the perioperative charts and records of the patients who had already implanted the permanent pacemakers to discuss whether the choices of the mode were appropriate.
Materials and Methods: This study designed as a retrospective cohort study in single university hospital. This study obtained the institutional review board from the ethics committee.
Our original algorism recommended 5 queries below (Figure).
1. Which is the surgical site under or above the diaphragm ?
2. Do the surgeons use monopolar electric knife ?
3. What is the diagnosis of the cause of the implantation of the pacemaker ?
4. What is current mode?
5. Can anyone access the pacemaker to change the mode during operation?
6. May patient's own QRS appear during surgery?

We investigated consecutive 48 patients who received any non-cardiac surgery from April in 2013 to October in 2018 whether the mode recommended by the algorism had corresponded to the actual mode chose intraoperatively.
If the actual mode was different from the algorism, we discussed whether the actual choice of the mode might be appropriate for the patient, such as increase of the risk of R on T wave or decrease of cardiac output due to absence of atrial kick.
Results and Discussion: In 42 patients (87.5%) of 48 patients, the modes of the pacemakers recommended by the algorism corresponded to the actual modes. However, the actual modes of 6 patients (12.5%) were different from the modes recommended by the algorism and might be chosen inappropriate mode which might cause any disadvantage intraoperatively.
Conclusion: In this study, the algorism might need for several patients who had implanted the permanent pacemakers to prevent cardiac events intraoperatively. We would improve the prototype of our original algorism by discussing with many physicians.

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01AP17-9
Lown-Ganong-Levine syndrome - a rare anesthetic challenge

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Background: Lown–Ganong–Levine syndrome (LGL) is a rare pre-excitation syndrome consisting of paroxysms of tachycardia and electrocardiographic (ECG) findings of short PR interval and normal QRS length [1]. Patients with LGL have increased risk for malignant perioperative arrhythmias, and literature is scarce regarding their anesthetic management. We present our approach on the management of a patient with LGL syndrome undergoing routine surgery.
Case Report: 80 year old female planned for percutaneous nephrolithotomy. Past medical history of LGL syndrome. Under Carvedilol 6.25mg PO daily. Physical examination: unremarkable. Preoperative ECG: sinus bradycardia(48bpm), PR interval <0.1ms and non-specific ST-T changes.The patient was given Midazolam for anxiolisys, and beta-blockade ensured perioperatively. Monitoring followed standard ASA guidelines, plus Bispectral Index. Propofol and Remifentanil Manual Controlled Infusions were titrated to BIS. After neuromuscular blockade with Rocuronium, patient was intubated. Hemodynamic stability was maintained during the case. Continuous temperature monitoring through esophageal probe and both warmed surgical irrigation and intravenous fluids provided. Multimodal analgesia with systemic medication as well as local anesthetic wound infiltration administered. MCIs were stopped and Sugammadex provided. On return of effective spontaneous breathing efforts and airway reflexes, the patient was extubated. No adverse events occurred perioperatively. Patient was discharged 4 days later.
Discussion: LGL syndrome patients are prone to bouts of paroxysmal tachycardia, particularly supraventricular[2]. Avoidance of pro-arrhythmogenic factors is key to successful management. Appropriate pre-operative consultation, maintenance of beta-blockade, and careful planning of anesthetic technique, drugs, and adequate analgesia are of paramount importance in managing patients with this condition.
References:
1. MK Sharma, S Misra Anaesthetic management of a patient with Lown-Ganong-Levine syndrome — a case report; MJAFI 2011;67:285–287
2. DD Aslan, F Adam, N Altunkaya Anesthesia management in cesarean section with lown-ganong-levine syndrome;Medicine Science 2018;7(4):951-2
Learning points: Anesthetic management aims to elicit the least stress related responses as possible, employing medication with the fewest effects on the accessory pathway, and avoidance of symptomatic (pain, anxiety, airway manipulation) as well as sympathetic stimuli.

01AP17-10
Management of a cardiac transplant recipient for an emergent surgery

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Background: The annual heart transplant rate is steadily increasing worldwide. As the number of heart transplants increases and patient survival improves, more of these patients will present for nontransplant-related surgeries outside transplant centers. A comprehensive preoperative assessment and optimization are essential in preparing the transplanted patient for surgery, being aware of the altered cardiac physiology and the consequences of immunosuppressive therapy. Close communication with the patient´s transplant team is essential for preparing an individualized perioperative anesthetic plan. However, in an emergency scenario, fully optimization of the patient might not be possible.
Case Report: 61-year-old cardiac transplanted patient, was admitted in the emergency room with a double mandibular fracture. Past history revealed a history of dilated cardiomyopathy leading to heart transplantation 4 years prior. Thereafter the patient developed hypertension and type-2 diabetes. The last consultation at his cardiac center had been 1 week past and he brought recent cardiac evaluations, which ruled out rejection and cardiac dysfunction. Nevertheless, a meticulous pre-operative assessment was performed. Standard ASA monitoring was used as well as invasive blood pressure monitoring and bispectral index. Surgery was performed under general balanced anesthesia and nasotraqueal intubation. The patient remained hemodynamically stable throughout the perioperative period, with a characteristic reduced heart rate variability. Post-operative period was uneventful.
Discussion: Preoperative careful assessment and optimization of the patient is vital, even in an emergent situation. A rigorous control of hemodynamic stability is vital during the procedure. Additionally, when considering nasal intubation and performance of invasive monitoring procedures, the higher risk of infection should not be left unspoken.
References:
1. M. Choudhury. Post-cardiac transplant recipient: Implications for anaesthesia. Indian J Anaesth. 2017 Sep; 61(9): 768–774.
2. J.Herborn, S.Parulkar. Anesthetic Considerations in Transplant Recipients for Nontransplant Surgery. Anesthesiology Clin 35 (2017) 539–553
Learning points: With an increasing number of heart transplant recipients in the general population, a thorough understanding of the unique anesthetic implications of a transplanted heart are essential for best perioperative management and improved post-operative outcome.

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01AP18-2
Effect of intravenous dextrose to prevent postoperative nausea and vomiting: A systematic review and meta-analysis

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is the most common complication associated with general anaesthesia. Intravenous (IV) dextrose administration is one of the non-pharmacologic approaches to prevent PONV. Several studies have demonstrated that the perioperative administration of dextrose decreases PONV, but the effectiveness of this approach remains controversial and the optimal amount of dextrose administration remains unclear. We conducted a systematic review and meta-analysis to elucidate the effect of IV dextrose administration to prevent PONV.
Materials and Methods: We searched literature databases such as MEDLINE, CENTRAL, EMBASE, and Web of Science without language restrictions. Randomised clinical trials (RCTs) reporting the effect of IV dextrose on postoperative nausea (PON), or postoperative vomiting (POV) were included. The primary outcome was the incidence of PON/POV at the early time period defined as the first of several time periods of the 24-h postoperative period. Dichotomous data were summarized using risk ratio (RR) with a 95% confidential interval (CI). Risk of bias were assessed using the Cochrane risk of bias tool. Heterogeneity was quantified using the I2 statistic. Small-study effects were assessed using a funnel plot and an asymmetry test.
Results and Discussion: Combined results of the effect of IV dextrose administration showed that there was no significant difference between the dextrose and control groups in preventing PON at the early time period, (RR [95% CI]=0.78 [0.61-1.00], I2=54%, for 955 patients in nine RCTs). The subgroup analysis revealed that the total amount of dextrose > 12.5 g was significantly effective in preventing PON at the early time period (RR [95% CI]=0.72 [0.54-0.95], I2=29%). The test for funnel plot asymmetry revealed the absence of a small-study effect. Combined results showed that there was no significant difference between the dextrose and control groups in preventing POV at the early time period, (RR [95% CI]=0.80 [0.52-

1.24], I2=0%, for 839 patients in eight RCTs).
Conclusions: Perioperative IV dextrose administration was not effective in preventing PON/POV at the early time period. However, high-dose dextrose administration has a potential to reduce PON at the early time period. Further clinical trials are needed to elucidate the effect of high-dose dextrose administration to prevent PON at the early time period.

01AP18-3
Survival to the following year after the implementation of an intensified recovery protocol (ERAS: Enhanced Recovery After Surgery) in colorectal elective surgery

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Introduction: The main aim of this study is to determine if the application of an ERAS protocol in elective colorectal surgery increases survival after one year of follow-up. The secondary objectives were to study hospital length of stay (LOS) and the rate of complications and re-admissions at 30 days.
Methods: 256 patients were included. We compared the one year survival from the date of hospital discharge of the first 121 consecutive patients that participated in the ERAS protocol with 135 consecutive patiens that were operated prior to its implementation with conventional surgery. 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, Fisher exact test and the Student t test was used. The survival function was analyzed by the Kaplan-Meier method. Results were considered statistically significant when p<0.05.
Results: The two groups were homogeneous. The average compliance with the ERAS protocol was 74.3%. The ERAS decreased LOS (9.8 ± 3.7 vs 11 ± 3.8, p0.018) but not the number of postoperative complications (38 (31.4%) vs 49 (36.3%), p 0.49) or the rate of re-admissions at 30 days (12 (9.9%) vs 15 (11.1%), p0.756) or the rate of reinterventions (9 (7.4%) vs 11 (8.1%), p0.833), whose difference was not statistically significant. The postoperative mortality at 30 days of follow-up after the date of surgery in both groups was similar (1 (0.7%) vs 2 (1.7%) ,p 0.498).) After 1 year of follow-up from the date of hospital discharge, there were no statistically significant differences in survival (118 (98.2%) vs 131 (97.1%), p0.791.) ERAS improved other variables in a statistically significant way: increase in laparoscopic surgery and regional anesthesia, earlier onset of ambulation and oral tolerance, decreased opioid requirements in the postoperative period, lower fluid intake during the entire process (fluid therapy for zero balance) ...
Conclusions: The ERAS protocol was associated with a decrease in LOS, without increasing the rate of readmissions or complications. The survival in the ERAS group did not improve after one year of follow-up. Longer term survival studies are needed to compare results.

01AP18-4
Randomized controlled study comparing general and spinal anaesthesia with and without a tourniquet on the outcomes of total knee arthroplasty

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Background and Goal of Study: Total knee arthroplasty (TKA) is an effective treatment for severe knee osteoarthritis for patients failing conservative treatment. It is commonly performed under spinal (SA) or general anaesthesia (GA) with or without a surgical tourniquet. The aim of our study was to determine the optimal anaesthesia and tourniquet use in TKA.
Patients and methods: We enrolled 412 patients for this randomized, parallel group, four-arm study with 12-month follow-up comparing SA and GA, with or without tourniquet, in a standardized set-up. Preoperative, 3 month, and 12 month post-operative clinical and radiological characteristics, and knee functional (Oxford knee score), pain (Brief pain inventory short form), and quality of life questionnaires (15D) were collected. Patients were 18-75 years, ASA I-III, body mass index 40 or less, and they had Kellgren-Lawrence grade 3-4 osteoarthritis. The primary outcome was to compare pain by 24h oxycodone consumption by patient controlled analgesia. Secondary objectives included pain by numerical rating scale (NRS), postoperative nausea NRS, vomiting, blood loss, length of stay (LOS), readmissions, complications, demand for surgical unit resources, postoperative knee function, quality of life, prolonged pain, and mortality.
Results and discussion: Preliminary results showed a trend for less pain (NRS) at rest (n=364, mean 3.6 vs 3.1, SD 2.1-2.3, CI 0.95; p=0.038), and after 5 metres walk (n=351, mean 5.7 vs 5.2, SD 2.1-2.3, CI 0.95; p=0.027) in the GA group. No differences were found between SA and GA regarding oxycodone consumption, nausea, LOS, or demand for surgical unit resources. There was a difference in both 24h haemoglobin decrease (n=386, 24,9 vs 30,2g/l, SD 7,9-8,3, CI 3.6-6.9; p<0.001) and blood loss by haemoglobin balance (n=384, 0,9 vs 1,1l, SD 0,32-0,35, CI 0,1-0,24; p<0.001) in favour of the tourniquet group. We found no difference between groups with or without tourniquet regarding oxycodone consumption or pain.
Conclusions: Based on our preliminary in-hospital results both anaesthesia regimens and surgeries performed with or without a tourniquet are equal regarding nausea, and LOS. There may be a trend for less pain 24h postoperatively in favour of GA. Tourniquet use was associated with a decreased blood loss. Detailed data of the in-hospital results will be presented at ESA 2019 congress in Vienna.

01AP18-5
How can risk scores predict cardiovascular morbidity and mortality after general surgery procedures?

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Background and Goal of Study: Cardiovascular events (CV) represent an important cause of postoperative morbidity and mortality after general surgery procedures. Multiple risk scores have been developed and became of paramount importance, yet lacking variables, objectivity and defined performance. The aim of this study was to assess predictive ability of several risk scores for CV complications 30 days after surgery.
Materials and Methods: A prospective audit was conducted during March and May of 2018, after institutional approval, including patients submitted to elective general surgery procedures. Analyzed scores were American Society of Anesthesiologists' (ASA) classification, Portsmouth-Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (P-POSSUM), Revised Cardiac Risk Index/ Lee Criteria (RCRI) and Gupta Cardiac Criteria. Primary outcome was to evaluate CV morbidity and mortality within 30 days after surgery. A descriptive analysis of variables was performed.
Results and Discussion:264 patients were included, mean age 62 years (max 93; min 20) and 122 (46.2%) male sex. The most frequent CV comorbidities were hypertension (53) and ischemic cardiac disease (38). Most patients were classified as ASA class II (50.4%). P-POSSUM morbidity (morb) risk was <10% in 108 patients, between 10-50% in 138 and above 50% in 18. For P-POSSUM mortality (mort), risk <1% in 255 patients and >10% in 2. In-hospital morbidity and mortality rates were 6.9% and 1.1%, respectively. 12 (60%) events were CV: 4 acute myocardial infarctions (AMI), 3 cardiopulmonary arrests (CPA), 4 CV dysfunctions requiring vasopressors (CVD) and one atrial fibrillation with rapid ventricular response (AF-RVR). The 30-day morbidity/mortality observed was 0.4/1.2%. Regarding CV complications, patients with AMI were all Gupta-risk <1% and RCRI > 6.6%. 4 CPAs were observed and all patients had Gupta-risk >0.8% (max 1.72%), RCRI >6.6% and P-POSSUM morb/mort reached maximum values of 62.6/5.8%. Of CVD patients, Gupta estimates were <1% and RCRI 0.9-6.6%. Low cardiac risk scores were predominantly obtained in 238 people without CV complications: 84% Gupta-estimated <1%, no patients with risk >7%; 113 with RCRI 0.9% and 31 >6.6%.
Conclusions: Overall cardiac risk scores performed well. Data suggest more accuracy but overestimation with RCRI. We underline the importance of combining scores to consider all pre- and post-operative variables.

01AP18-6
Dry gangrene after radial artery cannulation

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Background: Radial artery cannulation is recommended for continuous hemodynamic monitoring and for repeated blood sampling. However, beside the high frequency of arterial cannulation, the severe morbidity is unusual. We present a case which artery cannulation on the hand supplied only by single radial artery makes finger gangrene.
Case Report: A 78-year-old man with hypertension and diabetes mellitus was hospitalized with acute gastroenteritis. He had a lot of hematochezia and transferred to the intensive care unit for close monitorings. Although endoscopy and angiography were made, the bleeding focus was not found. Eventually, the patient underwent diagnostic laparoscopy twice and performed the right radial artery cannulation twice. During both surgeries, only phenylephrine was infused. Five days after artery cannulation, he felt paresthesia on index and middle fingers and color of the fingers started to change(Fig.1). In orthopedics consultations, his

fingers led to gangrene. According to upper extremity angiography, only radial artery supplied blood to right hand(Fig. 2). There was no thromboembolism but tapered digital arteries. Although he was treated with alprostadil, he had to amputate the fingers. Due to relapsed hematochezia, he was in poor general condition, and the amputation was postponed. After 11days of relapsed hematochezia, he expired.
Discussion: Radial artery cannulation makes several complications. The incidence of ischemia injury is less than 0.09%1. In addition, the blood supply to the hand by radial artery alone is very rare[1]. The probability of coincidence is very low but results in critical complications. For prevention of ischemic damage, we need to screen the quality of the collateral of ulnar artery. Considering recent research trend, pulse plethysmography is more recommended than the Allen test[2].
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2. Valgimigli M, Campo G, Penzo C,et al. Transradial coronary catheterization and intervention across the whole spectrum of Allen test results. J Am Coll Cardiol. 2014;63:1833-41
Learning points: Before the radial artery cannulation, the ulnar artery should be checked for sufficient collateral circulation

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01AP18-7
Post-discharge Surgical Site Infection (SSI) is the most important predictor of 30 day unplanned readmissions in major non-cardiac surgery

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Introduction: Infection is an important cause of unplanned hospital readmission after discharge, with SSIs being one of the most common. In our population, SSI rates stand at 5.8%. SSI is also a potentially modifiable risk factor. Past studies have shown that approximately 50% of SSIs after elective surgery occur after discharge. We seek to review post-discharge SSI as the most important predictor of 30 day readmissions after major non-cardiac surgery.
Methodology: This was a retrospective study where patients aged 45 years and above and underwent both elective and emergency non-cardiac surgery and stayed in the hospital for more than 24 hours were included. All patients were also seen within 30 days on follow-up, and screened SSI evidence. Information such as pre-existing comorbids, 30 day readmission to the same hospital after discharge, and post-surgical complications were collected. Patients with SSI were further divided into pre-discharge and post-discharge. Logistic regression was used to determine whether SSI had significance as a predictor of 30 day readmission.
Results: 160 out of 2747 patients had SSI (5.8%), and 279 were readmitted within 30 days (10.2%). SSI accounted for 17.6% of 30 day readmissions, making it the most important predictor for unplanned 30 day readmission. Many factors increased risk of SSI, including diabetes mellitus, malignancy, hyperlipidaemia, hypertension, renal disease, ischemic heart disease, peripheral vascular disease, haematology coagulation disorders and cerebrovascular accidents. 129 of 160 patients developed SSI pre-discharge (80.6%), with 32 patients readmitted (24.8%). 27 had SSI post-discharge (16.9%), with 17 patients readmitted (63%). There is a significant difference between patients with SSI pre-discharge and post-discharge (p-value=0.032). Secondary outcomes including 30 day mortality, stroke, major adverse cardiac events, and new ESRD did not differ between those who developed SSI pre-discharge and post-discharge.
Conclusion: Post-discharge SSI is likely to be the most important predictor for 30 day readmissions. While a greater proportion of patients developed pre-discharge SSI, post-discharge SSI patients were twice as likely to be readmitted within 30 days, with no significant difference in secondary outcomes. The higher readmission rate in patients with post-discharge SSI could be due to early discharge or insufficient training for wound care. Ongoing surveillance after discharge remains key.

01AP18-8
A Retrospective Study on the Risk Factors Affecting 30-Day Readmissions in Singapore

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Background and Goal of Study: Unplanned hospital readmissions are seen as an indicator of suboptimal healthcare and an inefficient usage of resources. A US study in 2013 showed that prevention of all unplanned readmissions would lead to cost savings of $620 million. Strategies to reduce 30-day readmissions may be more effective if focused on patients who face the highest risk of readmission. Hence, we seek to find the risk factors affecting 30-day unplanned readmissions after non-cardiac surgery in a patient cohort in Singapore.
Materials and Methods: Patients aged 45 years and above and underwent non-cardiac surgery and stayed in the hospital for more than 24 hours were included in this study. Information on patients were collected, such as their past medical history to determine if they had any pre-surgical comorbidities, if they were readmitted to the same hospital within 30 days of discharge, and if there were any post-surgical complications. Elective readmissions were excluded. To determine the significant predictors of 30 day readmission among the comorbidities, univariate analysis was first used and significant factors with $p<0.05$ were extracted for the multivariate logistic regression model. We sought to determine why these comorbidities had significant association with 30-day readmissions by looking at the readmission diagnoses.
Results and Discussion: 283 out of 2747 patients(10.3%) were readmitted within 30 days. These patients are more likely to have diabetes, hypertension, ischemic heart disease, peripheral vascular disease, renal disease, malignancy, history of stroke, asthma and arrhythmias. Further multivariate analysis showed that histories of malignancy(OR=1.59),renal disease(OR=2.18),stroke(OR=1.54),asthma(OR=1.79) and arrhythmias(OR=1.61) were significant predictors of 30-day readmissions. In contrast to other studies, Diabetes Mellitus, liver disease, congestive heart failure, rheumatoid arthritis, anaemia and chronic pulmonary disease did not matter in our study. This is likely because the median age of our population is younger compared to that of other studies which are on patients aged 65 and above. The most common cause of readmissions was infections, featuring in 43.6% of renal patients,45.8% of stroke patients,22% of cancer patients,40% of those with arrhythmias and 32% of those with asthma.
Conclusion: More attention to preventing infections may reduce the risk of unplanned readmissions.

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01AP18-9
Incidence of Surgical Site Infections (SSI) in a university hospital in Singapore and its risk factors

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Introduction: SSIs are defined as infections occurring up to 30 days after surgery or <1 year after implant surgery, affecting incision or deep tissue at the operation site. According to WHO guidelines, in low and middle-income countries, 11% of surgical patients develop SSIs. Developed countries are no exception. In UK, SSI rates go up to 10%, while in US, SSIs occur in 5% of inpatient surgical patients. But this number is likely understated due to limited post discharge surveillance. There is also no data on Singapore. Our institute adopted the WHO surgical safety checklist, including timely and appropriate use of antibiotic prophylaxis, in 2011, with strict adherence. We seek to review the incidence of SSI in a university hospital in Singapore and its risk factors.
Methodology: This was a retrospective study where patients aged 45 years and above and underwent both elective and emergency non-cardiac surgery and stayed in the hospital for more than 24 hours were included. Information such as pre-existing comorbids, 30 day readmission to the same hospital after discharge, and post-surgical complications were collected. Univariate analysis was performed to identify factors associated with SSI, and significant factors subjected to multivariate logistic regression analysis. P-values <0.05 were considered statistically significant.
Results and discussion: 160 of 2747 patients developed SSI(5.8%), with 50 readmitted within 30 days(31.3%). Patients who developed SSIs were more likely to have pre-existing comorbidities such as diabetes mellitus, malignancy, hyperlipidaemia, hypertension, renal disease, ischemic heart disease, peripheral vascular disease, haematology coagulation disorders and cerebrovascular accidents. The greatest risk factors for SSI included haematology coagulation disorders(3.70 times higher in odds); renal disease(2.97 times) and cerebrovascular accidents(2.44 times). The low rate of SSI in our population(5.8%) could be due to a longer hospitalisation stay in Singaporean hospitals, since shorter hospitalisations

are a factor leading to increased post-discharge SSIs.
Conclusion: Singapore has a low SSI rate compared to other studies. This could be due to strict adherence to the WHO surgical safety checklist, and better follow-up care. Patients at higher risk of developing SSIs ought to be identified. Heightened surveillance and follow up on them, be it inpatient or post-discharge, would allow further reduction of SSI rates in our institute.

01AP18-10
PRe-Operative Prediction of postoperative DElirium by appropriate SCreening

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Background: Postoperative Delirium (POD) is the most common complication of elderly patients after surgery. POD leads to longer and more costly hospital treatment and even results in increased morbidity and mortality. Due to demographic developments this problem is becoming increasingly important in perioperative medicine. The risk for POD results from predisposing factors of the patient and precipitating factors of treatment, which could be identified in the context of preoperative evaluation and treatment planning.
Goal: The goal of the prospective observational study PROPDESC is to develop a tool for predicting the risk for POD based on preoperative routine data in order to do preliminary work for an interventional study on the reduction of POD.
Methods: A prospective observation of 1000 patients older than 60 years with operations of at least 60 minutes is planned for the evaluation and subsequent validation of a predictive instrument for the risk of POD. Patients will be included within 12 months from different surgical disciplines at University Hospital Bonn. In a multivariate analysis, PROPDESC investigates the correlation of preoperative anesthesiological risk stratifications, laboratory values, long-term medication, known risk factors, cognitive impairment (Montreal Cognitive Assessment, Informant Questionnaire on Cognitive Decline in the Elderly) and the treatment performed (surgery, anesthesia, intensive care and pain therapy) with the occurrence of POD. The patients are visited on the first five days after the operation respectively after the postoperative awakening from sedation. For delir assessment, CAM-ICU (Confusion Assessment Method for ICU) and DOS (Delirium Observation Scale) are used on the Intensive Care and Intermediate Care units, CAM (Confusion Assessment Method) 4AT (Alertness, Attention, Abbreviated Mental Test), ASE (Attention Screening Examination) images and DOS are used on the normal ward. In addition, vital parameters, pain assessment and the occurrence of postoperative complications are recorded on the rounds.
Results: Interim results for the evaluation of a predictive instrument for the risk of a POD are expected in April 2019 and will be used for the subsequent validation of the instrument.
Conclusions: The results of PROPDESC should enable the preoperative identification of patients at high risk for POD and thus serve as a preliminary work for an interventional study to reduce the incidence of POD in patients at risk.

01AP19-1
Continuous Wavelet Transform of Heart Rate Variability show better autonomic stability in propofol Target Controlled Infusion than manually bolus during induction of general anesthesia

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Background and Goal of Study: Some studies have compared the clinical profile during propofol induction anesthesia with Target-controlled infusion (TCI) and manually showed similar control of anesthesia, such as depth of anaesthesia and hemodynamic stability, but did not use an objective measure of instantaneous autonomic activity during the brief time of induction anesthesia. We use the Continuous Wavelet Transform (CWT) to test whether the heart rate variability (HRV), an autonomic index, is more stable during propofol TCI or traditional manually bolus.
Materials and Methods: Sixty ASA physical status I or III patients were randomly allocated into propofol TCI (INJECTOMAT TIVA AGILIA) or manually bolus for induction of anesthesia. Group I received TCI at 5-6 ug/ml target effect concentration (Ce), groups II received an induction bolus of propofol (2-2.5mg/kg). Spectral analysis of HRV was using CWT, resulted in a characteristic power spectrum with two main regions, a high frequency (HF) and a low frequency (LF). LF, HF, and LF/HF were calculated from awake to two minutes after induction of anesthesia. The difference between groups with time was evaluated by nonlinear mixed model.
Results and Discussion: It can be seen that propofol manually bolus and TCI of both resulted in a significant non-linear curved relationship in HR, L/H ratio, LF, HF, normalized LF and normalized HF in a time-dependent manner. Besides, there are statistical significant time-varying differences between bolus and TCI groups in HR, L/H ratio, LF, HF, normalized LF and normalized HF (Table 1). We conclude that propofol induction anesthesia with TCI or bolus result in totally different impact on ANS during induction anesthesia. TCI improved autonomic stability during the brief time of propofol administration when compared with manual bolus.
Conclusions: Results from our study indicate that propofol induction with TCI or manually bolus show considerable differences in their effects on HRV stability. Intraoperative assessing ANS activity would be important to improve the prediction of the hemodynamic response. Our results suggest that CWT during propofol administration is able to overcome nonstationary limitations, thus providing a potential real-time monitoring approach for patients receiving anesthesia.

01AP19-2
The Application of Anesthetic Depth Monitoring for Sedation during General Anesthesia: a Prospective Study

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Background and Goal of Study: Since modern computer technology and complex statistical modeling techniques were advanced, raw electroencephalogram (EEG) signals have been processed to be transformed as quantitative numbers that indicate the quantitative EEG indexes (qEEGi) used for hypnosis status during anesthesia. ADMSTM (Anesthetic Depth Monitor for Sedation, Unimedics CO., LTD., Seoul, Korea) is a newly developed anesthetic depth monitor, which displays the patient's arousal state as a score of 0-99 points. This monitor provides a uCON of the qEEGi using mono-spectral power analysis and an Adaptive Neural Fuzzy Inference System (ANFIS), identical to the qCON index. Although many studies have been conducted with bispectral index (BIS) monitor monitor, the effect of using ADMS for monitoring anesthetic depth is not well known. Therefore, we performed this study to assess the validity of ADMS monitoring by comparison with BIS monitoring.
Materials and Methods: After approval by the Institutional Review Board, 79adult patients scheduled for general anesthesia with sevoflurane were included. Bispectral index (BIS) sensor and Unicon sensor were placed to each patient. Data from each device were collected at awake, loss of consciousness, intubation, incision, every 5 minutes during the operative period and emergence. These data were downloaded from BIS and ADMS monitor. We compared the values using scatter plot and Bland-Altman analyses. The limit of agreement was defined as a bias of ± 1.96 SD in which 95% of the difference between the two sensors were expected to lie. We considered a clinically acceptable level of limit of agreement to be ± 10 BIS units.
Results and Discussion: Total 1062 data was included in this study. Scatter plot analysis revealed a significant correlation between BIS and ADMS values at all time points ($R = 0.931$, $P < 0.001$). Bland-Altman analysis of BIS and ADMS values resulted in a bias of 5.2 with limits of agreement of 7.5 and 4.8 during total anesthesia. Additional values revealed -1.4 bias (3.1, -2.1) during awake, -1.4 bias (5.5, -2.6) at loss of consciousness, 7.4 bias (7.2, 6.9) during maintenance, and 0.2 bias (5.2, -0.9) during emergence.
Conclusions: This present study provided evidence of close correlation between ADMS and BIS monitoring during general anesthesia with sevoflurane. Therefore, we concluded that ADMS monitoring can be the alternative method to assess the depth of anesthesia.

01AP19-3
Comparative analysis of Phase lag entropy (PLE) and Bispectral Index (BIS) as an anesthetic depth indicator in patients undergoing thyroid surgery with nerve integrity monitoring

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Background and Goal of Study: Phase lag entropy (PLE) monitor (PLEM100, Inbody Co., Ltd, Seoul, South Korea), developed by using phase lag entropy algorithm, is a 4-channel EEG monitoring device. As a new measure, PLE can predict the complexity of communication by calculating the diverse connectivity of temporal patterns of the phase relationships between two EEG signals from prefrontal and frontal montages [1]. We aimed to evaluate the performance of PLE for assessing the depth of anesthesia during induction, nerve integrity monitoring(NIM) and emergence periods, compared to Bispectral index (BIS).
Materials and Methods: Thirty-four patients undergoing thyroid surgery were enrolled. After applying PLE and BIS sensors simultaneously and recording of initial values, propofol was started to infuse at target effect-site concentration (Ce) of 2 μg/mL via target-controlled infusion (TCI) device. BIS and PLE values were recorded at the time when the calculated Ce shown on the TCI device equals 2.0, 3.0, 4.0 and 5.0 μg/ml. After propofol Ce reached 5 μg/ml, remifentanil was started as target Ce

4.0 ng/mL and the trachea was intubated after administration of rocuronium 0.6mg/kg. Propofol and remifentanil Ce were titrated to maintain BIS values 40-60. NIM is conducted with 1.0 mA at three-time points: after exposure of platysma muscle, after exposure of thyroid, and after exposure of recurrent laryngeal nerve. During emergence periods, PLE and BIS were recorded until full recovery of orientation.
Results and Discussion: PLE and BIS values decreased progressively with increasing propofol Ce and increased during emergence from anesthesia. PLE values were correlated with the propofol Ce to an extent comparable with the correlation between BIS and propofol Ce. There was a significant statistical difference between PLE and BIS values during NIM and emergence periods, but the difference can be clinically acceptable.
Conclusion: PLE may be a viable alternative to the BIS for evaluating consciousness during the induction and emergence periods, as well as during nerve integrity monitoring.
References:
Hum Brain Mapp 2017; 38:4980-95

NIM	BIS	PLE	P
Platysma	36.5± 6.87	41.41±5.47	0.002
Thyroid	35.53±6.50	39.74±5.50	0.005
Recurrent laryngeal nerve	39.94±5.10	38.44±12.29	0.513

01AP19-4
POCT Accuchek II Blood Glucosemeter shows concordance with Hexokinase Plasma method during surgery under general anaesthesia.
A prospective cohort analysis

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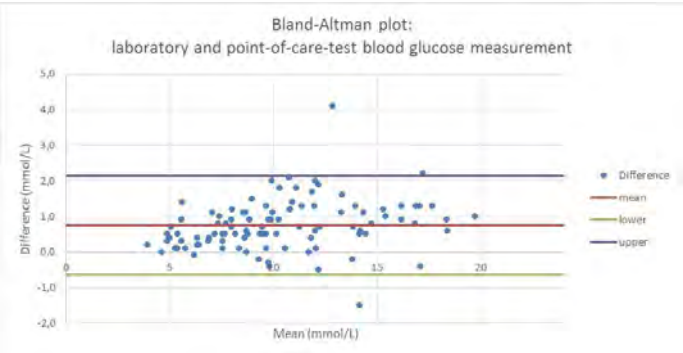
Background and Goal of Study: Blood glucose (BG) levels of patients with diabetes mellitus (DM) are monitored during surgery under general anaesthesia to prevent hypo- and hyperglycaemia. Usually arterial or venous blood samples are sent to the clinical laboratory at regular intervals for analysis. Access to point-of-care test (POCT) BG meters inside an operation room will provide monitoring at shorter intervals and may improve glycaemic control. However, these glucose meters are not validated for use in patients under general anaesthesia. In this study we investigated the concordance between Accuchek Inform II POCT BG meter (Roche, Accuchek Inform II, Mannheim, Germany) versus a laboratory Hexokinase Plasma reference method (Cobas 8000, Roche, Mannheim, Germany) in patients during surgery under general anaesthesia.
Materials and Methods: In this prospective cohort study, we included 103 BG measurements from 75 patients with insulin-dependent DM (n=67), non-insulin-dependent DM (n=4) and no DM (n=4) who underwent elective surgery under general anaesthesia and received an arterial catheter for hemodynamic monitoring. Arterial blood samples were taken at intervals of at least 60 minutes. One drop of blood was used for measurement with POCT BG meter and the residual blood was sent to the clinical laboratory in a sodium fluoride ethylenediaminetetraacetic acid citrate tube (Vacuette FC MIX blood collection, Greiner, Austria) to prevent glycolysis. Time of sampling and body temperature were registered. After all data was collected, a Bland-Altman plot was used to image the concordance between the different methods with a significance level of 5% (α=0.05).
Results and Discussion: A total of 103 blood samples were obtained. Most results (n=100; 97%) were in concordance with the reference method, with an average difference of 0.8 mmol/L (SD 0.7) (14.4 mg/dL (SD 12.6)) at which POCT BG meter measurements were in general lower.
Conclusion: BG measurements during surgery with patients under general anaesthesia using a POCT BG meter are in accordance with standard clinical laboratory analysis and add no additional risk for hypoglycaemia.



01AP19-5
Ankle-brachial index as a predictor for hemodynamic changes during anesthesia induction

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Background and Goal of Study: The present study aimed to investigate the relationship between the ankle-brachial index (ABI) and hemodynamic changes and to evaluate the availability of the ABI as a predictive factor for hemodynamic changes during anesthesia induction.
Materials and Methods: After obtaining Institutional Review Board approval (H-1804-025-066) and informed consent, 42 patients scheduled to undergo elective surgery under general anesthesia were enrolled. On the day before surgery, ABI was measured using a handheld Doppler (Hadeco Bi-directional Doppler ES-100V3, Hadeco, Kawasaki, Japan), and the mean value of left and right ABI (ABI_m) was used for the analysis. Non-invasive systolic (SBP) and diastolic blood pressure (DBP; CARESCAPE Monitor B850, GE Healthcare, Milwaukee, WI) were measured at the following three-time points: T1—pre-induction, T2—prior to intubation, and T3—intubation. The amount of hemodynamic changes was calculated as follows: (1) amount of SBP change at T2 (ΔSBP_{T2}): (SBP at T2 – SBP at T1)/SBP at T1; (2) amount of DBP change at T2 (ΔDBP_{T2}): (DBP at T2 – DBP at T1)/DBP at T1; (3) amount of SBP change at T3 (ΔSBP_{T3}): (SBP at T3 – SBP at T1)/SBP at T1; and (4) amount of DBP change at T3 (ΔDBP_{T3}): (DBP at T3 – DBP at T1)/DBP at T1. A significant hemodynamic change was considered to occur if any of the amounts of hemodynamic changes (ΔSBP_{T2}, ΔDBP_{T2}, ΔSBP_{T3}, or ΔDBP_{T3}) was above 0.2. The Spearman's correlation and the receiver operating characteristic (ROC) curve were used for statistical analysis.
Results and Discussion: The Spearman's correlation coefficients between the ABI_m values and the amount of hemodynamic changes (ΔSBP_{T2}, ΔDBP_{T2}, ΔSBP_{T3}, and ΔDBP_{T3}) were -0.388, -0.426, -0.093, and -0.043, respectively (p-values: 0.011, 0.005, 0.560, and 0.785 respectively). The area under the curves of ABI_m for predicting significant changes in ΔSBP_{T2} and ΔDBP_{T2} were 0.723 (95% confidence interval [CI]: 0.563-0.849) and 0.751 (95% CI: 0.593-0.871; Figure 1)
Conclusions: The ABI could be a useful tool for predicting changes in vital signs during induction of general anesthesia.

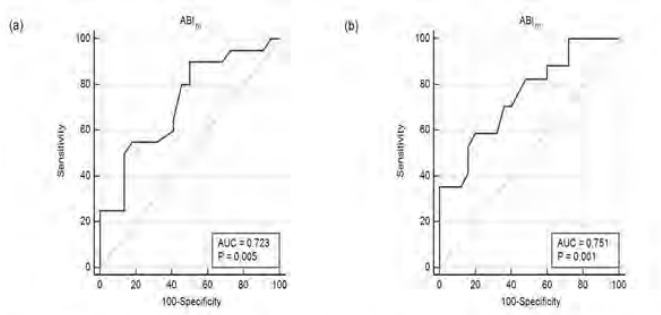

Figure 1. The ROC curves of ABIm for predicting significant changes in ΔSBPT2 (a) and ΔDBPT2 (b). A significant hemodynamic change was considered to occur if any of the amounts of hemodynamic changes (ΔSBPT2, ΔDBPT2, ΔSBPT3, or ΔDBPT3) was above 0.2. ABIm: the mean value of left and right ABI; ΔSBPT2: amount of SBP change at T2 (prior to intubation); ΔDBPT2: amount of DBP change at T2.

01AP19-6
Misinterpretation and Limitations of Bilateral Depth of Anesthesia Monitoring with Propofol plus Dexmedetomidine – A Case of Awareness?

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Background: Bilateral BISTM is a useful tool that allows us to titrate hypnotics while observing their density spectral array (DSA) signatures. The authors report a suspected case of awareness in a patient submited to a total colectomy under propofol and dexmedetomidine (dex) included in an opioid-sparing anesthesia 1.
Case Report: A 65 year-old man, ASA II was scheduled for a laparoscopic total colectomy. ASA standard monitoring, Bilateral BISTM, NMT- Mechanosensor®, ANI and Cheetah Starling™ SV were used. A combined anesthetia with TCI-guided propofol/remifentanil, dex (0.2-0.7mcg/kg/h), ketamine (bolus 20 mg + 20mg/h) and lidocaine (bolus 170mg + 170mg/h) plus thoracic (T8-T9) epidural (ropivacaine bolus 15mg + 10mg/h) was performed. Deep muscle relaxation was kept with rocuronium (total 150mg). During the procedure, dex was titrated to a maximum of 0.7mcg/kg/h and propofol Ce based on BISTM (values 40-60). Nearly 3:30h after induction, BISTM was between 30-40 while the trend graphic was

decreasing. Propofol Ce was adjusted from 1.5 to 0.5 and 30 mins later, a flat EEG appeared, BISTM suddenly rose from 35 to 74, suppression rate (SR) from 0 to 10, SEF from12 to 25 and DSA revealed a general loss in power of every wavelength. EMG was 0dB. HR rose from 60 to 90bpm, SBP from 100 to 190mmHg and the patient remained immobile. Propofol Ce was thereafter adjusted to 2.0 and BISTM values returned to 40-50, SR to 0, and SEF to 12-15Hz. δ waves & α oscillations reappeared on both raw EEG and DSA. After emergence, no recall was made spontaneously, although the patient mentioned a “death nightmare”. Modified Brice Test was applied at day 2 and 1 month after the procedure, both compatible with an awareness event, disregarded by the patient.

Discussion: Titration of dex/propofol infusions based mainly on BISTM values and their tendencies might be an inaccurate strategy to adequately manage depth of anesthesia. Concomitantly, discordant information was observed on the monitor during the wakefulness event. The authors believe that this might have happened because patient’s baseline EEG amplitudes were low, which made the monitor to assume the β & γ frequency waves as isoeletricity (defined by BISTM monitors as A <5mcV).

References:

1. Kaur, M. et al. (2011). Current role of dexmedetomidine in clinical anesthesia and intensive care. Anesthesia: Essays and Researches, 5(2), p.128.

Learning points: Bilateral BIS TM pitfalls; DSA hallmarks; Awareness screening tools.

01AP19-7
Estimation of Systemic Vascular Resistance by Photoplethysmographic Analysis during General Anesthesia: A Pilot Study

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Background and Goal of Study: Assessment of systemic vascular resistance (SVR) plays an important role in hemodynamic management during general anesthesia. In contrast to evaluating SVR using a pulmonary artery catheter (PAC), which is an invasive technique, pulse oximetry is a non-invasive technique by which a photoplethysmogram (PPG) is obtained. Although some reports have shown a relationship between PPG and SVR, it still remains uncertain whether SVR can be estimated by a PPG. Our goal was to determine the validity of SVR estimation by analysis of a PPG during general anesthesia.
Materials and Methods: This retrospective, observational study consisted of the two parts. First, we calculated a regression equation between the reflection index (RI; ratio between the heights of the backward and forward PPG waves) obtained from a PPG and SVR determined by using a PAC. Second, we assessed the validity of the regression equation. Patients who underwent cardiac surgery under general anesthesia were included. A PPG was obtained from the fingertip using an infrared finger probe (Nellcor™ NELL1; Medtronic, Boulder, CO, USA). Mean arterial pressure was measured with a radial artery catheter. A central venous catheter was used for central venous pressure measurement. Cardiac output was determined by the thermodilution method using a PAC. We obtained data for PPG waveforms and hemodynamic parameters at 10 time points for each patient and calculated the RI and SVR. In the first part, regression analysis between the RI and SVR was carried out. In the second part, we assessed the validity of the calculated regression equation by using Pearson’s correlation analysis and a Bland-Altman plot.
Results and Discussion: Twenty patients were included in this study. Regression analysis using data from 10 patients showed that a linear regression equation using the RI quantified SVR accurately (adjusted R2 = 0.651, $p < 0.0001$). Pearson’s correlation analysis with the calculated regression equation using data from the other 10 patients showed a strong correlation between SVR and estimated SVR ($r = 0.848$, 95% CI, 0.782-0.895; $p < 0.0001$). In the Bland-Altman analysis, the mean bias of estimated SVR was -102 dyn□sec□cm-5 (SD, ± 181 dyn□sec□cm-5). The percentage error of estimated SVR was 29%.
Conclusion: Estimation of SVR with the RI calculated by PPG analysis exhibited good accuracy and precision during general anesthesia.

01AP19-8
Induction with Propofol and Etomidate: a Comparative Study of Hypnotic Depth Analysing Entropy and Hemodynamic Parameters.

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Goal of Study: We compare the hypnotic depth achieved with usual induction doses of Propofol (Pf) and Etomidate (Et) in anaesthetic induction under a continuous register of entropy and hemodynamic parameters. Also, we analyse whether the hypnotic depth is maintained for the time necessary to achieve optimal intubation conditions.
Materials and Methods: A sample of 92 patients -randomly selected- has been taken from the entire population of general or urological surgery interventions at the “Hospital Clínico San Carlos” (Spain) over 24 months. The sample includes a fair distribution in the use of Pf or Et (Pr group n= 47; Et group n= 45) with both groups being similar in terms of demographic level, ASA and BMI. Patients with pathology or treatments that could alter the electroencephalographic record or hemodynamic parameters are excluded. Neuromuscular function is monitored to ensure deep block. We make a continuous record of the entropy, HR, BP and Sao2 values from the administration of the drug until there is some sign of superficialization, understanding as such a rise in entropy> 50 or elevation of BP or HR <20% of the initial values. Patients who do not reach entropy <50 at 3 min post-induction are withdrawn from the study.
Results and Discussion: The analysis result is compared using the Pearson metric. 7 patients in Et group are removed due to not reaching entropy values <50 after 3 minutes. The comparative study reveals significant differences in the minimum entropy values obtained, but no differences in terms of the duration of the record. In the Pr group, 97.87% of the patients presented signs of superficialization secondary to excessive elevation of entropy, although this percentage clearly reduces to 55.26% for the Et group, since almost half of them are due to elevation of hemodynamic parameters (Figures 1-2) In both groups, patients have a deep block, so it seems that myoclonus secondary to Et could not explain the behaviour of entropy.
Conclusions: The anaesthetic inductions with Pr reach standard hypnotic depth levels and allow to perform the orotracheal intubation manoeuvres. Although additional studies are required, our comparative analysis reveals that 15% of patients do not achieve adequate levels of hypnosis as measured by entropy with standard doses of Et. Therefore, we conclude that it is possible that induction with standard doses of Et could not reach entropy values that guarantee an adequate hypnotic depth in all cases.

01AP19-9
Can NOL index calibration help to individualize remifentanil TCI before skin incision?

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Background and Goal of Study: The NOL index (Medasense, Israel) is designed to define the optimal Nociception-AntiNociception (NAN) balance during general anaesthesia. The aim of the study was to assess if the remifentanil effect site concentration (Ce) required to abolish the NOL response to a tetanic noxious stimulus (Tetanos 100 Hz, 50 mamp during 30 seconds = TET100) could help to calibrate the NAN balance by predicting the Ce required for surgery.
Materials and Methods: This prospective pilot study was reviewed and accepted by the in-hospital ethics committee. We recruited 8 thyroidectomy and 8 CABG patients. After tracheal intubation under propofol-remifentanil TCI anaesthesia and rocuronium (0.6 mg/kg), a TET100 stimulus was delivered by two electrodes on the ulnar nerve (Algiscan, Idmed, Marseille, France) at a remifentanil Ce of 4 ng/ml (Minto set) when NOL was below 10. If the NOL index absolute value response exceeded 20, the Ce was increased by 1 ng/ml increment step until NOL response was abolished. This Ce served as reference and was targeted for skin incision and surgery. Propofol TCI was titrated to maintain a Bispectral Index between 40 and 60 at all times. Blood pressure was maintained within a 20% range of the pre-operative normal values of the patient using vasoactive agents if necessary.
Results and Discussion: The mean Ce calibration values to abolish the NOL response to TET100 was significantly lower in patients undergoing cardiac than thyroid surgery (see Table). Mean age between groups also differed significantly. Heart rate always remained in the 20% proposed range. One thyroid patient needed a bolus of vasodilator agent during surgery. There was a moderate linear correlation between the NOL variation observed after TET100 at a Ce of 4 ng/ml and the calibrated Ce (R-square = 0.535).

mean ± SD (median)	Thyroid	Cardiac	Mann-Whitney test, p-value
Age	48.7 ± 10.8 (47)	74.6 ± 10.9 (77.5)	0.0022
Calibrated Ce	5.9 ± 1.4 (5.5)	4.0 ± 0.6 (4)	0.006
Δ NOL first TET100	31.2 ± 13.7 (25)	15.4 ± 12.1 (13)	0.006

Conclusion: During propofol remifentanil TCI, a calibration NAN balance test using TET100 performed before skin incision could help to individualize the appropriate remifentanil Ce required to maintain adequate haemodynamic stability during surgery.

01AP19-10
The predictive value of age and comorbidities on intraoperative alpha power of the surface electroencephalogram during surgery

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Background and Goal of Study: Depth of anaesthesia (DoA) monitors use EEG derived parameters to calculate an arbitrary number depicting the level of hypnosis. Most of these parameters come from fast fourier transformed epochs of EEG, which provides detailed information of the amount (power) of predefined segments of EEG frequencies (e.g. Alpha power).1 Purdon et al reported a significant negative effect of age on frontal alpha power during sevoflurane anaesthesia.2 This is of essential interest as anteriorization of alpha rhythms occur during anaesthetics-induced unconsciousness.3 We wanted to test the predictive value of age and comorbidities on frontal alpha power during isoflurane anaesthesia.
Materials and Methods: We analyzed the two channel frontal EEG of 586 patients undergoing cardiac surgery (EPOCAS trial;NCT02976584). Relevant comorbidities and demographics were recorded according to EuroScore II. Sampling frequency was 125/second, electrode impedance levels were kept below 5 k-Ohms. We performed lasso (least absolute shrinkage and selection operator) regression to select the strongest factors effecting Alpha Power out of the following: Age, anaemia, uncontrolled hypertension, transient ischemic attack (TIA) or stroke, extracardiac arteriopathy, diabetes, glomerular filtration rate (GFR), sodium, BMI, liver disease, gender, left ventricular function, pulmonary hypertension, chronic pulmonary disease, acute endocarditis, aneurysmatic thoracic aorta, minimal alveolar concentration(MAC), coronary artery disease (CAD) or temperature (R version 3.3.3). Calibration was carried out on 70% of the data, validation on the remaining 30%. Matlab (R2016a, The MathWorks) was used to calculate Alpha power.
Results and Discussion: Out of the 19 factors 12 (underlined above) were selected by lasso regression to predict alpha power highly significantly (P=2.2e-16). The calibration model resulted in a R2 of 0.3 versus 0.26 of the validation model. Age alone resulted in a R2 of 0.15 (P=0.0004).
Conclusion: Comorbidities & age are significant predictors of frontal alpha power during general anaesthesia with isoflurane, possibly leading to misclassification of DoA by algorithm-based monitors in comorbid patients. This might pose the risk of under- or overdosing possibly leading to delirium or awareness.
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Ambulatory Anaesthesia

02AP01-1
The Safety and Efficacy of Target-Controlled Infusion versus Intermittent Bolus of Propofol for Sedation on Colonoscopy: A Randomized Controlled Trial

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Background and Goal of Study: Target-controlled infusion is well established for accurate drug delivery during anesthesia and it could also be useful in diagnostic procedures, in which the control of the level of sedation is important for performing the procedure and for patient safety. The aim of this study was to compare the target-controlled infusion with the intermittent bolus technique for propofol infusion during colonoscopy, regarding safety and efficacy
Materials and Methods: We conducted a prospective single-blinded randomized controlled trial in 34 adults ASA I-II, both sexes, aged 20 to 61 years, Body Mass Index between 19 to 30 $kg.m^{-2}$, undergoing colonoscopy at Cancer Hospital of Mato Grosso, Brazil. With continuous standard monitoring and 2 $l.min^{-1}$ oxygen supply via a nasal catheter, all patients received intravenous fentanyl, 1 $\mu g.kg^{-1}$, and were randomly allocated in two groups to be sedated with propofol by target-controlled infusion (TCI group, n=17, 2 μg.ml-1 plus 0.5 $\mu g.ml^{-1}$ according to the need - agitation, reaction to the procedure) or intermittent manual bolus (control group, n=17, 1 $mg.kg^{-1}$ plus 0.5 $mg.kg^{-1}$ according to the need). The primary outcome was the need of airway maneuvers (safety), evaluated as the number of jaw-thrust and facemask ventilation interventions triggered by SpO2 < 90%, and the number of interventions to control the level of sedation (efficacy), defined as number of dose adjustments (target correction or additional boluses of propofol). Secondary outcomes were the number of times for incidence of agitation and wake-up time. Data were compared with Fisher's exact test, Mann-Whitney or Student's t-test, as appropriate. Values are presented as median [interquartile range] or mean (standard deviation) and p<0.05 was considered statistically significant.
Results and Discussion: The number of airway maneuvers was 0 [0-0] and 0 [0-3], p=0.151, for TCI and control groups, respectively. The number of propofol dose adjustments was 1 [0-4] and 3 [2-5], p<0.001, for TCI and control groups, respectively. The incidence of agitation was 1 [0-2] and 2 [0-4], p=0.036, for TCI and control groups, respectively. The wake-up time was 4.4 (1.4) and 2.1 (1.9) minutes, p=0.001, for TCI and control groups, respectively.
Conclusion: Target-controlled infusion is equally safe as intermittent bolus infusion of propofol for sedation in colonoscopies, but reduces the incidence of agitation and the need for dose adjustments.

02AP01-2
Comparison of effects on respiration between dexmedetomidine and propofol sedation for ultrasound-guided radiofrequency ablation of hepatic neoplasm

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Background and Goal of study: Percutaneous radiofrequency ablation (RFA) is performed widely due to less invasiveness, relative safety, and reasonable cost. Despite of pain and discomfort, the patients must control their breathing at the request of the operator during procedure without body movement for precise and effective therapy. Therefore, adequate level of sedation and pain management is essential in RFA of hepatic neoplasm. Dexmedetomidine has sedative and analgesic effect, and it also shows a minimal respiratory depression than propofol. In this study, we compared a respiratory pattern of patients who sedated with dexmedetomidine and propofol during RFA of hepatic neoplasm. Our hypothesis is that dexmedetomidine provides more stable respiratory pattern than propofol.
Material and Methods: A total of 62 patients who were undergoing RFA, aged 20-70 years, were randomly allocated to two groups. Patients received either dexmedetomidine-remifentanil (group DR) or propofol-remifentanil (group PR) continuous infusion during RFA. We measured each tidal volume of patient's respiration for 1 min at 5 time points and compared the standard deviation of tidal volume (SDvt) between the two groups. The level of sedation, hemodynamic variables, satisfaction rate of operators and patients, pain scores and complications were also recorded.
Results and discussion: The SDvt at 10 min after start of RFA between the two

groups, primary outcome, was not statistically different (P=0.09). However, there was significant difference of SDvt over time, i.e. trend, between group DR and PR (P=0.015, ß=-0.151). The SDvt of group PR was significantly increased over time compared to the group DR (P = 0.004, ß = 0.142). The increment in end-tidal CO2 (ETCO2) in group PR was larger than that in group DR over time (P = 0.021, ß = -0.91). The heart rate was significantly decreased during the sedation in only group DR (P < 0.001, ß = -2.32). Satisfaction of operator was significantly higher and the incidence of apnea was lower in group DR (P = 0.010, P = 0.009, respectively). The both level of sedation and analgesia during the sedation was not different between the two groups.
Conclusion: Compared with propofol, sedation using dexmedetomidine during RFA of hepatic neoplasm provided more regular respiration, less apnea, less retention of ETCO2, higher satisfaction of operator, and a tendency to decrease heart rate.

02AP01-3
Our experience with sedation during gastrointestinal system endoscopy in children: retrospective study

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Background and Goal of Study: The aim of our study is to evaluate the efficacy and safety of sedation anesthesia by sedative agents such as midazolam, ketamine, propofol applied during gastrointestinal system endoscopy procedures in pediatric patients.
Materials and Methods: Total of 78 pediatric patients aged from 5 months to 18 years, who have been applied upper and/or lower gastrointestinal endoscopy with sedation anesthesia were evaluated retrospectively. Group 1 (control) which the ketamine is not used, Group (2) which the ketamine is used at a dose of 0.75 mg/kg and at lower dose, and Group (3) which the ketamine is used at a dose of 1mg/kg and at higher dose were compared in terms of demographic data (Table 1), duration of anesthesia and endoscopy procedure and recovery period.

	Group 1 (n= 17)	Group 2 (n= 30)	Group 3 (n= 31)	p-value
Age(Year)	8,2 ± 5,7	11,3 ± 5,5	11,1 ± 4,9	0,132
Height(cm)	112,0 ± 36,4[α]	136,4 ±34,5	136,3 ± 27,4	0,028
Weight (kg)	24,5 ± 18,2[α]	42,4 ± 23,7	35,1 ± 14,19	0,012
Body Mass Index (BMI)	17,8 ± 4,0	20,5 ± 5,7	18,4 ± 3,9	0,105
Endoscopy Area n (%)[1]				
Upper GIS n (%)	17 (21,8%)	27 (34, 6%)	18 (23,1%)	0,001
Lower GIS n (%)	0 (0%)	3 (3,8%)	7 (9,0%)	
Upper and Lower GIS n (%)	0 (0%)	0 (0%)	6 (7,7%)	

n: Number of patient Average ± Standard deviation p<0,05 significance level
*: In comparison of Group 1 – Group 2, p < 0,05
£: In comparison of Group 1 – Group 3, p < 0,05
β: In comparison between Groups, p < 0,05

Results and Discussion: When the amount of first dose of propofol was compared, it was observed that the averages of the control group was higher than the averages of Group 2 and Group 3, p= 0,000 and p=0,003 respectively. In terms of duration of anesthesia, averages of Group 3 was higher than Group 1 and Group 2 (p=0.000 and p=0.005 respectively). There was no significant difference on sedation score and recovery period (10 mins.) between the groups (Table 2).

	Group 1 (n= 17)	Group 2 (n= 30)	Group 3 (n= 31)	p-value
Duration of Anesthesia (min.)	13,5± 10,8[β]	19,3± 13,4[£]	31,0 ±16,1	0,000
First dose midazolam mg/kg	0,02±0,00	0,02±0,00	0,02±0,00	
First dose ketamine mg/kg	0±0	0,61±0,10	1,06 ±0,07	
First dose propofol mg/kg	1,55±,42[*β]	1,02±,34	1,16 ±0,38	0,000
Additional dose propofol mg/kg	,33±,40[β]	,33±,53[£]	,91 ±,91	0,002
Total dose propofol mg/kg	1,88±,58	1,36±,68[£]	2,08±1,13	0,007
Sedation score 5. mins	4,00±,00	4,00±,28	3,97 ±,18	0,378
Modified aldrete score (9) 0.min n (%) [α]	11 (64,7%)	11 (36,7%)	23 (51,1%)	0,004
Recovery Period (10) (min)	8,12±3,58	9,70±3,88	9,35±4,54	0,438

n: number of patient
Average ± Standard deviation
P<0,05 significance level
*: Comparison of Group 1 – Group 2, p< 0,05
£: Comparison of Group 2 – Group 3, p< 0,05
β: Comparison of Group 1 – Group 3, p<0,05
α: Comparison between Groups, p<0,05

As endoscopic procedures for GIS diseases increased in children, deep sedation requirement for children is also increased. However, there is no ideal protocol for sedation used during endoscopic procedures of children (2).
Conclusion: By reaching sufficient sedation depth, reducing hypnotic requirement, providing a quick recovery period and by not observing major complications induced by ketamine, it is supported that the ketamine which is used in different doses in pediatric endoscopic procedures is a safe drug. Major clinical trials are needed to better evaluate our findings.

02AP01-5
Effective analgesia and quick recovery in minor gynecologic operations; retrospective analysis

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Background and Goal of Study: Although minor gynecologic operations take short time, they require anesthesia which provides sufficient analgesia, quick onset and recovery because of severe pain during the procedure (1).
In this study, it has been aimed that the comparison of efficiency tramadol, paracetamol and dexketoprofen trometamol on pain and sedation in the intraoperative and recovery period in patients who underwent elective dilatation/curettage or revision curettage operation.
Materials and Methods: In addition to sedation anesthesia induced by propofol, in order to prevent pain, the patients who were applied 1mg/kg intravenous tramadol were evaluated as a control group (Group T), the patients who were applied intravenous 25 mg dexketoprofen trometamol were evaluated as (Group D), and the patients who were applied intravenous infusion 1000 mg paracetamol were evaluated as (Group P).
The demographic data (Table 1), analgesia, sedation and recovery scores of patients were compared.

	Group T (n= 60)	Group D (n= 60)	Group P (n= 60)	p-value
Age(year)	35,5 ± 8,8	32,3 ± 8,7*	36,6 ± 10,5	0,032
Body Mass Index (BMI)	27,2 ± 4,1	27,0 ± 5,4	26,8 ± 4,9	0,916
ASA (n)	ASA I= 53 ASA II= 7	ASA I= 47 ASA II= 13	ASA I= 49 ASA II= 11	0,336
R&C (n)£	46 (%76,7)	55 (91,7)	40 (66,7)	0,007
Duration of Operation (min)	5,8 ± 3,0	6,3 ± 3,0	6,0 ± 3,7	0,725
Duration of Anesthesia (min)	6,3 ± 3,0	6,9 ± 3,5	7,0 ± 3,7	0,484
Additional dose of propofol amount (mg)	45,8 ± 41,7	45,3 ± 37,0	47,5 ± 38,2	0,951
Total dose of propofol amount (mg)	106,1±18,9	104,5 ± 20,9	105,3 ± 21,1	0,905

n: Number of patient Average ± Standard deviation p<0,05 significance level

*: In comparison of Group D – Group P, p= 0,032

£: In comparison between Groups, p= 0,007

Table: 1 Demographic data and surgical procedure variables

Results and Discussion: It was observed that there was a significant difference between Group T and Group D in terms of VAS values (p=0.02), it was observed that the VAS averages of Group T was higher than the VAS averages of Group D. When Group P and Group D were compared in terms of VAS averages, the VAS values of Group P was higher (p=0.016) (Table 2).

	Group T (n= 60)	Group D (n= 60)	Group P (n= 60)	p-value
VAS (0- 10)				<0,01
Pre-operation	,47±,96	,53±1,09	,38±,97	
During operation	,65±1,07	,08±,38*£	,05 ±,38	
Postoperative 5. mins	,75±1,33	,27±,84*£	1,05 ±1,64	
Postoperative 30. mins	,62±1,18	,30±,76*£	1,0 ±1,41	
Postoperative 1. hour	,00±,00	,00±,00	,03±,25	
Postoperative additional analgesic requirement n (%)	10 (16,7%)	3 (5,0%)	14 (23,3%)	0,017
Patient Satisfaction Great, n (%)	25 (41,7%)	47 (78,3%)	26 (43,3%)	<0,01
Surgeon Satisfaction Good, n(%)	48 (80%)	56 (93,3%)	50 (83,3%)	0,096

n: number of patient
Average ± Standard deviation
P<0,05 significance level

*: Comparison of Group T – Group D, p= 0,02
£: Comparison of Group D – Group P, p= 0,016

Table: 2 Analgesic properties, patient and surgeon satisfaction

Arıbogan et al. determined that intravenous dexketoprofen trometamol provided efficient analgesia compared to intravenous paracetamol and placebo after ambulatory operative hysteroscopy (2).

Conclusion: It was observed that the dexketoprofen trometamol applied with intravenous line, which the analgesic efficiency was examined in terms of oral use in similar patient groups previously, provided better analgesic efficiency compared to tramadol and paracetamol in terms of VAS pain score and additional analgesia requirements.

02AP01-6

Unrecognized Increases in Midazolam Concentration after Intermittent Administrations for Dental Patients under Sedation

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Background and Goal of Study: Intravenous sedation is required for relieving patient anxiety during dental treatment. In our institute, the intermittent and repeated administrations of midazolam (1 mg each) after the initial bolus infusion (2 – 4 mg) had empirically applied, however, the pharmacological assessment was limited. The maintenance of adequate depth was dependent on the evaluation of each individual anesthesiologists. In the current study, the plasma and the effect-site concentration of midazolam were retrospectively simulated.

Materials and Methods: After the approval of Ethical Committee of Nagoya University Hospital, the successive 57 anaesthesia records (29 cases received less than 4 additional injection: Few group, and 28 cases received more than 6 injection: Frequent group) were reviewed, and midazolam dose and the duration of procedure were compared. Using the pharmacological parameters by Greenblatt et al. the concentration of midazolam during the procedures and 2 hours (mandatory observation period) after the discharge from monitored chair were simulated.

Results and Discussion: The Initial and 2nd peak of concentration was similar in both groups (Table). In Few group, the peak concentration after final administration was almost lower than the initial peak value (Fig. a), however, in Frequent group, the concentration progressively increased and the final value mostly exceeded the initial peak concentration (Fig. b). After 2 hours from discharge, the residual concentration was significantly higher in Frequent group. The procedure time of Frequent group was significantly longer than that of Few group.

Table. The Background of the patients and the results

		Few group	Frequent group
n		29	28
Age (yr)		31 ± 11	28 ± 6.4
Height (cm)		164 ± 9.5	163 ± 8.0
Weight (kg)		55 ± 13	55 ± 7.5
Sex (m / f)		16 / 13	12/16
Initial dose of midazolam (mg)		3.2 ± 0.83	3.0 ± 0.64
Additional injections (mg)		2.5 ± 0.69	8.3 ± 1.6 *
Procedure time (min)		67 ± 24	144 ± 28.6 *
The peak concentration after the initial injection (ng ml^{-1})	Plasma	81 ± 24	78 ± 24
	Effect-site	59 ± 14	58 ± 19
The trough concentration before the 2nd injection (ng ml^{-1})	Plasma	33 ± 14	33 ± 12
	Effect-site	37 ± 16	37 ± 13
The peak concentration after the 2nd injection (ng ml^{-1})	Plasma	56 ± 14	56 ± 12
	Effect-site	43 ± 12	44 ± 10
The trough concentration before the final injection (ng ml^{-1})	Plasma	36 ± 13	44 ± 15 *
	Effect-site	38 ± 12	46 ± 15 *
The peak concentration after the final injection (ng ml^{-1})	Plasma	60 ± 16	78 ± 14 *
	Effect-site	47 ± 13	64 ± 11 *
The time between the final injection and the final evaluation (min)		26 ± 16	22 ± 10
The concentration at the final evaluation of patient during the procedure (ng ml^{-1})	Plasma	34 ± 13	55 ± 17 *
	Effect-site	37 ± 14	60 ± 13 *
The concentration 2 hours after the procedure (ng ml^{-1})	Plasma	17 ± 5.0	58 ± 5.8 *
	Effect-site	17 ± 5.2	59 ± 6.6 *

The data were expressed as mean ± SD. *: A P value was less than 0.05 between groups.

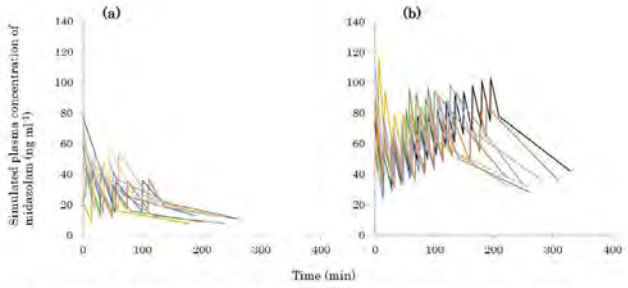

Fig. The changes in the simulated peak and trough plasma concentration of midazolam. (a): The data of 10 patients showing the low peak concentration smaller than 60 ng ml^{-1} excepting immediately after the initial bolus infusion during the procedure were demonstrated. (b): The data of 8 patients showing the high peak concentration more than 90 ng ml^{-1} during the procedure were demonstrated.

Conclusion: The anesthesiologists in charge closely evaluated the sedative state of the patient and decided the infusion period, however, the concentration unexpectedly increased. The calculated individual timetable of administration is required.

02AP01-7
Patient-Controlled Sedation (PCS) with Propofol during day-case cataract surgery under Topical Anaesthesia (CATARSIS)

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Background and Goal of Study: Cataract surgery is currently performed under topical anaesthesia but induced patient discomfort and apprehension[1]. The aim of this study was to evaluate the need of sedation, patient and surgeon satisfaction and the safety of PCS.
Materials and Methods: This prospective randomised double-blind non-inferiority trial included 60 patients elected for cataract surgery under topical anaesthesia from July 2016 to February 2017. A patient-controlled pump (bolus 0.125 $ml.Kg^{-1}$ with a 3-min lockout) was used for their sedation according to 2 groups: Groupe P (propofol diluted at 2 $mg.ml^{-1}$) and Groupe I (placebo: intralipid 4%). The primary outcome was the mean number of self-administered bolus. Secondary outcomes were surgeon satisfaction, patient satisfaction using Iowa Satisfaction with Anesthesia Scale (ISAS > 5.4: high level of satisfaction), perioperative side effects or complications, preop anxiety using Amsterdam Preoperative Anxiety and Information Scale (APAIS) and determination of a group of patients who require sedation. The margin for non-inferiority was defined for mean difference of 1 bolus; i.e. a mean number of self-administered bolus under 1.
Results and Discussion: The treatment groups were well balanced with regard to patient characteristics, surgery duration (17.8 ± 8.5 min) and APAIS score. Almost 1 in 2 patients used their pump: 53.3% (I) and 48.3% (P) with a ratio successful/demand of 0.3 ± 0.4 (I) and 0.4 ± 0.5 (P) (ns). The mean number of self-administered bolus was 3.6 ± 6.3 in the placebo group 1.9 ± 3.8 in the propofol group; i.e. a difference of 1.6 [-1.1; 4.4]. The level of pain (NRS), sedation (Ramsay score), ISAS (5.2 ± 0.7), surgeon satisfaction were not different between groups. ISAS > 5.4 was significantly correlated to patient age > 65 yo, per op NRS, surgical duration and surgeon satisfaction. There was no correlation between preop APAIS and number of bolus. No adverse events occurred such as oxygen desaturation, confusion, nausea or vomiting (mean propofol dose: 20.6 ± 30.6 mg).
Conclusion: Almost 50% of patients required PCS use, with similar satisfaction level in both groups, suggesting that pump more than propofol seems to be required for patient anxiety. A trial comparing 3 groups placebo-pump, propofol-pump to no pump would confirm these results. Preop APAIS was not useful to select patient requiring sedation. NCT02771912
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02AP01-8
Effect of midazolam as pre-medications on propofol dosing in the elderly and adults during sedated esophagogastroduodenoscopy

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Background and Goal of Study: To investigate the effect of pre-medication (midazolam) on propofol dosing in the elderly (age ≥65 years old) and adults (age≥20 and below 65 years old)
Materials and Methods: This is a retrospective observation study conducted in a regional hospital from November 2017 to March 2018. Medical records of patients older than 20 years old received sedated esophagogastroduodenoscopy by propofol, midazolam and alfentanil were analyzed. We collected data including patient demographics, dose of anesthetics/opioid, anesthesia time, procedure time and adverse events. Factors related to the induction dose of propofol were analyzed. We compared the dose of propofol between patients with or without midazolam and patients receiving high or low dose of midazolam in different age groups.
Results and Discussion: Seven hundred and twenty-five patients were included in the final analysis. In adults, the mean dose of propofol for sedation was 54 mg and was 41.77 mg in the elderly. In univariate analysis, the dose of propofol was negatively related to age ($p<0.001$), class of American Society of Anesthesiologists (ASA) ($p = 0.001$) and the dose of midazolam ($p<0.001$), positively related to body weight ($p<0.001$) and anesthesia time ($p=0.037$) in adults. In the elderly, the dose of propofol was negatively related to age ($p=0.016$), positively related to body weight (0.033), and anesthesia time ($p<0.001$). The dose of propofol was significantly lower in adult patient acquiring midazolam compared to adult patient not acquiring midazolam (Figure 1, $p<0.001$), but the variation could not be observed in the elderly (Figure 1, $p=0.266$). Among adults patient taking midazolam, the dose of propofol was significantly lower when comparing patients receiving high dose to low dose patients (Figure 2, $p<0.001$). In the elderly patient receiving midazolam, high dose or low dose of midazolam does not matter the dose of propofol (Figure 2, $p=0.859$).
Conclusion: In adults, midazolam as pre-medications for propofol during sedated esophagogastroduodenoscopy would decrease the needed dose of propofol and higher dose of midazolam might have more significant effect. However, similar result was not seen in the elderly. Pre-medication of midazolam may not be needed in sedated esophagogastroduodenoscopy in the elderly.

02AP01-9
Study of the respiratory depression during a conscious sedation technique combining remifentanil and ketamine in TCI for oocyte retrieval

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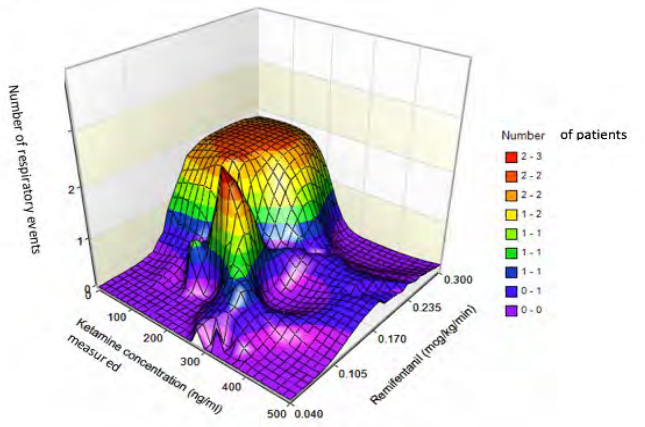
Background: Conscious sedation is a widely accepted method for oocyte retrieval. In our institution, we administer remifentanil effect-site (Ce) target-controlled infusion (TCI) titrated to keep a pain-score below 3/10, but respiratory depression needing verbal stimulus is frequent. Our main objective was to assess if the addition of ketamine-TCI titrated to keep a plasma concentration (Cp) at 150 ng/ml and 200 ng/ml allowed a reduction of remifentanil-Ce, to avoid episodes of respiratory depression, while maintaining patient contact.
Materials and Methods: In this prospective, non-randomized study, 20 women were divided in two groups of 10: group 1 received ketamine at target-Cp of 150 ng/ml and group 2 of 200 ng/ml, both in association with remifentanil-TCI. Our main outcome measure was the incidence of bradypnea (RR <8/min), with or without moderate (SpO2 90-94%) or severe (SpO2 < 90%) desaturation, in relation to remifentanil and ketamine consumption. Sedation levels were also evaluated (Observer's Assessment of Alertness/Sedation and Ramsay Sedation scale). At the end of the procedure, a venous blood sample was drawn for ketamine blood-level measurement with mass spectrometry. Binary variables were analysed with a Chi-squared test, continuous data with Student's t-test.
Results and Discussion: Both group combined, measured ketamine blood levels were lower than determined by the model (mean of 144,2 ng/ml in group 1, 180.3 ng/ml in group 2) in patients who experienced respiratory events, and remifentanil consumption was higher (0.167 ± 0.055 µg/kg/min versus 0.114 ± 0.059 µg/kg/min, p= 0,04). The lower the measured ketamine-Cp, the higher the amount of remifentanil required, and consequently, the higher the incidence of respiratory depression. (Figure 1) Patient contact was maintained through the whole procedure.

Figure 1



Conclusion: When combining ketamine Cp-TCI with remifentanil Ce-TCI for oocyte retrieval, remifentanil-Ce is higher and respiratory depression is more frequent when measured ketamine-Cp is lower than predicted. Further studies in larger groups combining ketamine at higher target-Cp and remifentanil should be conducted, under anaesthetic surveillance.

02AP02-1
Surgeons Vs Anesthesiologist Or Our Trust Issues.

Are We Really Team?

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Background: How often do we hear from our surgeons: “It`s just a minor procedure. Don`t make a big deal. We will do it in a few minutes”. And what do we get if believe them? This medical about a patient whose life was too close to death because of trust.
Case Report: Patient X has been admitted to the hospital for surgery: Endoscopic polypectomy. Her medical history without any features, excepting obesity(BMI 46,1).Considering procedure duration tracheal intubation was performed. Ventilation parameters: SIMV,TV 468 ml, BR 12 per min, Psup 15 cmH2O,PEEP 5 cmH2O,Pi 19 cmH2O, FiO2 40%), Capnography 37 mmHg, SpO2 98%. Anesthesia maintained according to standard protocol. Polypectomy has been started. Patient condition became unstable in 1,5 hour (HR 135 per minute,BP decreased from 124\74 mmHg to 85\45 mmHg and then increased to 175\100 mmHg.TV decreased to 260 ml, Pi increased to 35 cmH2O. SpO2 dropped to 82%. FiO2 was changed to 100% and SpO2 improved to 96%. Lung sounds were normal but emphysema has been detected(face, neck, breast, abdomen). Surgery has been stopped. Patient transferred to the ICU.X-ray was performed: pneumothorax, pneumomediastinum were detected. In the ICU HR 50- 126 per min, BP 178\125mmHg.Considering CO2 using we decided to observe the patient till morning. Next day the patient`s condition didn’t improve. Decided to do CT scan to figure out the reason of this condition. During scanning patient`s condition became dramatically unstable HR 190 per min, BP 50\23mmHg.Lung sounds did not detected at left side. Drainage was placed. After draining patient`s condition began to improve. During medical conference surgeons confessed on they had been working with air, not with CO2 and had known about perforation.
Discussion: Teamwork isn`t just words. It`s not about romantic things. It is about our patient`s safety and effective medicine for people who ask us for help. It is what we need to every day for our patient. And to trust each other is the biggest part of this.

02AP02-2
Local Infiltration Analgesia significantly improves pain scores after Anterior Cruciate Ligament reconstructive surgery

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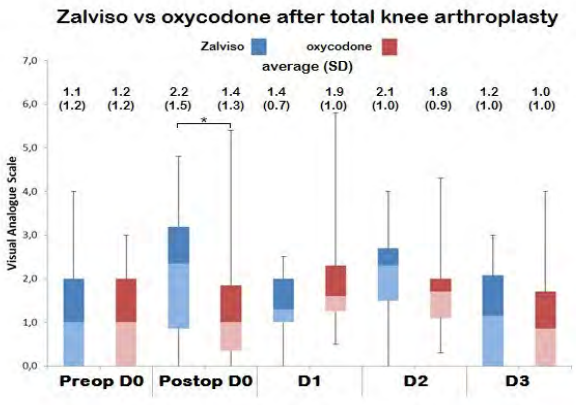
Background: Anterior Cruciate Ligament (ACL) repair surgery comprises harvesting and tunnelling of the hamstring tendons into the femur and tibia, which often provokes significant postoperative pain. The aim of this study is to compare postoperative pain in patients receiving conventional intravenous (IV) analgesia versus patients receiving additional Local Infiltration Anaesthesia (LIA).
Materials and Methods: After ethics committee approval, 153 patients of the AZ Maria Middelares hospital in Ghent were included in this retrospective analysis. All patients underwent a primary, unilateral ACL reconstruction between February 2017 and March 2018. All surgeries were performed using the same surgical technique by two orthopaedic surgeons, under a standardized general anaesthesia. All patients received multimodal IV analgesics during the operation (table). In the control group (75 patients), the patients received IV analgesia only. In the LIA group (78 patients), the patients received IV analgesia, supplemented with LIA (60ml ropivacaine 5mg/ml + 15ml lidocaine 10mg/ml). Post-operative pain was measured using the Visual Analogue Scale (VAS) -scores every 15-30 minutes by Post Anaesthesia Care Unit (PACU) nurses, who were unaware of the used anaesthesia technique. The highest VAS-score in the first postoperative hour of each patient was used for statistical analysis. VAS scores were analysed using an unpaired T-test; distribution of intravenous analgesics was compared using Chi-Square test.
Results and Discussion: The mean (SD) VAS score in the control group was 7.66 (1.39) vs 6.13 (1.95) in the LIA group (p < 0,001). Even though the perioperative use of IV analgesics in the LIA group was lower or equal than in the control group (table 1), pain scores were significantly better in the LIA group. All patients in the LIA group were treated in ambulatory surgery setting.
Conclusion: In patients undergoing ACL repair surgery, LIA results in significantly better post-operative pain scores compared to classic IV analgesia. The addition of LIA to the antinociceptive management after ACL repair surgery satisfyingly permitted ambulatory surgery for this painful procedure.



02AP02-3
The Low Flow Oxygen Inhalation using Conventional Nasal Cannula Effectively Prevents Hypoxia during Dental Treatment under Sedation by Dexmedetomidine

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Background and Goal of Study: Dental treatment often requires sedation during surgical procedure for maintaining patients’ comfortably. One of the most concerned complications of sedation is hypoxia by airway obstruction and respiratory depression. Recently continuous infusion of dexmedetomidine (Dex) becomes an alternative sedative. The appropriate oxygen (O_2) inhalation for preventing hypoxia during Dex infusion was evaluated.
Materials and Methods: After the approval of Ethical Committee of Nagoya University Hospital, prospective, single-blinded randomized study was conducted. 24 adult patients participated in the study after giving written informed consent. The patients were allocated into 3 groups: no O_2 inhalation (RA group), oxygenation using nasal cannula (NC group, 3-l/min O_2) and oxygenation using high flow nasal cannula system (HF group, 30%- 20-l/min humidified O_2). ASA standard monitor was applied. 6-μg/kg/h Dex was infused 10 min as a loading and subsequently 0.7-μg/kg/h Dex was continuously infused. The infusion was terminated 10 min before the end of the procedure. The change in the vital sign, and the frequency of airway maneuver and stimulation were recorded.
Results and Discussion: There was no difference in patients’ background among the groups (Table). The pulse oximetry values immediately after loading and at the lowest was significantly lowered in RA group (Figure). The stimulations to the patients were fewer in NC and HF groups.

Table. Patients' characteristics and results of the study.

	No oxygen	3-l/min nasal cannula	High flow nasal cannula
n	8	8	8
Age (yr)	28 ± 13	38 ± 12	28 ± 11
Sex (m/f)	5/3	4/4	4/4
Weight (kg)	57 ± 8.9	61 ± 13	60 ± 16
Height (cm)	162 ± 9.2	169 ± 8.6	165 ± 13
Operation time (min)	107 ± 46	84 ± 44	84 ± 50
Anaesthetic time (min)	129 ± 46	103 ± 45	106 ± 16
Total dose of dexmedetomidine (μg)	129 ± 46	118 ± 32	113 ± 25
Pulse oximetry after loading	95 ± 4.0	99 ± 1.4 *	99 ± 1.4 *
Lowest value of pulse oximetry	90 ± 7.8	98 ± 2.9 *	98 ± 1.2 *
Stimulation (times)	5	2 *	0 *
Jaw lifting (times)	3	1	0

Data was expressed as mean ± SD. *: A $P < 0.05$ vs. no oxygen group.

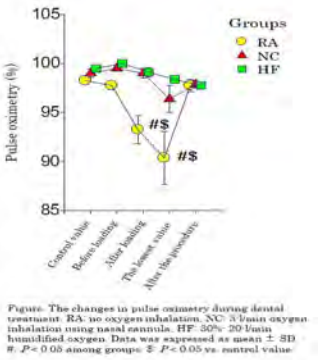

Figure. The changes in pulse oximetry during dental treatment. RA: no oxygen inhalation, NC: 3-l/min oxygen inhalation using nasal cannula, HF: 30%- 20-l/min humidified oxygen. Data was expressed as mean ± SD. #, $P < 0.05$ among groups. $: $P < 0.05$ vs. control value.

Although one of the most emphasized advantage of Dex is minimal respiratory depression, the Dex-induced significant desaturation was observed during the infusion. Although Sago et al. recently reported that only high flow nasal cannula system could prevent hypoxia during midazolam sedation, the Dex-related hypoxia was easily prevented by the minimal oxygenation using conventional nasal cannula and 3-l/min inhalation.
Conclusion: Continuous infusion of Dex and conventional oxygenation might provide office-based safe and efficient sedation to dental patients.
Reference:
Sago T, et al. A nasal high-flow system prevents hypoxia in dental patients under intravenous sedation. J Oral Maxillofac Surg 2015; 73: 1058-64.

02AP02-4
Use of a modified paediatric face mask to provide CPAP and pressure-controlled ventilation to maintain oxygenation in a morbidly obese OSA patient with advanced lung cancer during ambulatory fiberoptic bronchoscopic resection of endobronchial tumor

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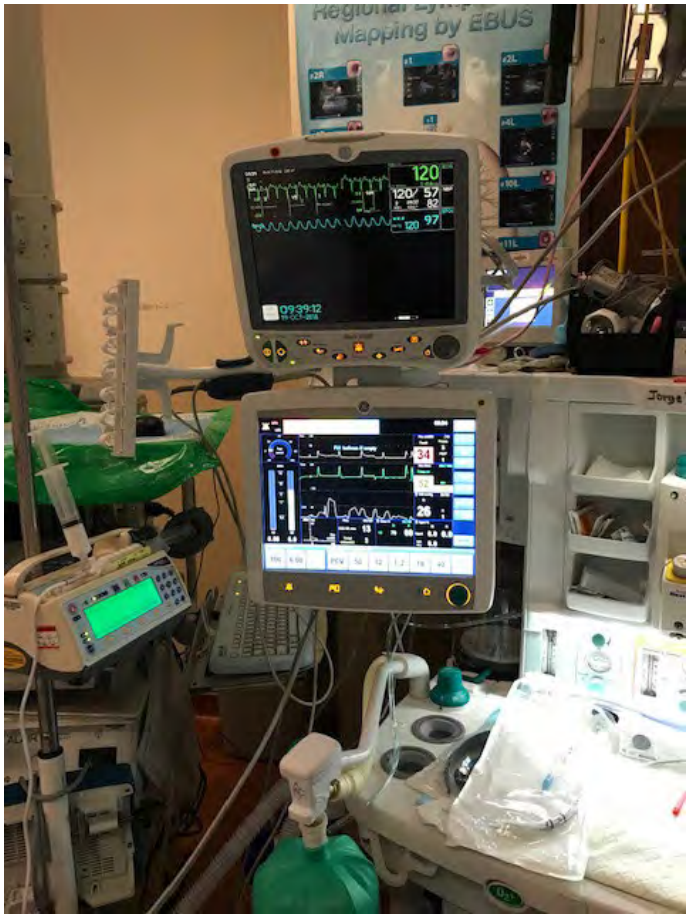
Background: A simple nasal PAP mask assembly using a paediatric face mask and existing anaesthesia equipment and machine has been shown to maintain spontaneous ventilation and improve oxygenation in sedated obese patients with OSA.[1-3] We used this technique in a morbidly obese OSA patient with advanced lung cancer during fiberoptic bronchoscopy (FOB).
Case Report: A 68 y/o male, BMI 47.3 kg/m^2, former smoker, with COPD, IDDM, HTN, CKD, CAD, lung adenocarcinoma s/p left lower lobectomy and OSA on home BiPAP and home O_2 presented for ambulatory FOB. His wife and daughter were physicians and deeply concerned about the ability to extubate him if FOB performed under GA. The pulmonologist preferred to perform FOB under sedation if possible. He was pre-treated with albuterol and lidocaine nebulizer. A modified infant face mask (#2) with fully-inflated air cushion was secured over his nose with elastic head-straps and connected to the anaesthesia machine via a breathing circuit. The APL valve was adjusted to deliver 12 cm H_2O CPAP with 4-6L O_2/min. His SpO_2 improved from 96% (2L/min NC) to 98%. Deep sedation was titrated with 100 mg lidocaine, propofol 50 mg bolus and infusion 100 mcg/kg/min. During difficult FOB resection of endobronchial tumor, his respiration was supported by pressure-controlled nasal ventilation (pip 50 cm H_2O, PEEP 19 cm H_2O, RR 12/min) in order to maintain 97% SpO_2.



Discussion: This modified paediatric face mask provided nasal CPAP and PC ventilatory support to a morbidly obese patient with lung cancer during FOB resection of endobronchial tumor. It maintained oxygenation and avoided ETI.
Learning points:
1. How to modify a paediatric mask to fit most adult noses in <2 mins.
2. How to provide nasal CPAP by adjusting APL valve and BiPAP by using pressure control mode.
References:
1. www.TSEMask.com; 2. SAMBA 28th AM, 2013; 3. IARS AM: MCC1080, 2015

02AP02-5
Planned Overnight Hospital Stay and Extended Recovery Period may Allow Longer Oral and Maxillofacial Surgeries to be Scheduled in the Operating Room of a Dental Hospital with Outpatient Setting: A single-center experience

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Background and Goal of Study: The requirement for overnight-hospital-stay for oral-maxillofacial (OMF) surgeries is determined by patient-related-factors, type of surgery and anesthetic management, which also have major impact on location of these surgeries. We aimed to define the major factors which determined the need for an overnight-hospital-stay after OMF surgery carried in an operating room (OR) of a dental hospital with outpatient setting.
Materials and Methods: The anesthesia records of patients who underwent oral procedures under general anesthesia between 2014-2017 were reviewed. Type and duration of surgeries, adverse events in the postoperative period, co-morbidities and need for hospital stay were the main data to be obtained.
Results and Discussion: A total of 821 patients underwent oral procedures under general anesthesia. 631 were OMF surgeries performed in the OR of dental hospital. 174 needed an overnight-hospital-stay. There was no significant difference in number of patients with co-morbidities between day-case and hospitalized patient groups (p=0.389). The duration of surgery was longer in the hospitalized patient group (90 min (10-330) vs 165 min (45-390); p<0.001). The overall recovery period was 145.4±53.2 min.
Conclusion: The duration of surgery was the main determinant of the requirement for an overnight-hospital-stay in patients who underwent OMF surgeries in the OR

of a dental hospital with outpatient setting. The patients with American-Society-of-Anesthesiology physical status (ASA)<3 can be scheduled for OMF surgery in an OR of outpatient setting regardless of the duration of surgery provided that an overnight hospital stay is planned with a recovery period to be extended until patients fulfill the discharge criteria.

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1. Kramer KJ. Discharge criteria, impact of the patient and the procedure. What the oral surgeon should know? Oral Maxillofacial Surg Clin N Am 2017; 29: 197-208
2. Whippey A, Kostandoff G, Paul J, Ma J, Thabane L, Ma Kan H. Predictors of unanticipated admission following ambulatory surgery: a retrospective case-control study. Can J Anesth 2013; 60: 675-683

Acknowledgements:
Prof. Hıfzı Hakan Tuz, PhD is appreciated for his support with his experience and knowledge.

02AP02-6
Ambulatory hemithyroidectomy is safe and feasible: one year of experience

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Background and Goal of study: Outpatient surgery consists of performing an elective surgical procedure in the context of a day-only admission. This type of management is the result of sociological changes and it is convenient, safe and cost-effective. The purpose of this study was to determine the feasibility and safety of outpatient hemithyroidectomy in our centre
Materials and Methods: Retrospective review was performed of all hemithyroidectomy patients from a tertiary care center between October 2017 and October 2018. Inclusion criteria for outpatient surgery were surgical, anaesthetic and patient-dependent. Preoperative information and the modalities of anaesthesia, surgery, postoperative surveillance and follow-up were standardized. We analyzed patient outcomes based on hospital unplanned admission and readmission rates as well as complication rates. Day of discharge, conversion to inpatient procedure, age, gender, American Society of Anaesthesiologists score and indication for surgery were also recorded
Results and Discussions: Forty-nine patients were incluyed. The mean age was 50 years, and most of them were women (77%). Thirty-five had a score of two in the American Society of Anaesthesiologist. Of the forty-nine patients who underwent hemithyroid surgery, thirty-nine (79.5%) were discharged successfully on the day of surgery day, after an observation period of at least 6 hours Ten patients (20.5%) became hospital procedures perioperatively; two of them (4%) due to the difficult surgery and the monitoring of the hemorrhage and the other cases (16.5%) because finally they underwent a total thyroidectomy that according to the protocol is maintained per day. None had laryngeal nerve palsy, compressive haematoma or symptomatic hypocalcaemia. There was no case of death, need for surgical reoperation or hospital readmission 5 patients (10%) went to the emergency room, 3 (6%) due to causes unrelated to the surgery and 2 patients (4%) due to seromas in the surgical wound.
Conclusions: This study has shown that outpatient hemithyroidectomy performed by experienced surgeons in carefully selected patients could be safe, feasible and was associated with a low complication rate. Althoug the series in our centre was still small, the results have benn similiar to those published in the literature.

02AP02-9
E-assessment of postoperative recovery in day surgery patients using SATELIA: a prospective observational electronic follow-up in an academic center.

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Background and Goal of Study: SATELIA is an e-health solution created by the Bordeaux University Center to evaluate and improve the perioperative care after outpatient surgery. The purpose of this study was to assess postoperative recovery of patients using SATELIA.
Materials and Methods: We conducted a prospective monocentric study involving all patients with a valid phone number undergoing ambulatory maxillofacial, ENT, ophthalmic and plastic surgeries. On day 1 and 7 after their intervention, patients received by SMS online questionnaires to assess post-operative pain and to evaluate the incidence and severity of the most frequent side effects.
Results and Discussion: 1069 patients were included between March 21st and November 21st, 2018. Mean age was 39.5 years +/- 19.5 years and 47.8% were women. 79.9% received general anesthesia. Despite systematic multimodal analgesia regimen for 95.3% of patients, 42.5% had moderate to severe post-operative pain (NRS > 3/10) at Day 1. At Day 7, 37.9% of patients still had moderate to severe persistent pain. 11.5% had PONV at home during the first 24th hours and 26.6% presented surgical site bleeding. 8.5% and 10.9% respectively needed to consult a general practitioner or an emergency service during the first week after surgery.
Conclusion: This study demonstrates that moderate to severe pain and other adverse events are frequent after day surgery. Electronic follow-up tools like SATELIAÒcan be useful to evaluate and improve the postoperative course of ambulatory patients.
Acknowledgements: Nicolas Pages, anesthesia resident and co-founder of Satelia

Regional Anaesthesia

03AP01-1
Adverse events during regional anesthesia for hip arthroplasty

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Background and Goal of Study: The “gold standard” of intraoperative (IO) anesthesia and postoperative (PO) analgesia for hip arthroplasty (HA) is not yet defined. The aim of our study was to compare IO adverse events with several anaesthetic options.
Materials and Methods: We analysed perioperative adverse events in 347 adult patients who underwent HA with one of five anesthetic and analgesic options. In group 1 (n=78), IO spinal anesthesia (SA) and PO systemic opioid analgesia; in group 2 (n=69), IO SA and PO prolonged lumbar paravertebral analgesia; in group 3 (n=68), IO SA and PO lumbar epidural analgesia; in group 4 (n=69), IO psoas compartment block with sciatic nerve block and PO systemic opioid analgesia; in group 5 (n=63), IO lumbar paravertebral block with caudal epidural block and PO prolonged lumbar paravertebral analgesia were used. The IO events were registered during the block execution and the surgery. The significance of intergroup difference was estimated by Fisher’s exact criterion.
Results and Discussion: Blood aspiration incidence was 2.9% in groups 2 and 3, 7.3% in group 4, and 6.4% in group 5. Several attempts of block were needed in 10.3% of cases in groups 1 and 3, 15.9% in group 2, 21.7% in group 4, and 19.1% in group 5. Technical difficulties were met in 1.3% of group 1, 1.5% in group 2, 11.8% in group 3, 4.4% in group 4, and 6.4% in group 5. Respiratory depression (RD) was absent in groups 2 and 3, 1.3% in group 1, 15.9% in group 4, and 4.8% in group 5. Insufficient block was absent in groups 2 and 3, 2.6% in group 1, 21.7% in group 4, and 7.9% in group 5. Cardiac arrhythmias were seen in 12.8% of group 1, 13% in group 2, 14.7% in group 3, 2.9% in group 4, and 9.5% in group 5. Arterial hypotension (AH) took place in 24.4% of group 1, 24.6% in group 2, 23.5% in group 3, 8.7% in group 4, and 15.9% in group 5. Nausea and vomiting occurred in 9% of group 1, 7.3% in group 2, 11.8% in group 3, 5.8% in group 4, and 7.9% in group 5. Shivering happened in 5.1% of group 1, 4.4% in group 2, 5.9% in group 3, 2.9% in group 4, and 4.8% in group 5.
The incidence of blood aspiration in groups 4 and 5 was significantly higher than in group 1. Technical difficulties were most frequent in group 3. Insufficient block was most frequent in group 4. On the contrary, arrhythmias and AH were least frequent in group 4.
Conclusion: All five options had advantages and disadvantages.

03AP01-2
Adverse events after anaesthesia for hip arthroplasty

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Background and Goal of Study: The best option of intraoperative (IO) anaesthesia and postoperative (PO) analgesia for hip arthroplasty (HA) is not yet defined. The aim of our study was to compare PO adverse events with several anaesthetic options.
Materials and Methods: We analysed PO adverse events in 398 adult patients who underwent HA with one of six anaesthetic/analgesic options. In group 1 (n=78), IO spinal anaesthesia (SA) and PO systemic opioid analgesia; in group 2 (n=69), IO SA and PO prolonged lumbar paravertebral analgesia; in group 3 (n=68), IO SA and PO lumbar epidural analgesia; in group 4 (n=69), IO psoas compartment block with sciatic nerve block and PO systemic opioid analgesia; in group 5 (n=63), IO lumbar paravertebral block with caudal epidural block and PO prolonged lumbar paravertebral analgesia; in group 6 (n=51), IO general anaesthesia and PO systemic opioid analgesia were used. The PO adverse effects were registered during three PO days. The significance of intergroup difference was estimated by Fisher’s exact criterion.

Results and Discussion: Muscle weakness (MW) was absent in groups 4 and 6, 1.3% in group 1, 1.5% in group 2, 8.8% in group 5. Falls happened in group 3 only (2.9%). Insomnia was met in 18% of group 1, 5.8% in group 2, 4.4% in group 3, 10.1% in group 4, 9.5% in group 5, and 19.6% % in group 6. Nausea and vomiting (NV) occurred in 14.1% of group 1, 4.4% in group 2, 10.3% in group 3, 13% in group 4, 4.8% in group 5, and 21.6% in group 6. Orthostatic hypotension (OH) happened in 5.1% of group 1, 4.4% in group 2, 17.7% in group 3, 1.5% in group 4, 4.8% in group 5, and 7.8% in group 6. General weakness (GW) or dizziness were seen in 14.1% of group 1, 5.8% in group 2, 7.4% in group 3, 10.1% in group 4, 6.4% in group 5, and 23.5% in group 6. The installed catheter was not used in 8.8% of group 3 only. Inability to eat in the first 24 hours was registered in 18% of group 1, 7.3% in group 2, 10.3% in group 3, 15.9% in group 4, 9.5% in group 5, and 29.4 in group 6. Urine retention took place in 47.4% of group 1, 34.8% in group 2, 47.1% in group 3, 15.9% in group 4, 33.3% in group 5, and 35.3% in group 6.
OH and MW were seen significantly more in group 3 with epidural analgesia, even with 2 falls (2.9%). GW, NV, and inability to eat were most frequent in group 6.
Conclusion:The most unpleasant events were seen with systemic opioid analgesia.

03AP01-3
Is it simply OK? Or is there any real notable factor affecting the assessment of the quality of ultrasound-guided peripheral nerve blockade?

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Background and Goal of Study: The success of peripheral nerve blockade (PNB) with ultrasound guidance can be evaluated by many tools and characterized by several factors. The assessment of the quality of every PNB is necessary, moreover, it is indispensable for the statistical analysis of the applied method. Unfortunately, there is no any equation that describes perfectly the relationship between a predictive variable (e.g. obesity) and the response variable (e.g. performance time). Researchers collect data on the technical and intraoperative quality characteristics of the block, using diverse or unclear reference time points, different needle types, and needling techniques, different feedback forms, and evaluation methods. The outcome quality measurement is uncommon. The aim of the study: 1. to review the methods of predictive and intraoperative quality assessment in the literature 2. To identify the negligible and indispensable factors 3. To clarify the reference time points 4. To review the applied statistical methods, particularly the logistic regression models.
Materials and Methods: Meticulous pinprick, touch and flexion tests in the distribution of the four terminal nerves predict the occurrence of the completed blockade of the brachial plexus, preoperatively. During surgery the success of the block is evaluated by simple tools (e.g. excellent, good, unsuccessful), that concerns the technical quality of the block only. Besides pain intensity scales there is a couple of psychometric test for measuring the satisfaction of the patient; these tests are time-consuming and hardly convenient in daily practice.
Results and Discussion: A novel tool was developed with which the Sensory, Motor, Coping of patient and Postoperative pain were measured (five-point scale from 0-4 points). The quality of PNB can be interpreted in a GCS-like manner from 0000 to 4444 or based upon the aggregate points (<7:failed,8-11=Tolerable;12-13=Good;14-16=Excellent). No statistical relationship was found between predictive and response variables, but the type and volume of local anaesthetics and the duration of anaesthesia/analgesia.
Conclusion: This tool ignores several predictive and response factors but considers the sensory, the motor quality of the PNB, the coping of patients towards the whole situation and the postoperative pain. Measuring the satisfaction of the patient is important for quality improvement in RA.

03AP01-4
Multidisciplinary anesthesiological protocol in “fast-track” orthopedic surgery

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Background and Goal of Study: The application of a “fast-track” protocol in orthopedic surgery improves postoperative recovery of patients, reduces morbidity and shortens the period of hospitalisation in patients undergoing hip and knee aloplasty. Objective: To determinate the effectiveness of anestetic-analgesic protocol in post-operative recovery of patients with hip and knee joint alloplasty.
Materials and Methods: Prospective study for the period of November 2017-November 2018, conducted at the Clinic of Orthopedic and Traumatology ot “ Tsaritsa Yoanna” University Hospital - ISUL among 30 patients aged 37-70 years undergoing knee and hip endoprothesis. Preoperative admition of Pregabalin, and preoperative overload with Sol.Glucosae 500ml .Intraoperative fast-track protocol was performed providing: 1. Anesthesia and post-operative analgesia by subarachnoid administration of Marcaine 20 mg and Morphine 150 mcg, local infiltration of the operative wound with Ropivacaine 50 mg, Dexamethasone 4 mg, Morphine 4 mg and NaCl 0,9 % 30 ml; Drug prophylaxis of postoperative nausea and vomiting: Dexamethasone 8 mg, Ondansetron 4 mg and Famotidine 20 mg; 3. Prevention of postoperative blood loss with administration of Tranexamic acid at a dose of 10 mg/kg infused 15 minutes before the start of surgery and at the end of joint arthroplasty.
Results and Discussion: The VAS pain rate was reported- after verticalisation of the patient on the day of operative intervention- 0.33, on the 2nd day at VAS-2.6 and the 3rd day-2.1. The postoperative hospitalization period med 4,6(3.8-5,9 days) was redused. Intraoperative administration of anesthetics and opioids (intratecal and topical) reduces the need for postoperative analgesia, and side effects such as nausea and vomiting are minimized at a frequency of 30% (9 out of 30 patients). Reduced postoperative blood loss - med 201ml(132-298ml).
Conclusion: The application of a “fast-track” protocol is a feasible and useful method for optimizing the recovery period after hip and knee joint endoprothesis.

03AP01-5
Ultrasound probe covers: time efficiency comparison between TEGADERM® and dedicated gel-free ultrasound probe covers

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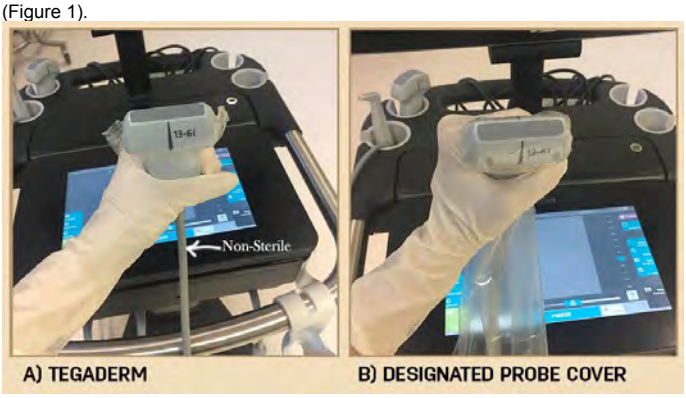
Background and Goal of Study: Ultrasound probe covers are recommended for sterility and transducer protection to prevent cross-infection during ultrasound examination and point of care procedures (e.g., nerve blocks, joint injections). Occlusive wound dressings (e.g. TEGADERM®) are often used for this purpose because of their availability and ease of application. The goal of this study was to measure time-efficiency applying TEGADERM versus dedicated gel-free (adhesive) probe covers.
Materials and Methods: After instructions and practice, 10 anesthesiology practitioners and nurses were asked to apply and remove TEGADERM (large, 10” x 6”) or 120 cm long gel-free probe covers (EZCOVER probe covers,120 cm, MedXpress.Pro, Belgium) as they would do in clinical practice. Both covers were applied by trained practitioners using gloves. The time to complete application, from picking the item out of the packaging to readiness to scan; and to remove the probe cover from a linear transducer (Figure 1) was compared between the two groups (Figure 1).



Results and Discussion: A total of 20 measurements were done and analyzed. The mean time required to apply the TEGADERM was 22 ± 4 seconds vs 19 ± 3 seconds for the gel-free probe covers. The time required to remove the cover after a simulated nerve block procedure was 5 ± 1 seconds for TEGADERM and 7 ± 2 seconds for the gel-free probe covers. There was no statistical or clinically meaningful difference in time to apply or remove the probe covers between the TEGADERM or the gel-free probe covers.
Conclusion: It is often assumed that application of TEGADERM to a linear probe is faster than the application of a long, sterile, designated probe cover. In our experiment, the use of dedicated, gel-free probe covers has similar time-efficiency as the designated sterile probe covers and provides full sterility of the ultrasound probe and its cable.

03AP01-6
Assessment of plasma levels of free bupivacaine after combined administration of liposome bupivacaine for femoral block and bupivacaine HCl in the posterior knee capsule.

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Background and Goal of Study: Liposome bupivacaine injectable suspension (LB; EXPAREL®, Pacira Pharmaceuticals, Inc., USA) is a multivesicular formulation that releases bupivacaine in an extended fashion. A prior study on perineural LB application by femoral nerve block reported the pharmacokinetic (PK) levels of bupivacaine after injection, without assessment beyond 72 hours. The goal of this multicenter study was to investigate the plasma levels of free bupivacaine after co-administration of LB and bupivacaine HCl beyond 72 hours.
Materials and Methods: After EC and IND approval, patients having primary unilateral total knee arthroplasty were randomized in 1:1:1 ratio to receive femoral nerve block by a single injection of LB 133 mg, LB 266 mg, or placebo. Additionally, 20 ml of 0.5% bupivacaine HCl was injected into the posterior capsule of the knee intraoperatively in each group, including placebo. Pharmacokinetics were assessed by analysis of blood samples at regular time points for up to 10 days following administration, using high-performance liquid chromatography with a tandem mass spectrometric method. PK levels of patients who received placebo were analyzed only for 24 hours.
Results and Discussion:PK samples from 13 study sites collected at scheduled intervals of 230 patients were analyzed and are presented in Table 1. Cmax and Tmax were higher in subjects who received the higher dose of LB and were not affected by ethnicity. Higher Cmax was detected in women and older patients, but these levels were not clinically meaningful.

Table 1:. Summary of Bupivacaine Pharmacokinetic Parameters after Administration of a Single Dose of Liposomal Bupivacaine (data from placebo group not included)

Parameter	Liposomal bupivacaine 133 mg (N=75)	Liposomal bupivacaine 266 mg (N=76)
C_{max}, ng/mL (SD)	390 (142)	691 (348)
T_{max}, hr	64	75
AUC_{0t}, hr*ng/mL (SD)	22681 (8784)	44174 (19481)
AUC_{0inf}, hr*ng/mL (SD)	24330 (10824)	46872 (19821)
λ_z, 1/hr (SD)	0.07 (0.04)	0.05 (0.03)
$t_{1/2}$, hr (SD)	15 (10)	19 (17)

AUC_{0t}, area under curve from time 0 to the time of the last quantifiable concentration; AUC_{0inf}, area under the curve from time 0 to infinity; C_{max}, maximum plasma concentration; SD, standard deviation; T_{max}, time to reach C_{max}; $t_{1/2}$, apparent terminal elimination half-life.

Conclusion: In our study, the co-administration of LB in a femoral nerve block and bupivacaine HCl in the posterior capsule of the knee resulted in pharmacokinetic profiles consistent with studies in which LB was administered alone. The measured bupivacaine concentrations were significantly lower (three-fold) from levels associated with systemic toxicity of bupivacaine ≤2000 ng/ml. There was no unexpected or "rebound" release of bupivacaine observed beyond 96 hours. In summary, co-administration of full dose LB (266 mg) with 20 mg bupivacaine 0.5% resulted in plasma levels of bupivacaine not associated with systemic toxicity.

03AP01-7
Peripheral nerve blocks in uncontrolled pain in post anesthetic recovery

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Background: Postoperative pain control may be a challenge for oncological patients. The ultrasound-guided erector spinae plane (ESP) block and pectoral nerve block (PEC) type 1 are interfascial plane blocks and both have been increasingly used for postoperative pain control and nonsurgical analgesia. We present one case of patient who developed an uncontrolled pain in post anesthetic recovery. Peripheral nerve blocks (PNB) were used with successful for the rescue of postoperative pain.
Case report: 40 year old woman with breast cancer. She was underwent to right mastectomy with reconstruction under general anesthesia. There was no complication. Postoperative analgesia was made with 2 g of metamizol and 10 mg of morphine, 30 minutes before extubation. In a few minutes in recovery room, her pain level was 10/10 on the numerical rating scale (NRS) with allodynia that we could not even examine the thorax region. PEC 1 was performed with the patient in supine position. 12MHz linear transducer was placed in the parasagittal plane below the clavicle, just medial to the coracoid process. After identified the pectoralis major and pectoralis minor muscles, 10 cc of ropivacaine 0.5% was injected in the plane between the pectoralis major and minor muscles to anesthetize the lateral and medial pectoral nerves. 5 minutes after this procedure, her pain level was 6/10 on the numerical rating scale (NRS). ESP block was performed with the patient in lateral decubitus position. 12MHz linear transducer was placed in sagittal orientation over the T5 transverse process(TP). A Stimuplex needle 20g was inserted in plane until the tip of the needle reached the interfacial plane between the ESM and TP. Hydrodissection demonstrated linear cranial-caudal spread. After negative aspiration for blood, 20cc of ropivacaine 0.5% was slowly injected.and 20 minutes after her pain level was 2/10 on the numerical rating scale (NRS).Her pain level in postoperative day 1 (POD 1) and POD 2 was 2/10 on the numerical rating scale (NRS) and controlled with 1 g metamizole 6/6hs. She was discharge from hospital in 2 days.
Discussion: Peripheral nerve blocks are relatively simple and safe to perform. While ESP was originally described for treatment of chronic thoracic pain and PEC 1 for postoperative pain control in breast surgeries, both PNB can be valuable tools in recovery room as a rescue analgesia for postoperative period.

03AP01-8
Upper extremity regional anesthesia in trauma: an analysis of patient safety of two different brachial block techniques (ultrasound-guided versus neurostimulation)

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Background and Goal of Study: The aim of this prospective observational study was to evaluate the incidence of complications related to upper limb regional anesthesia comparative between recently introduced in our clinic ultrasound-guided versus neurostimulation technique.
Materials and Methods: During two years period we enrolled 125 adult patients who required upper limb surgery due to traumatic injury. After monitoring and light sedation, the patients received, depending on anesthesiologist preference, ultrasound-guided (US) or neurostimulation (NS) interscalene, axillary or combination of two blocks according to the site of surgery. We recorded data on block success rate, local anesthetic (LA) volume, immediate and late complications, patient's satisfaction. The results were statistically analyzed, with significance assumed at p<0.05.
Results and Discussion: We enrolled 63 patients in NS group and 62 in US group, with similar demographic, surgical characteristics and block success rate. We used significant less LA in US group vs. NS group (20,89 ± 3,9 ml vs. 43 ± 5,1 ml). We recorded less paresthesia during block performance and vascular puncture due to US guidance (p<0,05). In the NS group we recorded 2 LA systemic toxicity (minor-moderate neurologic symptoms) with complete recovery and none in US group. Late complications (transient paresthesia and local hematoma) are more frequent in NS group, but had resolved in maximum one week.

Complications		NS group (n=63)	US group (n=62)	p
Immediate	paresthesia	9	2	0,016
	vascular puncture	8	1	0,017
	LAST	2	0	ns
	Total	**19**	**3**	**0,001**
Late	transient paresthesia <7 days	4	1	ns
	local hematoma <7 days	4	1	ns
	Total	**8**	**2**	**<0,05**

Distribution of complications related to technique performed (LAST – local anesthetic systemic toxicity)

Conclusion: This results suggest that both techniques of brachial plexus block are adequate for upper limb surgery, but US guidance provides significant benefits for patients in terms of safety, decreasing the risk of nerve injury or potential systemic toxicity due to lower risk of vascular puncture and using less volume of LA.
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Neal JM. Local anesthetic systemic toxicity: improving patient safety one step at a time. Reg Anesth Pain Med. 2013; 38: 259–261.

03AP01-10
An audit of anaesthetic technique for revision arthroplasty surgery

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Background: Golden Jubilee National hospital is one of the largest arthroplasty center in Scotland. We operate around 5000 hip and knee operations which include primary joint replacements and also, revision joint surgery. Owing to our well established "enhanced recovery after surgery" unit (1) and brilliant results, the number of referrals for primary & revision surgeries to GJNH has gone up in last 2 years. Our goal with this retrospective audit was to look at number of revision surgeries, review of our clinical practice and results.
Methods: We collected data from January 2017 – September 2018.This included number of hip & knee revision operations, anaesthetic technique used, rescue techniques, Pain scores, PONV rates, and time to mobilise, time to discharge to home or base hospital.
Results and Discussion: Total number of cases were 299 (Hip-161, Knee-138). The choice of anaesthetic technique was Combined spinal & epidural (CSE) followed by spinal and GA.Rescue analgesic technique was needed in 13% of knee revisions. General Anaesthetic was usually used in isolation or with regional techniques in the following situations: Infected joints, failed regional techniques, patient preference or long operating times. For revision knee procedures, hunter canal blocks and catheter has been shown to be very effective analgesic technique. PONV rate were 17% & 29% for hip & knee revisions, respectively. POD- 1 mobilisation Rate was 74% & 47% for hip & knee revisions, respectively. Time to discharge on POD-3 was around 15%-16% for both types of revisions.
Conclusions: Regional technique has been technique of choice over general anaesthesia for all revisions (2).Post-operative mobilisation rate has been promising. Detailed analysis if patient records shows that cause of delayed mobilisation and discharge was always infected revisions.
References:
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2. A comparison of regional and general anaesthesia for total replacement of the hip or knee: a meta-analysis.J Bone Joint Surg Br 2009; 91: 935–42

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03AP02-1
Adjuvants in ultrasound-guided supraclavicular brachial plexus block: A randomized controlled trial comparing perineural fentanyl versus dexmedetomidine.

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Background and Goal of Study: Adjuvants to long acting local anaesthetics are necessary in single shot peripheral nerve blocks to provide clinically relevant prolongation of postoperative analgesia. The analgesic benefit of perineural fentanyl has been demonstrated to be equivocal.[1] Evidence suggests that perineural dexmedetomidine improves quality and duration of analgesia of brachial plexus block. Perineural addition of fentanyl and dexmedetomidine to 0.5% bupivacaine in ultrasound-guided supraclavicular brachial plexus block were compared against a control to evaluate the safety and efficacy of these adjuvants.
Materials and Methods: After IRB approval and written informed consent, 90 adults undergoing upper limb surgery under ultrasound-guided supraclavicular brachial plexus block were randomized into 3 groups of 30 patients each. The group which received only 25 mL of 0.5% bupivacaine was the control. Additionally the other two groups received 1 µg/kg each of fentanyl and dexmedetomidine. Duration of analgesia was the primary outcome and the secondary outcomes were the onset and duration of sensory and motor block, haemodynamic measurements. Data was systematically analyzed.
Results and Discussion: There was 100% success rate of block with no requirement of conversion to general anaesthesia. No difference was found in the onset of sensory and motor block between the three groups. There was no significant difference in outcomes measured between the fentanyl and the control. Notably the dexmedetomidine group had significant prolongation of duration of sensory, motor block and duration of analgesia ($p<.001$); along with higher RSS scores intraoperatively and postoperatively and lower VAS scores postoperatively. The heart rate and mean arterial pressures in the dexmedetomidine group were lower both intraoperatively and postoperatively than the other groups($p<.001$). No bradycardia or hypotension requiring pharmacotherapy was seen in any of these patients.
Conclusion: Perineural dexmedetomidine 1µ/kg in ultrasound-guided supraclavicular brachial plexus block produces clinically relevant prolongation of analgesia whereas, perineural fentanyl is probably less clinically relevant as a adjuvant with 25 mL of 0.5% bupivacaine.
References :
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03AP02-2
Ultrasonic assessment of phrenic nerve palsy after interscalene block versus supraclavicular block with ultrasound guidance

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Background and Goal of Study: The ultrasound guided interscalene block(ISB) has been considered as the standard technique in managing pain after shoulder surgery, however it was associated with the incidence of hemidiaphragmatic paresis. In contrast to this method, supraclavicular block(SCB)was suggested to provide effective anesthesia with low rate of side effects. That's why, the aim of this study was to compare SCB with ISB for evaluating the efficacy and safety.
Materials and Methods: We conducted a prospective randomized study including 40 patients ASA I and II, undergoing arthroscopic shoulder surgery, divided into 2 equal groups: ISB and SCB(we used 0.3 mL/kg of bupivacaine 0.5%).We excluded those with a history of bronchopulmonary disease. Measured outcomes included procedure time, onset time and duration of the block and patients satisfaction. Before the block, we calculated the thickening fraction of the diaphragm and the diaphragmatic excursion in addition to the pulsed oxygen saturation(SpO2). Measurements were redone 30 min,2 hours,6and24 hours after the block. Concerning the post-operative analgesia, we assessed pain scores(Visual analogue scale)and supplemental analgesia. Statistical analysis was performed using SPSS25.
Results and Discussion: Demographic data was similar in both groups. There were no significant difference in procedure time, onset and duration of the block.

Thickening fraction/ Diaphragmatic excursion	H0	30 min	H2	H6	H24
ISB	67.14±6.75 5.64±0.91	31.14±11.88 2.56±1.35	28.07±11.84 2.29±1.26	31.14±11.12 2.44±1.13	32.36±11.52 2.70±1.36
SCB	63.71±6.83 4.88±0.74	55.79±15.80 4.41±1.12	54.57±17.87 4.37±1.13	56.57±13.44 4.42±1.11	58.21±15.42 4.65±1.03
p	0.19 0.24	0.000 0.001	0.000 0.000	0.000 0.000	0.000 0.000

Concerning post-operative analgesia , we did not noticed a significant difference between the two groups in the average value of VAS and the request of paracetamol and opioids in addition to the patients satisfaction .
Conclusion: The supraclavicular block is associated with a lower incidence of diaphragmatic paresis compared with that of the interscalene block after arthroscopic shoulder surgery. However, there is no difference in the quality of post-operative analgesia between the two blocks.

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03AP02-3
Patient satisfaction and opioid requirements after ultrasound-guided regional anesthesia for arthroscopic shoulder surgery among operators with different levels of experience: a prospective observational study

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Background and Goal of study: Analgesic outcomes and patient satisfaction should be an integral part of regional anesthesia training proficiency assessments. The purpose of this study was to determine if ultrasound-guided interscalene nerve block (UGINB) procedural expertise influences patient satisfaction and opioid requirements in patients undergoing arthroscopic shoulder surgery.
Materials and methods: We conducted a prospective study that compared 98 patients undergoing UGINB for arthroscopic shoulder surgery performed by operators with different levels of experience. Operators who performed 20-50 UGINBs were defined as novice operators, and those who performed >50 UGINBs as expert operators. Patient demographics, anesthetic strategies, and post-operative analgesia were recorded. Patient satisfaction was measured through a questionnaire validated for regional anesthesia[1]. Qualitative variables were compared using chi-square or Fisher's exact tests, and quantitative data using Wilcoxon rank-sum or Student's T-tests, as appropriate.
Results and Discussion: Eight novice supervised operators performed UGINBs in 49 patients, and 13 expert operators on 49 patients, over a three-month interval. Surgery was performed under sedation with propofol using target-controlled-infusion (TCI) in 86.7% of the cases and under general anesthesia in 13.3%. Two patients in the novice operator group required unplanned general anesthesia during the surgery due to insufficient analgesia. Patients in the expert operator

group presented significantly higher satisfaction questionnaire scores (90 vs. 82.9, p < 0.01) and lower post-operative opioid requirement rates (4% vs. 16.3%, p = 0.04). There was a significant difference in time to hospital discharge between groups (103 vs. 86 minutes, p = 0.04). Among patients under TCI sedation, those in the expert operator group presented lower intra-operative opioid (fentanyl) requirement rates (9% vs. 36%, p = 0.003).
Conclusion: Analgesic outcomes and patient satisfaction assessments of UGINB operator training can longitudinally evaluate competence and expertise. Operators who have performed 50 UGINBs achieve higher satisfaction scores and lower opioid requirements than novice operators, when performing arthroscopic shoulder surgery.
References:
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03AP02-4
Two cases who underwent continuous Ultrasound Guided interscalene brachial plexus block using a pigtail-shaped catheter for Arthroscopic shoulder surgery

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Background: The use of continuous interscalene brachial plexus block (CISB) using a catheter has been proven to be effective for pain management in shoulder joint surgery. However, we have experienced a few cases whose analgesic effect has become insufficient due to abnormal catheter position . In the case reports, we presented two CISB cases using a pigtail-shaped catheter (P catheter), which stayed in the body securely and rated low on the Numerical Rating Scale (NSR) during the post-operative period.
Case Report:□Case 1□A sixty-year-old man with a rotator cuff tear of the right shoulder was performed for arthroscopic rotator cuff repair. General anesthesia and CISB with P catheter were induced using ultrasound, and 0.2 % ropivacaine was continuously administered at 4 ml/hr following a single dose of 0.375 % ropivacaine. □Case 2□A fifty-year-old woman with tendinitis of the right shoulder was performed for rotator cuff calcified arthroscopic lime extraction and rotator cuff repair. General anesthesia and CISB with P catheter were induced using ultrasound, and 0.2 % ropivacaine was continuously administered at 4 ml/hr following a single dose of 0.35% ropivacaine. In both cases, the NSR just after the operation and 24 hours were almost zero, and we saw no catheter malposition and no neuropathic disorder.
Discussion: The pigtail portion related to the fixation force was located in the anterior scalene muscle. The portion of the chemical solution outflow catheter hole was located close to the C5 nerve as well by the method. Due to the reasons, the malposition and withdrawing of the catheter could be prevented, which kept stable low NRS. The drawback of P Catheter is that it does not have any neural stimulation function, however we believe that there is a very low possibility of nerve damage, because the pigtail portion is usually a little bit far from the nerve by using ultrasound.
References:
Anesth Analg 2017; 124:308-35.
Learning points: Continuous interscalene brachial plexus block with ultrasound using P catheter could reduce the possibility of catheter malposition and lower the pain score. Moreover, for this method to be successful, it is important to understand the characteristics of needle and insertion techniques with ultrasound.

03AP02-5
Changes of rSO2 during shoulder arthroscopy under general anesthesia with interscalene block in the beach chair or lateral decubitus positions

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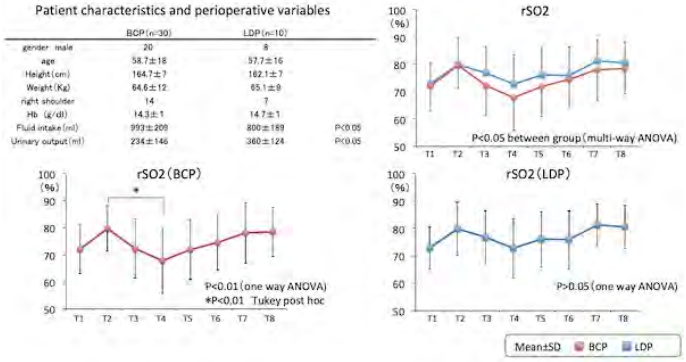
Background and Goal of study: Patients undergoing shoulder arthroscopy in the beach chair position (BCP) may be at more risk for adverse neurologic events due to cerebral ischemia than in the lateral decubitus position (LDP). Interscalene block may help to reduce the intraoperative dose of general anaesthetics and opioids, preserve the sympathetic response and stabilize hemodynamics during surgery. Therefore, interscalene block may help to reduce the incidence of cerebral oxygen desaturation. We compared the rSO2 changes during shoulder arthroscopy in the BCP or LDP under general anaesthesia with interscalene block.
Material and Methods: Data were collected on consecutively enrolled 40 patients undergoing elective shoulder arthroscopy in the BCP (30 subjects) or LDP (10 subjects) from July 2015 to June 2016. Anaesthetic management was standardized in all patients. Patient were received interscalene block with ropivacaine (10ml,0.75%) before induction of anaesthesia. Regional cerebral oxygen saturation (rSO2) was quantified using an INVOS near-infrared spectroscopy (Somanetics, Troy, MI). Time points for recording were as follows: T1: before anaesthesia induction, T2: 5 min after intubation, T3: 5 min after position placement, T4: 30min after position placement, T5: 60 min after position placement, T6: 90 min after position placement,T7: 5 min after placing patient in a horizontal position, and T8: 5 min after extubation.
Results and Discussion: Patient characteristics and perioperative variables were comparable between the BCP group and the LDP group except for intraoperative fluid intake and urinary output. Intraoperative hemodynamic variables did not differ between groups. Changes in rSO2 values were significantly different between the BCP group and the LDP group. In the BCP group, mean rSO2 values were significantly decreased 30 min after patient positioning (67±12%, mean±SD) compared to after induction of anaesthesia (79±8%).
Conclusion: Current study demonstrates that significant reductions in rSO2 occur when position is changed from supine to BCP in patients undergoing general anesthesia with additional use of interscalene block.



03AP02-6
An analysis of consecutive 122 patients receiving continuous interscalene block using catheter-over-needle method.

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Background and Goal of Study: The continuous interscalene block is widely used for pain management in shoulder surgery. However, continuous interscalene block by catheter-through-needle method reportedly causes adverse event (e.g. pericatheter local anesthetic leakage, phrenic nerve paralysis, hoarseness)(1). The catheter-over-needle method is expected to reduce those adverse events (2). We retrospectively evaluated the incidence of adverse events following shoulder surgery with interscalene block using catheter-over-needle method.
Materials and Methods: After obtaining institutional review board approval, we retrospectively reviewed the anaesthesia records and medical record of adult patients who underwent shoulder surgery with a continuous interscalene block using catheter-over-needle method at our hospital from July 2015 to July 2017 and evaluated the incidence of the adverse events.
Results and Discussion: During the surveillance period, 122 adult patients underwent shoulder surgery with a continuous interscalene block using catheter-over-needle method. In all cases, a catheter was inserted using the catheter-over-needle system (Cotiplex®C) under direct ultrasound guidance before the induction of anaesthesia. Adverse events were observed in 46 cases (37%). Catheter dislodgements in 3 cases (2.4%), dyspnea in 4 cases (3.2%), hoarseness in 12 cases (9.8%), insufficient effect in 13 cases (10%), dizziness in 15 cases (12%), bradycardia in 4 cases (3.2%), cough reflex at drinking in 3 cases (2.4%), ptosis in 2 cases (1.6%) respectively. There were no cases of pericatheter local anesthetic leakage. Patient characteristics and perioperative variables were comparable between the adverse event group and the non-event group.
Conclusions: Catheter-over-needle method prevents the pericatheter local anesthetic leakage. However, even using catheter-over-needle method, there are remarkable incidences of the adverse events in the continuous interscalene block. Therefore, careful observation of patient for adverse event is crucial during the continuous interscalene block.
References:
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03AP02-7
Comparison of the effects of adding dexamethasone at 0.25% Ropivacaine with 0.5% Ropivacaine alone in the supraclavicular brachial plexus block

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Background and Goal of Study: Ropivacaine was often used in peripheral nerve block for postoperative analgesia, but it could easily lead to long-term motor nerve blockage, and other serious side effects such as systemic toxicity, and even cardiac arrest. In order to reduce the incidence of these complications, reducing the concentrations of Ropivacaine was a feasible method. But this would also result in a shorter duration to neurological block. Dexamethasone was common to use as an adjuvant to local anesthetics in brachial plexus block, and had been demonstrated to improve the quality and to increase the duration of that. Therefore, the goal of this study was to compare the effects of adding Dexamethasone 5mg to Ropivacaine low concentrations (0.25%) with Ropivacaine high concentrations (0.5%) alone in the supraclavicular brachial block.
Materials and Methods: Patients received ultrasound-guided supraclavicular brachial plexus block were enrolled and divided into three groups: Group RH (0.5% Ropivacaine 20mL + N/S 1mL), Group RL (0.25% Ropivacaine 20mL + N/S 1mL), and Group DLD (0.25% Ropivacaine 20mL + dexamethasone 5mg), randomly. The block was performed at the end of the surgery. The pain score (Numeric Rating Scale) and the degree of motor block (Modified Bromage Scale) were evaluated four times in the recovery room every 15 minutes, then were also evaluated at the 2nd hour, 4th hour, 6th hour, 8th hour, and 24th hour after surgery.
Results and Discussion: There were no statistical differences in pain score between the three groups on the first day after surgery. To the degree of motor block, Group RLD had been relieved in the 2nd hour after surgery than the other two groups and lasted until one day after surgery. The degree of motor block of group RL was less than that of Group RH at the 8th hour after surgery.

Table 1. The degree of motor block on the 1st day after surgery

Motor block (0/I/II/III)	15 min	30 min	45 min	1 hour	2 hours	4 hours	6 hours	8 hours	24 hours
Group RH	3/0/3/24	3/0/3/24	3/3/0/24	3/3/0/24	3/3/0/24	3/3/3/21	3/3/3/21	3/3/4/20	12/12/3/3
Group RL	0/0/8/22	0/0/8/22	0/0/8/22	0/0/8/22	0/0/4/26	2/2/9/17	4/4/4/18	4/9/9/8**	10/16/4/0
Group RLD	3/3/4/20	3/3/4/20	8/0/4/18	8/0/4/18	10/10/0/10*#	15/6/0/9*#	16/6/0/8*#	16/6/2/6*#	24/3/0/3*#

Group RLD compared with Group RL: * P < 0.001
Group RLD compared with Group RH: # P < 0.001
Group RL compared with Group RH: ** P < 0.05
Motor block (Modified Bromage Scale)
0 = no block, I = partial block-total forearm and partial arm flexion, II = Almost complete block-inability to flex the arm and decreased ability to flex the forearm, III = total block

Conclusions:Compared with 0.5% Ropivacaine alone, adding dexamethasone to 0.25% Ropivacaine not only achieved the same analgesic effect but also shortened the duration of motor blockade on the first day after surgery.

03AP02-10
Evaluation of local and systemic analgesic effects of dexamethasone in the upper arm bone fracture and shoulder joint surgery.

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Background and Goal of Study: Shoulder surgery is associated with severe post-operative pain. Pain delays early rehabilitation, increases morbidity and lowers quality of life. Aim of the work was to investigate which of administration methods: dexamethasone perineuraly or intravenously prevents pain more effectively and improves patient quality of life.
Materials and Methods: Prospective, randomized study conducted at Hospital of Traumatology and Orthopaedics after Ethics committee approval. Study involved 75 patients with upper limb fracture or shoulder joint surgery in combined regional and and general anesthesia. Group I: Bupivacaine 0.25% - 70mg + Dexamethasone 8mg perineuraly. Group II: Bupivacaine 0.25% - 70mg perineuraly + Dexamethasone 8mg i/v. Group 0 (control): Bupivacaine 0.25% - 70 mg perineuraly. Stimulator and ultrasonography were used for nerve identification. Following indicators were fixed: pain intensity, morphine consumption, and patient satisfaction. Statistical analysis was performed using SPSS software.
Results and Discussion: Pain reliably (p <0.05) differed on D0 at all standardized times. Pain was significantly lower in I and II groups comparing to the control group. There was significant difference in pain intensity between groups II and I in favour of the intravenous group (p <0.05). The mean morphine consumption for the control group on D0 was significantly higher- 26.4 mg, in group I-15.6 mg and in group II -13.2 mg (p <0.05). Satisfaction with analgesic method was 3.6 ± 0.5 in group I, 3.3 ± 1.5 in group II and 2.9 ± 0.7 in group 0 on D0(p<0.05). In the control group, at first night, sleep disorders were more frequent (72.0%), but in group I only 12.0% and 4% in group II (p = 0.0001).
Conclusions: The pain intensity is significantly lower in the dexamethasone groups, especially if systemically given. Morphine consumption is significantly lower in dexamethasone groups and patient postoperative period quality is significantly higher in dexamethasone groups.
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Zhao WL., Ou XF., Liu J.et al. Perineural versus intravenous dexamethasone as an adjuvant in regional anesthesia: a systematic review and meta-analysis. J Pain Res, 2017 Jul 4;10:1529-1543

03AP03-1
Development of electrophysiological toxicity concomitant with myocardial depression after a lethal dose of bupivacaine. Study in an experimental porcine model.

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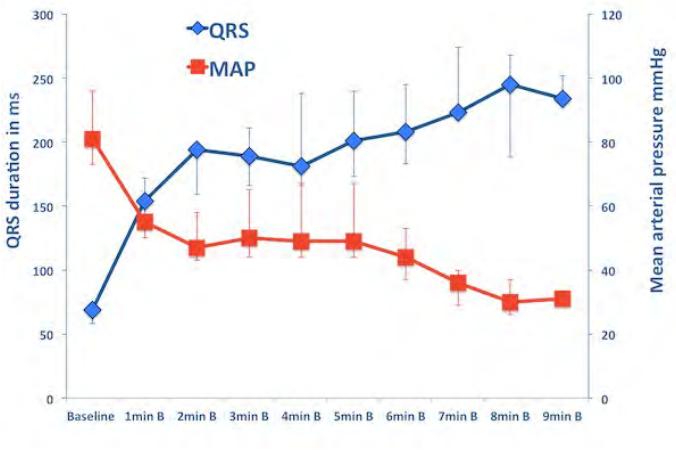
Background and goal of study: The mechanism of bupivacaine (B) cardiotoxicity is not clearly understood. There is an intense debate as whether B cardiotoxicity mainly results from electrophysiological dysfunction (arrhythmias and/or conduction disturbances), contractile dysfunction or both. Prolonged QRS is a marker of intraventricular conduction delay but it does not necessarily indicate impaired myocardial contractility. In addition, in the context of B intoxication, the duration of the QRS that is associated with impaired myocardial contractility is not well established. We evaluate the correlation between QRS widening and hemodynamic parameters after a lethal B dose.
Material and Methods: Pigs were anesthetized with thiopental and sevoflurane. A 5-French catheter was inserted through the femoral artery (FA) for transpulmonary thermodilution and blood analysis. A quadripolar catheter was use to atrial pacing (AP). Then a sequential B administration was started: 4 mg.kg-1 followed by 1mg/kg/min until cardiovascular collapse. Continuous AP was performed at 80 bpm at 30 mA with a stimulator. Electrocardiographic, hemodynamic parameters and blood samples were evaluated. Statistics: Pearson's correlation coefficient (QRS/haemodynamic parameters); P <0.05.
Results and discussion: 4 animals were studied. Mean B dose associated with cardiovascular collapse was 9.75±1.7mg/kg. The maximum peak B plasma concentrations were 31.4±6.9 µg/mL. Mean time to cardiovascular collapse was 10.25±1.5 min. QRS interval was prolonged from 66.75±8.5 to 245±23.4 ms (Δ 270±51%). A prolongation of QRS interval was seen simultaneously with hemodynamic deterioration. A negative correlation between QRS lengthening/mean arterial pressure (i.e. as QRS interval increased/MAP decreased (r= −0.75, p=0.0001). QRS interval and left ventricular contractility Index (dP/dtmax), (r= -612, p=0,0001) and with cardiac Index (r= -506, p=0,001) was observed.



Conclusions: B administration to a lethal dose leads to a concomitant QRS widening and a depression of myocardial function. The association between QRS and cardiovascular impairment suggest a prominent protagonism of QRS duration in severe B toxicity.

03AP03-3
2-Chloroprocaine does not support the growth of human pathogens including multidrug resistant clinical isolates

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Background and Goal of Study: Medications that support bacterial growth may be responsible for serious infections if contaminated during preparation or administration. On opening glass ampoules small particles fall into the medication (1). There are studies proving that bacteria may enter the medications via this way (2). It is known that local anaesthetics have antimicrobial properties if not diluted (3). In this study we investigated the impact of the ester-type local anaesthetic 2-chloroprocaine on bacterial growth.
Materials and Methods: Investigated medication: 2-chloroprocaine hydrochloride 10 mg/mL (Ampres®, Sintetica, Germany). Bacterial strains: *Staphylococcus aureus* ATCC 23923, *MRSA* ATCC 700698, *Klebsiella pneumoniae* ATCC 13883, *Pseudomonas aeruginosa* ATCC 27853, *Escherichia coli ESBL*, *K. pneumoniae ESBL*, *P. aeruginosa* MDR (multidrug resistant), Acinetobacter baumannii MDR. Bacterial inoculums were prepared in sterile physiological saline (0.9% NaCl) after dilution of standardized microbial suspension adjusted to 0.5 McFarland scale. Ten µL of each strain containing 10^6 colony forming units (cfu)/ml was inoculated into 1 mL of chloroprocaine 1%. The solution was kept at room temperature. Following 0, 1, 2, 3, 4, 6, 8, 24 hours 10 µL was plated from the inoculated chloroprocaine on Mueller-Hinton agar plates. Then the plates were incubeted at 37°C for 24 hours and the cfu was counted. Three parallels were used for each bacterial strain. Statistical analysis: analysis of variance, Scheffé test.
Results and Discussion: The cfu of the Klebsiella and Pseudomonas strains significantly decreased following 1 hour and that of the other strains following 2 hours in chloroprocaine 1%. The bacterial count did not grow at any time interval. Infection is a feared complication of neuraxial block and contaminated medication may be a source of this. As chloroprocaine 1% does not support bacterial growth its use seems to be as safe as the use of the amid type local anaesthetics.
Conclusions: Our results suggest that the use of chloroprocaine is safe as far as infection control is concerned. Should the solution be contaminated on opening it will not support bacterial growth.
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03AP03-4
Susceptibility of ropivacaine and bupivacaine to paced-induced sustained ventricular tachycardia and electrophysiological parameters implicated. Preliminary evaluation in an experimental porcine model

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Background and Goal of Study: Ropivacaine (R) is considered safer than bupivacaine (B). However, clinical reports have been described, in which its accidental administration has caused severe complications as arrhythmias and ventricular tachycardia. Knowledge of the electrophysiological parameters that promote the induction of ventricular arrhythmias (VA) with R and B intoxication may be useful for its treatment and prevention. Our aim was to investigate the arrhythmogenic potential of R versus B and evaluate the electrophysiological parameters associated with the development of VA with both anesthetics.
Material and methods: Fifteen pigs were anesthetized with sodium thiopental 5mg-kg and sevoflurane 1 MAC (2.6%). Femoral artery and vein were canalized for invasive monitoring, analytical blood gas samples and local anaesthetic determinations. Three quadripolar catheters were used for stimulation and intracardiac recordings (high right atrium, right ventricular apex and His bundle recording area). After instrumentation, the animals were consecutively assigned into 2 groups that received B: 4 mg.kg-1 (n=9) or R: 5 mg.kg-1 (n=6) followed by an infusion of 100 µg.kg-1.min-1 during 15 min. A programmed ventricular stimulation protocol (PVSP) was performed at baseline after 15 min of B or R perfusion. To evaluate the frequency-dependent effect of B and R, ventricular pacing was performed at a cycle lengths of 400 and 500ms. Electrophysiologic parameters and ventricular induced arrhythmias were compare between both groups.
Results: At baseline, two animals, one in each group developed VA after the PVSP. After drugs administration sustained VA occurred in 8 out of 9 animals (89%) in B group and in 4 out of 6 animals in R group (67%), p= 0.52. No electrophysiological differences were observed between the two groups immediately before the PVSP (animal intoxicated). The electrophysiological parameter related with the induction of VA in both groups was the stimulated QRS at 400 and 500 ms that were significantly increased in animals that developed VA (QRS400ms 277±103 vs 116.5±4ms, p=0.0001; QRS500ms 232±112 vs 112 ±6ms, p=0.005).
Conclusion: Our study has shown that **there are no differences in VA induction between R and B**. The **main electrophysiological parameter associated** with the induction of VA with the administration of both local anaesthetics was related with its **frequency-dependent cardiotoxicity highlighted with fast frequencies of ventricular stimulation.**

03AP03-5
Protective effect of thymoquinone in prilocaine toxicity

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Background and Goal of Study: At high doses of prilocaine (P), central and cardiac toxic effects can be seen. Thymoquinone (TQ) is a potent antioxidant and protects many organs against oxidative stress. The aim of this study was to investigate the efficacy of TQ in prilocaine induced neurotoxicity and cardiotoxicity.
Materials and Methods: Four groups (total 40 rats, n=10) (Sham, P, TQ, P+TQ) were generated by using Wistar Albino rats. P:8mg/kg/min from the femoral venous catheter was used to produce cardiotoxicity and epileptiform activity. TQ:3 days, 3x5mg/kg/day with intragastric gavage was given. On the 4th day single dose 15mg/kg i.p. was done. After 3 hours, rats underwent tracheostomy and mechanical ventilation was performed. ECG and EEG was monitored. Invasive blood pressure measurement was performed by femoral artery catheterization. Initial arrhythmia, asystole and epileptiform activity time were determined in the groups. Blood gas analyzes were performed at regular intervals. After rats were sacrified, brain and heart tissue were taken and Total Antioxidant Capacity (TAC) and Total Free Radical Activity (TFRA) were determined. Immunohistochemical staining was performed with AQP4, p50, p65, Cleaved Caspase-3 from brain tissue. Serum CK-MB and Myoglobin levels were also measured.
Results and Discussion:In the P+TQ group; When compared with the P group, seizure activity, first arrhythmia and asystole were significantly longer (Seizure: p=0.044, Arrhythmia: p=0.0048, Asistol: p=0.011). In addition, TAC of the brain and heart tissue samples were significantly higher in the TQ group. Serum levels of CK-MB and Myoglobin were significantly increased in the P group compared to the P+TQ group (p<0.001). In immunohistochemical analyzes; Rats with experimental epilepsy with prilocaine have been shown to increase AQP4 expression due to payment in their brains. As a result; It has been shown to increase NFκB pathway proteins p50 and p65 expressions by inducing neuroinflammation. In the P+TQ group; It was observed that p50, p65 expressions decreased due to decreased AQP4 expression and inflammatory response. In the literature, there is no study investigating the efficacy of TQ in local anesthetics toxicity. TQ has been shown to have protective efficacy in cardiotoxicity hepatotoxicity, nephrotoxicity, neurotoxicity.
Conclusions: We found that protective effect of TQ in local anesthetics toxicity

03AP04-1
The Analgesic Efficacy of Dexamethasone added to Levobupivacaine in Ultrasound-guided Transversus Abdominis Plane Block for Total Abdominal Hysterectomy or Total Abdominal Hysterectomy with Bilateral Salpingo-oophorectomy

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Background and Goal of Study: The transversus abdominis plane (TAP) block is an effective method for providing postoperative pain relief following various lower abdominal surgeries. Various adjavants has been used to improve the quality, whilst increasing the duration of the local anesthetic action. We evaluate the analgesic efficacy of dexamethasone addition to levobupivacaine in TAP block following total abdominal hysterectomy or total abdominal hysterectomy with salpingo-oophorectomy.
Materials and Methods: A randomized, double blinded, prospective study. A total of 99 patients undergoing elective total abdominal hysterectomy or total abdominal hysterectomy with salpingo-oophorectomy were enrolled in the study. The patients were randomly divided into three groups using a random number table generated program with seal opaque envelopes. TAP block was obtained with 20 mL of 0.25% levobupivacaine + 2 mL 0f saline 0.9% (control group, n=33) or 20 mL of 0.25% levobupivacaine + 1 mL of saline 0.9% + 1 mL of dexamethasone (dexa 4 mg group, n=33) or 20 mL of 0.25% levobupivacaine + 2 mL of dexamethasone (8 mg dexa group, n=33). The primary outcome was time to first analgesia defined as the interval from completion of TAP block, till first need of rescue analgesic in the form of IV morphine PCA, whereas the secondary outcomes were postoperative pain, as evaluated by verbal numerical rating scale (VNRS) at 1, 2, 4, 12, 24 and 48 hr postoperatively, morphine consumption and occurrence of nausea, vomiting, pruritus and somnolence.
Results and Discussion: The median of time to first analgesia was 150 min (135-166) in the control group, 170 min (147-197) in the dexa 4 mg group and 175.5 min (158.5-194.5) in the dexa 8 mg group (P <0.05). Otherwise, there was no difference in pain score at 1, 2, 4, 12, 24 and 48 hr and no difference in the the total total morphine consumption and morphine related side effects.
Conclusions: Addition of dexamethasone to levobupivacaine in transversus abdonimis plane block prolong time to first analgesia following total abdominal hysterctomy or total abdominal hysterectomy with salpingo-oophorectomy.

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03AP04-2
TAP block in conjunction with dexmedetomidine for strangulated hernia repair in a patient with severe dilated cardiomyopathy. A case report.

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Background: Patients with comorbidities trouble both anesthesiologists and surgeons. Transversus Abdominis Plane (TAP) block is used for analgesia in hernia repairs. Our case is a female with dilated cardiomyopathy managed with TAP block and intravenous continuous infusion of dexmedetomidine as an anesthetic technique for repair of a strangulated inguinal hernia.
Case Report: A 74 year old female presented in the emergency department with fecal vomiting because of a strangulated inguinal hernia. Preoperative assessment revealed a history of dilated cardiomyopathy, mild kidney disease, hypertension and dyslipidemia. She was classified as ASA IVE, NYHA III and a bedside ultrasound depicted reduced EF=35%, global hypokinesis and enlarged left ventricle. After detailed description of our plan and informed consent she was moved to the OR. Regular monitoring plus an arterial line, BIS and an O_2 mask with $ETCO_2$ tracing were placed. She was given 1mg midazolam and the intravenous infusion of dexmedetomidine was initiated. US-guided TAP block was then performed and 25ml of 0,5% ropivacaine were injected. At 30 minutes, 0,05mg fentanyl were administered and the incision was made with no distress of the patient. No enterectomy was needed and the operation lasted 60 minutes. Dexmedetomidine infusion was terminated 10 minutes before the end of the operation. No hemodynamic compromise was recorded and spontaneous breathing was maintained. After 30 minutes, she was transferred to the surgery clinic. On postoperative day 5 she was interviewed and expressed her overall satisfaction. She had no recall of the block or the procedure and mentioned “dreaming”.
Discussion: Upon a life threatening condition surgery is often the endpoint. Peripheral nerve blocks are known for preserving cardiovascular and respiratory function. Dexmedetomidine is also attracting anesthesiologists for its analgesic and sedative properties. The pathophysiology of dilated cardiomyopathy is complex and any disruption of its subtle balance could lead to decompensation and adverse events. Combination of both interventions resulted in the successful management of this patient.
Learning points: TAP block along with intravenous infusion of dexmedetomidine proved to be an alternative for this high risk patient with strangulated hernia. A structured plan is necessary to manage such patients.

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03AP04-3
The comparison of postoperative analgesic effects between wound infiltration with local anesthetics and ultrasound guided ilioinguinal/iliohypogastric nerve block in cesarean section

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Background and Goal of Study: Multimodal analgesics are recommended following cesarean section(C/S)in order to increase the efficiency of the analgesics, and to decrease the use of opioids and side effects. In this study, we aimed to compare effects between wound infiltration with local anesthetics and ultrasound guided bilateral ilioinguinal/iliohypogastric nerve block combined with patient controlled anesthesia (PCA) on opioid dose and patient satisfaction.
Materials and Methods: 90 pregnant women were included to this study. Patients were assigned into 3 groups:In Group LA(n=30)we performed 10ml of 2% lidocain and 10cc of 0.5% of bupivacain subcutaneously over the wound edges. Group K(n=30)was control group and we only used intravenous tramadol PCA.In Group US(n=30),we applied ultrasound guided bilateral ilioinguinal/iliohypogastric nerve block with 5ml of 2% lidocain and 5ml of bupivacain. PCA was applied using I.V. tramadol HCl among all groups. We assessed VAS score, arterial blood pressure, pulse rate, oxygen saturation, additional diclofenac sodium, sedation score, fever, nausea, and followed for the presence of infection at 0,2,4,8,12,16,20,24 hours. Additional analgesics were provided using 75mg of I.M. diclofenac sodium. We recorded total I.V. opioid use and patient satisfaction at the end of 24 hours.
Results and Discussion: Total I.V. opioid use was statistically lower in Group LA and Group US compared to group K. Total I.V. opioid use was significantly lower in Group US compared to group LA.VAS scores were found to be significantly lower at all measurements in group LA and group US compared to group K. Postoperative need for diclofenac was significantly lower in group US compared to other 2 groups. Nausea was reported to be the most common side effect(30%)among overall patients. The incidence of nausea was lowest in group US(6.7%),which was found to be statistically significant. Patient satisfaction was significantly higher in group LA and group US compared to group K
Conclusions: Local anesthetics and US guided II/IH block results decreased opioid dose and side effects and increased patient satisfaction compared to control group. We found that US guided II/IH nerve block significantly decreased opioid use compared to other 2 groups. We believe that US guided II/IH nerve block, which is easy to use and has a high success rate, could enhance the effects of multimodal treatment on postoperative analgesics.

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03AP04-4
Assessing the efficacy of ultrasound guided posterior quadratus lumborum block for postoperative analgesia in patients undergoing laparoscopic pyeloplasty.

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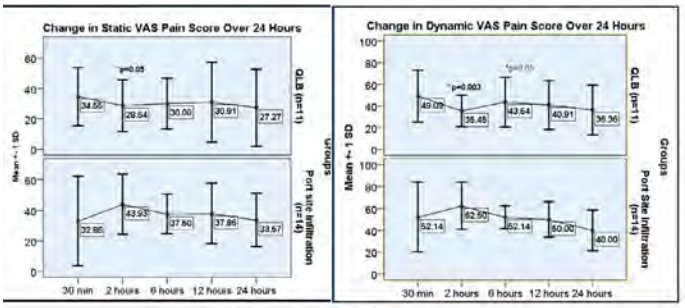
Background: The institutional practice for analgesia in patients undergoing Laparoscopic pyeloplasty is to administer fentanyl and paracetamol intravenously along with port site infiltration with local anaesthetics. Posterior quadratus lumborum block(QLB) involves depositing local anaesthetic drug in the interfascial plane between quadratus lumborum and psoas major muscle. It covers T7 to L1 dermatomes providing abdominal wall and visceral analgesia.
Goal of Study: We hypothesised that QLB reduces the pain after Lap pyeloplasty as compared to port side infiltration with local anaesthesia.
Materials and Methods: It is a randomised parallel group ongoing trial in a single centre. Twenty Five ASA1or2 adults scheduled for lap pyeloplasty under general anesthesia were randomly assigned to receive a ultrasound guided QLB with 20ml of 0.5%ropivacaine or port side infiltration with same drug. Patients were blinded to group allocation.1gm intravenous paracetamol was given intraoperatively and TID thereafter.The primary outcome was Static and dynamic (on movement) pain assessed by Visual Analogue Scale of 0-100 at half,2,6,12 and 24 hours after awakening from anaesthesia. The secondary outcome was nausea or vomiting at same time points and number of patients requiring rescue analgesic(100mg intravenous tramadol)in 24hours.16 patients were required in each group to

significantly reduce dynamic VAS at 2 hours from 60 to 40 at β=80% and αerror at 5%

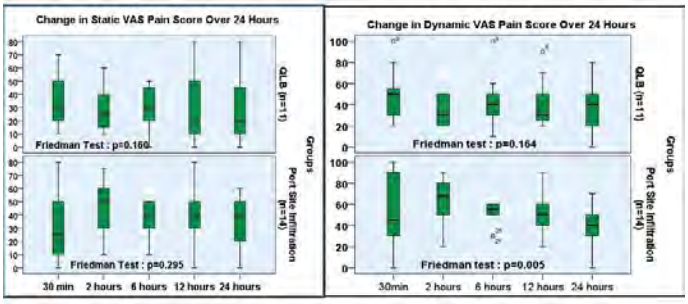
Results and Discussion: Interim data is herewith presented with figures 1 and 2.No difference was observed in patient demographics and nausea scores.3 patients required rescue analgesic in QLB (27%)and 7(50%)in 2nd group. Variation in pain scores in 2nd group was probably dependent upon time from paracetamol administration.

Conclusion: Posterior quadratus lumborum block is an effective addition to post lap. pyeloplasty multimodal analgesia regime.



* Mann Whitney U Test (for median values)

The Mean and Median Static and dynamic VAS were lower in QLB group at all time points although the difference was statistically significant only in Dynamic VAS at 2 hours



The change in dynamic pain in patients with port site infiltration was statistically significant over 24hours period. It remained similar or stable less than 50 in QLB group

03AP04-5

Analgesic effects of ultrasound-guided preoperative bilateral transverse abdominis plane block in laparoscopy: preliminary data.

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Background and Goals: The aim of this study was the evaluation of the postoperative pain in patients (pt) undergoing laparoscopic cholecystectomy treated with bilateral transverse abdominis plane(TAP)block after induction of general anesthesia (iGA).

Materials and Methods: 76 patients were enrolled in the study and were randomized into two groups : G1 received bilateral 20 ml US-TAP block with levobupivacaine (50mg) and clonidine (1mcg/kg) after iGA and 1000mg intraoperative paracetamol. G2 received tramadol (100 mg) + ketorolac (30mg) intraoperatively and continuous infusion of tramadol (400 mg)+ ketorolac (120mg) for the following 48h. The incidence of pt measured with numeric rate scale (NRS)≥4, the postoperative Postoperative Nausea and Vomiting(PONV), patients satisfactory scores (0-10), and any adverse events were recorded within the first 24h after surgery.

Results and Discussion: No significant differences were found in gender, age, body mass index between the two groups. The incidence of NRS≥4 or PONV in G1 were significantly lower than in G2 (respectively, NRS: 16.5 % vs 26.57 %, p=0.006; PONV: 10.6% vs 39.5%, p=0.0008). No significant differences were found in patient satisfaction score. Any adverse events as itch, drowsiness and dizziness were recorded.

Conclusions: Our preliminary data showed that the ultrasound-guided bilateral TAP block is a valid alternative in the postoperative pain management with no opioids in pt undergoing laparoscopic cholecystectomy.

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03AP04-6

Dermatomal spread following ultrasound-guided quadratus lumborum block in children

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Background and Goal of Study: Dermatomal spread following ultrasound-guided quadratus lumborum block (QLB) reliably expands cephalad to T8 in adult female patients[1]. We have also experienced cephalad spread sometimes and QLB seems epochal block, however, data is limited, and still less in children. Therefore, we investigated a dermatomal spread of various types of QLB in pediatric patients.

Materials and Methods: This prospective observational study was conducted from Dec 2016 to Oct 2018. Children more than 60 months who underwent appendectomy, gynecological surgery and urological surgery (both open and laparoscopic) were enrolled. After general anesthesia was induced and stabilized, QLB was performed by two anesthesiologists and the dose was 0.4 ml/kg of 0.25% levobupivacaine per one side. Four types of QLB were performed; QL1: the needle tip was placed anterolateral to the quadratus lumborum muscle (QLM), QL2: the needle tip was placed posterior to QLM, QL3: the needle tip was placed anteromedial to QLM, iQL: the needle tip was placed at the center of QLM. General anesthesia was maintained with sevoflurane and remifentanil. Remifentanil infusion was stopped when the abdominal wall closure was started. Topical local anesthetics was added in case pain reaction was observed during the closure. Opioid use was limited to less than 2.5 μg/kg of fentanyl. Sensory level was checked postoperatively using ice pack along the anterior axillary line and assessed just as either cold or not.

Results and Discussion: Forty five children were recruited, and sensory level data were obtained from 39 children and 75 blocks. Sensory block data in each block type are shown in Figure. Briefly, sensory block that reached to T10 in QL1, QL2, QL3, and iQL were 2/11, 8/29, 0/16, and 0/18, respectively. Child population property and the way to determine the level of sensory loss might affect the results different from previous study.

Conclusions: We investigated the dermatomal spread following four types of QLB in children. In most of cases, sensory loss was limited to the lower abdomen.

References:

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03AP04-7

Comparison of quadratus lumborum block with transversus abdominis plane block for postoperative analgesia after cesarean section. A prospective, observational study.

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Background and Goal of Study: Acute postoperative pain still remains a relevant issue in patients after cesarean section. Poorly treated postoperative pain can lead to chronic pain development. Trunk blocks could alleviate postoperative pain intensity and limit opioid administration. The main goal of our study was to compare two types of regional blocks: quadratus lumborum block (QLB) and transversus abdominis plane block (TAP) as a part of multimodal analgesia after cesarean section.

Materials and Methods: After obtaining a written, informed consent, patients anesthetized spinally were allocated to one of two groups: TAP or QLB. At the end of procedure, under ultrasound guidance, up to 20 mL per side (0.2 ml/kg) 0.375 ropivacaine solution was injected. We evaluated pain intensity via visual-analogue scale (VAS) at the 2, 4, 8, 12 and 24 hours and consumption of painkillers during the first postoperative day. Beside nonopioid drugs, parturients could get up to 2 dosages of subcutaneous morphine (5 mg). The study protocol was approved (permit number KE-0254/62/2018) by the local bioethics committee of Medical University of Lublin.

Results and Discussion: The study was conducted from March 2018 to July 2018. 76 patients, 37 in TAP and 39 in QLB group were recruited. Both groups did not differ according to their demographics. In 45 cases (59%), the reason of

procedure was the subsequent cesarean section. No difference was found between both groups in pain intensity measured on VAS either at rest or in patient activity. The mean VAS results at rest in QLB group were 27 (2nd h), 33 (4th h), 32 (8thh), 32 (12th h), and 25 (24th h). The mean VAS results at rest in TAP group were 33 (2nd h), 42 (4th h), 37 (8thh), 37 (12th h), and 32 (24th h). The mean VAS results in activity in QLB group were 32 (2nd h), 44 (4th h), 45 (8thh), 48 (12th h), and 45 (24th h). The mean VAS results in activity in TAP group were 41 (2nd h), 52 (4th h), 50 (8thh), 49 (12th h), and 41 (24th h). We did not notice any significant difference in consumption of nonopioid painkillers and morphine between QLB and TAP groups.
Conclusions: In the current study, QLB and TAP block showed similar activity in the alleviation of acute postoperative pain after cesarean section.
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03AP04-9
Quadratus Lumborum Block for Conventional Inguinal Hernia Repair: When Better to Perform it?

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Background and Goal of Study: Effective postoperative analgesia after abdominal surgeries is crucial for early ambulation and patients comfort. Avoid of opioid usage is very important to lower perioperative complications. Quadratus lumborum block (QLB) is rapidly growing analgesia method for abdominal surgeries that provides analgesia to the abdominal wall Th6-L1. **The aim** of this investigation was to compare effectiveness of performing QLB and when is better to perform it before or after conventional inguinal hernia repair.
Material and Methods: 24 patients (ASA I-III) were included in this study. Patients were divided into two groups (first group[QLB before surgery group], n=12; second group[QLB after surgery group], n=12). All patients were in the supine position under general anaesthesia, for lateral QLB approach, injection of 30ml of 0.25% levobupivacaine performed under ultrasound control. For all patients the pain level was evaluated using numerical rating scale (NRS) at 30min, 3rd, 6th, 12th, 24th hour. At the end of surgery all patients received 50mg dexketoprofene i/v for visceral pain. Next dose was given only if NRS were ≥3. Opioids were given only if NRS were >4.
Results: Mean BMI in 1group (23,2±2,4 kg/m2), 2group (22,6±2,6 kg/m2) (p=0.924). All 24 blocks where successful, no complications were observed. Lateral QLB effect lasts at least 24 hours. For 20 patients NRS was no higher than three. After surgery 16,7 % (n=4) required rescue analgesia with opioids, 1group – one patient, 2group – 12,5% (n=3). Performance of QLB before surgery required 166,7±61,5 mkg of fentanyl. Performance after surgery required in average 279,1±45,0 mkg of fentanyl during anesthesia (p=0.39).
Conclusion: Quadratus lumborum block is an effective method for pain management.It is easy to perform and better to perform before surgery because it reduces needs of fentanyl during surgery and opioids in postoperative period.

03AP05-1
Automated intermittent bolus technique and continuous infusion for femoral nerve block result in equivalent analgesia and quadriceps strength after total knee arthroplasty: a prospective randomized trial

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Background and Goal of Study: Although continuous femoral nerve block (CFNB) is a common method of analgesia after total knee arthroplasty (TKA), continuous infusion (CI) for CFNB causes quadriceps weakness. The goal of our study is to determine whether an automated intermittent bolus (IB) for CFNB provides enhanced analgesia after TKA compared with CI for CFNB while preserving quadriceps strength.
Materials and Methods: Prospective single-blinded, randomized controlled trial comparing CI with IB for CFNB after primary TKA. Fifty-three patients with osteoarthritis were enrolled from May 2014 to March 2016 (UMIN000032988) and were randomly assigned to receive either an IB of 4 ml of ropivacaine 0.2% every hour with patient-controlled analgesia (PCA; 2 ml bolus, lockout time 20 minutes; Group A) or a CI of 4 ml/hour of ropivacaine 0.2% with PCA (Group B). All patients received single-injection sciatic and femoral nerve blocks plus femoral nerve catheter placement before general anesthesia. CFNB was started immediately after surgery, and was administered until post-operative day (POD) 4. A rescue dose of oral tramadol was allowed for breakthrough pain even if PCA was used. Our outcome measures were postoperative knee pain assessed by a 0-10 numeric rating scale (NRS) on POD 0 at 3:00 and 6:00 PM and on POD 1, 2, 3, 4, and 7 at 12:00 PM, and quadriceps strength measured by a belt-stabilized hand-held dynamometer on POD 1, 2, 4, and 7. The use of ropivacaine via PCA and the amount of rescue tramadol medication for pain were recorded. Mann-Whitney U test analyzed the data. A p value of <0.05 was considered statistically significant.
Results and Discussion: Ten patients were excluded because of missing data; thus, 43 patients were included in the analysis. The median NRS score ranged from 0 to 2.5 for Group A (n=22) and 0 to 3 for Group B (n=21) at 3 and 6 PM on POD 0 (p=0.29 and 0.08, respectively) and at 12:00 PM on POD 1, 2, 3, 4, and 7, (p=0.95, 0.75, 0.54, 0.51 and 0.25, respectively). Mean volume of anesthetics via PCA and amount of rescue tramadol were also not statistically significantly different between Groups A and B. Quadriceps strength (kgf/kg) ranged from 0.04 to 0.31 for Group A and 0.04 to 0.30 for Group B preoperatively and on POD 1, 2, 4 and 7 (p=0.84, 0.74, 0.05, 0.50 and 0.62, respectively).
Conclusions: IB and CI for CFNB resulted in equivalent pain control and quadriceps strength after TKA.

03AP05-2
Comparison of intra-articular bupivacaine-dexmedetomidine and bupivacaine-magnesium for postoperative analgesia in arthroscopic knee surgery: a randomized controlled clinical trial

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Background and Goal of Study: Arthroscopic meniscus surgeries are the most frequent day-case orthopedic procedures. However, these surgeries can lead to pain at various levels. This study's objective is to compare the efficacy of magnesium sulphate and dexmedetomidine in combination with local anesthetics to be given intraarticularly for postoperative pain management in patients undergoing arthroscopic meniscectomy under spinal anesthesia.
Materials and Methods: Fifty-two patients aged between 18 and 65 years who were scheduled for elective arthroscopic meniscectomy under spinal anesthesia were included in this prospective, randomized controlled double-blind study. Patients were randomly assigned to group D (bupivacaine + dexmedetomidine) or group M (bupivacaine + magnesium sulphate). The study solution was injected intraarticularly at the end of the procedure. Perioperative data, postoperative visual analogue scale (VAS) scores, and total analgesic consumption were recorded.
Results and Discussion: There were no statistically significant difference in mobilization time, rescue analgesic time, and non-steroidal anti-inflammatory consumption (p>0.05). In the intergroup comparison of VAS scores, the mean VAS score at rest in group D and the mean VAS score during movement in group M were significantly higher (p<0.05). The maximum mean VAS values at rest and during movement in group D were measured at the 6th hour. The VAS scores at rest and during movement in group M peaked at the 8th hour (Figure-1).
Conclusions: Both intraarticular dexmedetomidine and magnesium sulphate in combination with bupivacaine are effective for post-operative analgesia in arthroscopic knee surgery.
Acknowledgements: Trial registration: NCT03479216

Table-1: Perioperative vital parameters of the patient.

		Heart Rate (bpm)	Blood Pressure (mmHg)	SpO_2 (%)	$EtCO_2$	BIS	TOF (%)
	Preoperative	109	155/102	93	-	97	-
Anesthesia induction	Induction	100	136/90	100	-	40	0
	Intubation	112	146/93	100	-	45	0
	Incision	93	132/87	98	46	50	0
	Trocar insertion	99	138/88	95	40	42	0
Anesthesia maintenance	10. min	83	105/74	96	36	45	0
	20. min	78	110/78	95	35	50	0
	30. min	80	113/81	95	36	48	0
	40. min	81	108/80	94	38	51	0
	50. min	76	106/72	94	37	43	0
End of anesthesia	0. min; Sugammadex	74	111/81	95	37	40	84
	10. min	79	109/85	94	36	38	105
	20. min	65	121/92	93	37	40	100
	30. min; Theophylline	83	115/78	97	38	41	100
	40. min; Extubation	88	132/80	93	-	93	104

BIS: Bispecteral Index; TOF: Train-of-Four Stimulation

03AP05-4
Retrospective evaluation of postoperative knee flexion and pain relief outcome after total knee arthroplasty; comparison of the combination of local infiltration and peripheral nerve blocks with local infiltration alone

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Background: Local infiltration analgesia (LIA) and peripheral nerve block including a femoral triangle block (FTB) and a tibial nerve block (TNB) are gold standards for postoperative pain management after total knee arthroplasty (TKA). In addition, the combination of these regional anesthesia improves postoperative analgesia compared with a single regional anesthesia procedure. However, the long-term efficacy of the combination is still unknown. We examined the long-term progression of rehabilitation after total knee arthroplasty with retrospective case-control research in a single institution.
Methods: This trial was approved by IRB in the institution and waived the informed consent. A total of 554 subjects was extracted from the medical record. The subjects were received total knee arthroplasty with a same surgical procedure. All subjects were received LIA with 0.75% ropivacaine 150mg into the anterior aspect of the knee capsule and incision site and multimodal analgesia protocol including NSAIDs, paracetamol and dexamethasone. The Group Both subjects were received single-shot FTB and TNB with each 25mg of levobupivacaine 10mL. We evaluated the knee flexion angle, the possibility of deep knee flexion beyond 140 degrees, Seiza (Japanese traditional style sitting like squatting), the existence of postoperative walking pain despite the administration of pain relief on the 6 months after surgery.
Results: We analyzed 263 subjects in LIA and 291 in Both. Group Both patients remarkably improved the knee flexion angle on postoperative day 1 and 3 compared with Group LIA (Both versus LIA; 57 degrees versus 35 degrees in day 1, p<0.001; 96 degrees versus 93 degrees in day 3, p=0.02). However, the knee flexion angle in postoperative 6 months was not statistically different between the two groups (132 degrees versus 133 degrees, p=0.06). The ability of postoperative deep knee flexion above 140 degrees was 172 patients in Group Both (59.1%) and 153 patients in Group LIA (58.2%), the Seiza sitting was 57 patients (19.6%) versus 48 patients (18.3%), and the existence of walking pain was 8 patients (2.7%) versus 15 patients (5.7%), respectively. There was no statistical difference between the two groups (p=0.86, 0.75, 0.09, respectively).
Conclusion: The retrospective research findings suggest that the combination of peripheral nerve blocks with LIA did not improve long-term outcome after TKA.

03AP05-7
The adductor canal block as component of the perineural block in knee surgery

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Background and Goal of Study: Anaesthesia procedures in knee surgery is well known and consist of spinal anaesthesia, lumbar plexus block(LPB) or Femoral nerve block(FNB)[1]. Nevertheless, postoperative recovery is limited due to excessive pain or limited mobility especially in LPB with ropivacaine. Study was designed to test the efficacy adductor channel block(ACB) in postoperative analgesia after knee surgery[2].
Materials and Methods: A prospective cohort study involved 95 pts. with arthroscopy and knee replacement. Pts. were randomized into two groups. In main group (n=47), Lumbap plexus block and proximal sciatic (PSNB) using 1.5% lidocaine+ adductor channel block(ACB) using 0.75% ropivacaine added ketanov 30 mg, dexamethasone 4 mg were performed. In control group(n=48), Lumbar plexus block using 0.75% ropivacaine added ketanov 30 mg, dexamethasone 4 mg and PSNB using 1.5%lidocaine were performed. Neural blocks were performed by neurostimulation, ultrasound guided and light sedation. Pain was evaluated by visual analogue scale. Evaluation of power quadriceps femoris muscle by Tinetti scale[3]. Also we account an urinary retention.
Results and Discussion: In both groups, operation duration was similar 120±24 min, anaesthesia was adequate, postoperative VAS evaluate was 0-1 scores, no additional analgesia. Within 24 hours after surgery, in main group Tinetti score was 16 ± 3 points, no cases of urinary retention. In control group, Tinetti score was 2 ± 1 points. Also 7 (3.36%) pts. had urinary retention, and 2 (0.96%) patients had bilateral block, as result of epidural spread of anaesthetic
Conclusions: 1.Both types of anesthesia provided adequate and safe anesthesia for knee surgery. 2. Adductor canal block in combination with LPB and PSNB is effective for postoperative analgesia after knee surgery.
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03AP05-8
Fascia iliaca block versus local infiltration analgesia for postoperative pain control after hip replacement surgery.

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Background and Goal of Study: Fascia iliaca block (FIB) provides N. femoralis, N. cutaneous femoris lateralisand hypothetically N. obturatorius analgesia. We suggest that FIB is applicable in acute postoperative pain management for patients undergoing total hip arthroplasty under spinal anesthesia and its analgesic effect is comparable with local infiltrational analgesia (LIA). Aims of study were to compare mean pain scores during rest and mobilization, to determine if FIB or LIA shorten hospitalization time and have morphine sparring effect.
Materials and Methods: Prospective observational study was conducted after ethics committee approval at Hospital of Traumatology and Orthopaedics, Riga, Latvia. Patients were divided in 3 groups according to regional anaesthesia provided - FIB, LIA and control group. FIB was conducted under ultrasound control by the anesthesiologist, LIA intraoperative by surgeon; the control group received spinal anesthesia only. Al patients received similar multimodal analgesia in postoperative period. Pain intensity according to VAS, morphine consumption and side effects were registered. Statistical analysis was performed using SPSS software.
Results and Discussion: In total 56 patients were randomized, 5 were excluded from study due to protocol break. Demographics were similar in all groups. LIA was significantly better according to analgesia in postoperative period (p< 0.05) Both LIA and FIB provided morphine sparring effect (p< 0.05). There wasn't significant difference in hospitalization time (p< 0.1). Sleep quality and overall satisfaction was better in LIA group (p< 0.05).
Conclusions: FIB does not provide statistically significant difference in VAS pain scores comparing to control group. LIA provides better pain management profile in comparision to FIB. Both groups provided morphine sparring effect.
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Yang L, Li M, Chen C, Shen J, Bu X. Fascia iliaca compartment block versus no block for pain control after lower limb surgery: a meta-analysis. Journal of Pain Research. 2017 Dec 14;10:2833-2841.
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03AP05-9
Perioperative outcomes of adductor canal block versus femoral nerve block following total knee arthroplasty: a meta- analysis with trial sequential analysis of randomized controlled trials

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Background and Goal of Study: The efficacy and safety of adductor canal block (ACB) as compared with femoral nerve block (FNB) for pain management in total knee arthroplasty (TKA) remains controversial. The aim of this study was to determine whether ACB superior to FNB.
Materials and Methods: A meta-analysis, and trial sequential analysis of randomized controlled trials (RCTs) was conducted across relevant databases, including PubMed, EmBase, Medline, and the Cochrane Library, from inception to October 2018. Randomized controlled trials that assessed the perioperative outcomes of ACB and FNB in TKA patients were included. Two reviews independently assessed data extraction and quality of the studies.
Results and Discussion: A total of 1,030 patients from 16 RCTs were included in the meta-analysis. At any follow-up time, ACB was not inferior to FNB regarding pain control, mobilization ability, opioid consumption, complications and length of hospital stay, but ACB is superior to the FNB regarding muscle strength at most time measurement. After sensitivity analysis, ACB was associative with better preserved muscle strength than FNB. As well as , ACB showed better range of motion in comparison with FNB. However, current most outcomes were absence firm evidence from trial sequential analysis.
Conclusions: Meta-analysis supported that ACB may achieve faster mobilization ability recovery and better preserved muscle strength for patients after TKA without increasing the risk of complications, with similar pain management and opioid consumption when compared with FNB in the early postoperative period. However, due to the variations in the included studies, additional studies are needed to confirm these conclusions.

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03AP05-11
Comparison of Three Different Volumes - Doses of Bupivacaine for Adductor Canal Block for Postoperative analgesia after Anterior Cruciate Ligament Reconstruction

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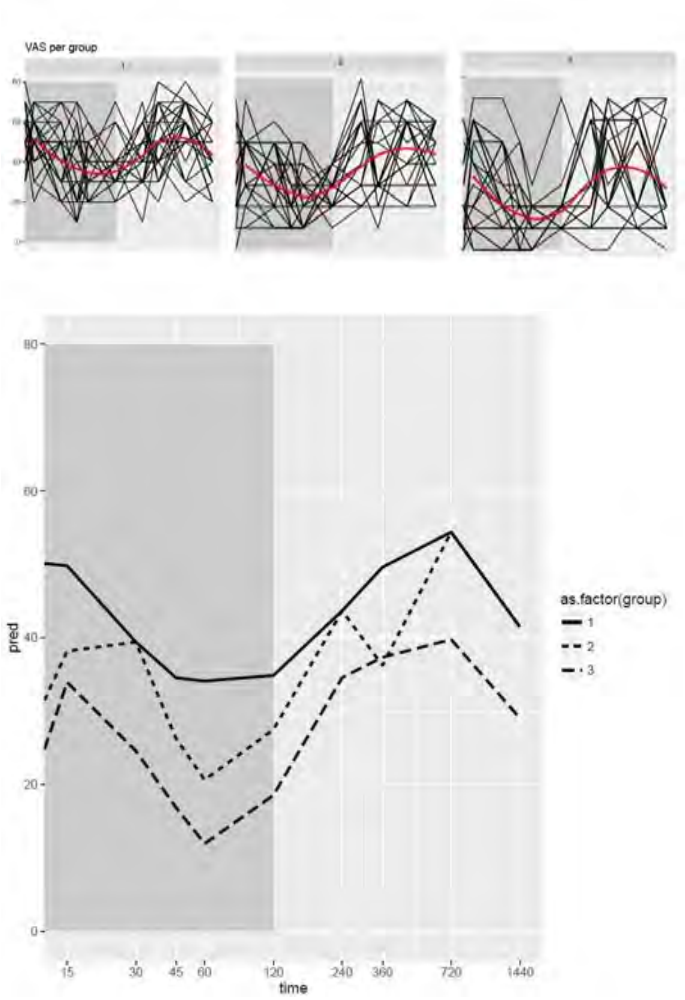
Background and Goal of Study: Adductor canal bloc is used frequently for postoperative analgesia following knee surgery. The best effective volume of bupivacaine 0.25 % of Adductor canal bloc following anterior cruciate ligament reconstruction is currently ill defined. We designed the present report to compare bupivacaine 0.25% in three different volumes to evaluate analgesic quality. Secondary aims were duration of analgesia, physiotherapy tolerance and time to home discharge.
Materials and Methods: Ninety patients undergoing anterior cruciate ligament reconstruction under general anaesthesia received Adductor canal bloc were assigned in a double-blind manner into three groups: group G20 (n = 30) received 20 ml bupivacaine 0.25% , group G25 (n = 30) received 25 ml bupivacaine 0.25% and G30 (n = 30) received 30 ml bupivacaine 0.25%. Postoperative pain scores were compared, at intervals (0,15,45,60, 90 and 120 min), and following discharge from the post anaesthesia care unit at 4, 6, 12 and 24 hr. Morphine doses during the post anaesthesia care unit stay and pethidine consumption in the subsequent 24 hours were measured. NONMEM was used to estimate VAS scores



Results and Discussion: The result showed lower pain scores in group G30 when compared with groups G25 and G20. The percentage of patients in the G30 group requiring rescue analgesia in post anaesthesia care unit stay was 60% which is lower than the percentage of patients in either the G25 group (80%) or the G20 group (100%). The 24 h consumption of analgesic were less, tolerance to physiotherapy pain was better and time to discharge was earlier for group G30 when compared with the two groups.
Conclusions: our report showed that ACB of 30 ml bupivacaine 0.25% provided longer postoperative analgesia following ACL reconstruction than that produced by administration of 25 ml or 20 ml of bupivacaine 0.25%

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03AP06-2
Retrospective study of the analgesic effect of subarachnoid morphine in spinal surgery

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Background and Goal of Study; Interventional spine procedures are associated with intense post-operative pain. An adequate pain management is essential in order to improve the functional outcome and to prevent the development of chronic pain. We tested the hypothesis that a single injection of subarachnoid morphine intraoperatively might provide efficient and safe analgesia for those patients.
Materials and Methods: A retrospective observational study was undertaken to evaluate the efficacy and safety of a low-dose subarachnoid morphine. We examined the charts of all patient submitted to non-urgent thoracolumbar spinal surgery during 2015 and 2016 in the orthopedics department at our hospital. Underaged patients, pregnant women, urgent surgery and trauma patients were excluded. We analysed the intraoperative and postoperative charts from the remaining 47 patients in order to determine the pain level, the need of rescue analgesia and the occurrence of side-effects. Statistical analysis were carried out using SPSS 20 ®. We also conducted univariable analysis with ChiSquare and F Fisher for qualitative variables and t Student/Mann Whitney for quantitative variables. A p value > 0.05 was considered statistically significant. Permission to conduct the study and collect the data was granted by the hospital ethical committee.
Results and Discussion: In two years the orthopedics department performed 47

non-traumatic thoracolumbar spinal surgeries. Three of those patients were excluded due to missing data. The patients were divided in Group A (general anesthesia, 32 patients) and Group M (general anesthesia with subarachnoid morphine, 12 patients), with no significant difference in age, gender or ASA classification. In the univarieted analyses were seen differences in “Analgesic rescue in recovery room” (p-value 0,002), “Intra-operative intravenous Morfine” (p-value 0,042); and “Maximal pain in the recovery room” (p-value 0.021). There were no differences in the incidence of complications, the length of time in the post-anesthesia care unit, or the the length of the hospital stay.
Conclusion: Our data shows that a low-dose of subarachnoid morphine provided analgesia with less need for rescue and lower pain scores when compared with conventional analgesia, without increasing the occurrence of side effects, proving the hypothesis that it is a valid option for analgesia for those patients.

03AP06-3
Ultrasound guided identification of the intervertebral level for thoracic epidural anaesthesia.

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Background: The accurate localization of intervertebral level is essential for epidural anaesthesia. However the accuracy of palpation of surface landmarks at vertebral identification has been reported to be 30 to 40% [1]. Recently, the use of ultrasound has proven to increase the accuracy [2]. In this study, we marked the 2nd thoracic spinous process using ultrasound and identified the intervertebral level for thoracic epidural catheter insertion. The accuracy was compared between this ultrasound guided method and the conventional surface landmark method.
Methods: After approval of the Institutional Research Board, 80 patients undergoing thoracic epidural anaesthesia combined with general anaesthesia were enrolled and randomly allocated to either the Ultrasound group or the Landmark group. In the Ultrasound group, 2nd thoracic spinous process was identified by ultrasound and used as the reference point for epidural catheter insertion. In the Landmark group, 7th cervical spinous process by palpation was performed. The catheter insertion level was confirmed by postoperative chest X-ray. We assessed the agreement between the intended target and the confirmed catheter insertion level. Fisher’s exact test was used to compare the accuracy of identifying the intervertebral level between groups, and P value < 0.05 was considered to indicate a significant difference.
Results and Discussion: Out of initial 70, 3 patients were excluded due to difficulty in epidural puncture. In the Ultrasound group (n=33), epidural catheter was correctly located at the intended intervertebral level in 28 patients. In the Landmark group (n=34), that was in 14 patients. Accuracy in the Ultrasound group was significantly higher than that of the Landmark group. The required time for identification was 1min 32 ± 28sec in the Ultrasound group and significantly longer than that of the Landmark group (26 ± 18sec). Data are mean ± SD.
Conclusion: This study shows that ultrasound could improve the accuracy of identifying the intervertebral level for thoracic epidural anaesthesia. The second thoracic spinous process is considered to be feasible as an ultrasound guided landmark, because it is relatively easily identified using ultrasound from the 2nd rib and trapezius attachment. The difference in the required time for identification is small and acceptable, considering the total anaesthesia time.
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03AP06-4
Efficacy of caudal epidural pulsed radiofrequency for chronic low back pain - Retrospective study of 10 cases -

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Background and Goal of Study: Pulsed radiofrequency decreases pain without motor or sensory dysfunction. Conventionally, pulsed radiofrequency is applied to a single nerve. Rohof reported caudal epidural pulsed radiofrequency (CE-PRF), which could affect a distant nerve from the electrode tip. There is a possibility to apply CE-PRF as a method to implement pulsed radiofrequency over a wide range. Objective: To examine the usefulness of CE-PRF.
Materials and Methods: retrospective, case accumulation study Patients: 10 cases who underwent CE-PRF at Nagasaki Rosai Hospital for chronic low back pain from January 2018 to November 2018. Treatment: A slighter needle with a total length of 54 mm and 4 mm non-insulated top tip was inserted through the sacral fissure and the electrode pad was attached to the back. A pulsed radiofrequency method of 42 degrees was performed for 480-600 seconds. Outcome measurment: Time to pain relief onset, change in numerical rating scale□NRS), presence of complications.
Results: Pain relieved after 1 to 5 days in most cases, did after 1 month in one case. Pain intensity in NRS markedly improved in 1 case, moderately improved in 4 cases, slightly improved in other 4 cases, unchanged in 1 case. There were no complications.

Conclusion: CE-PRF was performed quite safely without complications and seems to reduce chronic low back pain.

03AP06-5
Comparison of prophylactic use of tramadol and ondasetron for prevention of shivering after spinal anesthesia - a randomised double-blind study

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Background and Goal of Study: The incidence of post-spinal shivering (PSS) is 30 to 60% in the literature and its mechanism is complex . This shivering, apart from its physiological and hemodynamic effects, has been described as even worse than surgical pain. The aim of the study was to evaluate and compare the effectiveness of prophylactic use of intravenous (IV) ondansetron and tramadol for prevention of shivering after spinal anesthesia.
Materials and Methods: After obtaining Ethics Committee approval and written informed consent, sixty patients (ASA I-II) subjected to spinal anesthesia were included in the study. The subjects were randomly divided into three groups to receive either tramadol 0.5 mg/kg IV (group T)or ondasetron 8 mg iv (group O)or 10 mL of 0.9% normal saline (group NS). All the drugs/NS were administered as IV infusion over 10 min immediately before giving spinal anesthesia. Temperature (core and surface), heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure, peripheral oxygen saturation were assessed before giving the intrathecal injection and thereafter at 5 min intervals. Important side effects related to study drugs were also noted. Student’s t-test and Chi-square test were used for analysis.
Results and Discussion: The incidences of shivering were 13 (65%) in Group NS, 6 (30%) in Group T and 7 (35%) in Group O. The difference between groups O and group T with group NS was statistically significant (P < 0.05). No significant difference was noted between groups T with group O in this regard (P > 0.05). Peripheral and core temperature changes throughout surgery were not significantly different among three groups (P > 0.05). Incidence (%) of hemodynamic changes was not significantly different between the three groups (P > 0.05).
Conclusions: Prophylactic use of ondansetron 8 mg IV was comparable to tramadol 0.5 mg/kg IV in preventing shivering after spinal anesthesia without causing any major untoward side-effects

03AP06-6
Saddle block versus caudal block in anorectal surgical patients: a prospective, randomized study

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Background and Goal of Study: Different regional anesthesia techniques are used in anorectal surgeries. The ideal anesthetic method should provide adequate analgesia, patient comfort and safety, and enable early mobilization. The aim of this study was to compare the effects of caudal block and saddle block techniques on perioperative hemodynamic values, sensory and motor block levels, postoperative pain scores, initial analgesic requirement.
Materials and Methods: The current study was designed exprimental prospective randomized. After ethics committee approval (KOÜ-GAEK: 2017-384) 73 patients undergoing elective anorectal surgery were enrolled, written informed constent of patients was obtained. In the saddle block group, we inserted 25 G Quincke spinal needle by the ultrasonography guidance into the intrathecal space at L4-L5 level and administered 10 mg hyperbaric bupivakain . In the caudal block group, we inserted 20 G caudal needle ultrason guidance into the epidural space at S4-S5 level and administered 20 ml bupivacaine at a concentration of 0.5%. Sensory block level, motor block degree, hemodynamic parameters, postoperative visual analog scale (VAS) values, analgesic requirements and motor block dissolution times of regional anesthesia were recorded.
Results and Discussion: Demographic and hemodynamic data were similar between the groups (Table1-Table2). In the caudal block group, first analgesic requirement time, postoperative analgesic amount, motor block duration, anal sphincter relaxation score were significantly lower than the saddle block group (p<0.05). The sensory block level of sacral dermotoma was significantly higher in

the the caudal block than the saddle block group (p<0.05, Table 1). In the caudal block group, the bromage score was significantly lower than the saddle block group (p<0.05). The VAS scores at 30 min and 60 min were significantly lower in the caudal block group than in the saddle block group (p <0.05, Table 2).
Conclusions: Although regional anesthesia is used primarily in anorectal surgeries, the ideal method has not been determined. In this study, significantly better results were obtained in the caudal block group in terms of sensory and motor block levels, postoperative pain scores, initial analgesic requirements. The caudal block that is easy to apply and low cost, can be performed more widely in clinical practice in a

03AP06-8
Survey of Use of Spinals for Elective Colorectal Surgery, and the Doses of Spinally Administered Opioid and Local Anaesthetic

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Background and Goal of Study: For analgesia for colorectal surgery spinally (intrathecal) administered opioids and local anaesthesia (LA) have been recommended. The doses used vary between studies. We surveyed delegates attending the annual 2015 colorectal anaesthesia meeting organised by the Colorectal Anaesthesia Group-UK to investigate current practice.
Materials and Methods: On arrival delegates at the meeting were handed a structured paper survey form and these were collected on the same day. The survey form asked if they regularly anaesthetised for an elective adult colorectal list and if they used spinals for laparoscopic and/or open colorectal operations.If they did use spinals for colorectal surgery, they were asked to answer specific questions about what agents and substances they would use for a 70-year-old woman who is 70 kg with 160 cm height. The forms were analysed using Excel for MAC.
Results and Discussion: 66 forms were returned from 95 delegates (69%). 5 out of 66 were excluded because they were incomplete. 60 forms were suitable for analysis. 60% of 60 regularly anaesthetised for an elective colorectal list and 40% did not. 63% performed spinals for laparoscopic surgery and only 32% for planned open colorectal surgery. The result from the 42 anaesthetists who answered what they would give in the spinal for the 70-year-old woman above are as follows: 68% would give spinal LA and 70% would use spinal opioids. For the LA it varied. Most, 80%, used hyperbaric bupivacaine 0.5%. There were 7 different volumes given with most, 26%, giving 2 mls, followed by 18% giving 3 mls.17% gave a range of doses of LA they would use depending on the patient. 20% gave plain levobupivacaine or bupivacaine. For the opioids given spinally, out of the 42 anaesthetists, 95% would use diamorphine and 2% would use morphine. 2 % would use either. The most common dose used by 28% was diamorphine 0.5mg. 19% used diamorphine 1mg and 14% used diamorphine 0.3mg.
Conclusion: This survey showed that in anaesthetists attending a national colorectal anaesthesia meeting many use spinal/intrathecal local anaesthesia and opioids for elective colorectal surgery, particularly laparoscopic colorectal surgery. There is much variation in doses administered, with the most common dose in an elderly adult female being diamorphine 0.5mg and 2 mls of 0.5% hyperbaric bupivacaine.

03AP06-9
Spinal anesthesia for lower extremity femoropopliteal bypass after prior revascularization in a patient undergoing continuous infusion of unfractionated intravenous heparin.

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Background: Performing neuraxial anesthesia in patients undergoing unfractionated heparin remains controversial and should ensure a risks-benefits decision with the surgeon. In this case, a spinal anesthesia was performed after the surgeons decided to maintain the infusion of unfractionated intravenous heparin and aspirin.[1,2]
Case Report: We report a spinal anesthesia, as the only anesthetic technique, with a 26G needle, atraumatic and without catheterization, for femoropopliteal bypass. The patient is a male, 53 years old, ASA III, with hypertension, morbid obesity and lung cancer and smoking. He had undergone urgent thrombectomy of the left deep femoral artery 5 days before and initiated low molecular weight heparin. He had a new episode of acute painful ischemia of the lower limb 2 days after. At admission, he underwent infusion of intravenous unfractionated heparin, aspirin and analgesia. It was decided to maintain unfractionated intravenous heparin infusion during surgery and postoperative with aPTT vigilance. He recovered from surgery without neurological deficits and no signs of limb ischemia at rest.
Discussion: In this case, it was decided that the risks of discontinuing intravenous unfractionated heparin and aspirin were greater than the benefits, during surgery. Regional anesthesia techniques have the advantages, over general anesthesia, of reduction of vascular occlusion rate after surgery and block the response to surgical stress. General anesthesia is also associated with increased postoperative hypercoagulability, which is already present in cancer patients.[1] Anticoagulation and antiaggregation should be discontinued during regional anesthesia. The most recent reviews of neuraxial hematomas after epidural or spinal anesthesia have been associated with the three major risk factors.[2] Other risk factors described are epidural (compared to spinal) and neuraxial catheterization.[3] The risk of neurological complications can be reduced with early diagnosis and intervention. [2]
References:
1 - Rev Bras Anestesiol. 2017; 67(6):626-631.
2 - Reg Anesth Pain Med. 2010 Jan-Feb;35(1):64-101.
3 - Int Anesthesiol Clin. 2001; 39(1):51-61.
Learning points: The choice of neuraxial anesthesia in patients undergoing vascular surgery without discontinuing unfractionated intravenous heparin may improve surgical outcomes. It is important to monitor the coagulation status and an early diagnosis of neurological complications.

03AP06-10
Lumbar epidural bleeding even with accomplishment of recommendatios for perioperative Clopidogrel management: case report

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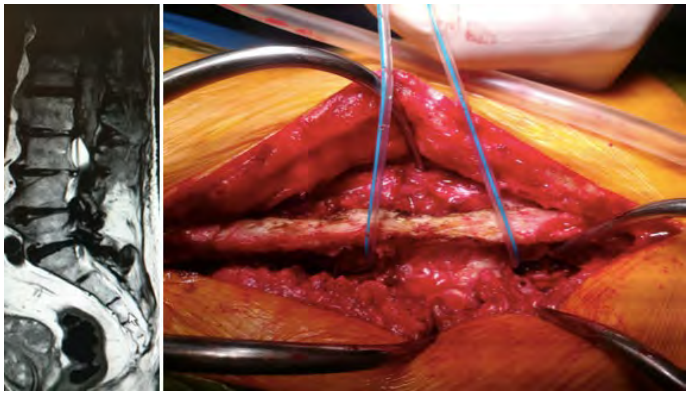
Background: Spinal hematoma (SH) is a tragic complication, which could lead to a permanent neurological damage(1,2). An early diagnostic is essential in order to ensure the success of the treatment. Risk factors (RF) include coagulopathy, spinal canal stenosis, renal impairment and elderly age(3). The aim of this report is to describe a case of SH after a atraumatic epidural anaesthesia (EA) in a patient following chronic treatment with Clopidogrel properly discontinued following the latest guidelines.
Case Report: An 82-year-old man, with previous history of coronary disease, in treatment with Clopidogrel 75mg/24h since he did not tolerate ASA. A right hip arthrodesis was performed. He was programmed for a prosthesis replacement of right knee. Given that Clopidogrel was discontinued 5 days before the surgery and no other coagulation disorders were found, atraumatic EA was performed without any complications during the procedure. During postoperative surveillance, an incomplete paresis of lower limbs (Bromage III/IV) was developed. This fact associated with previous arthrodesis was related to motor blockade because of EA. 24 hours later, EA infusion was interrupted and there was not any evidence of recovery. Hence, MRI was arranged 38 hours after surgery. The MRI shown T11-L3 SH causing a compression of the spinal cord and unknown spinal canal stenosis. Urgently, a surgical evacuation of SH was performed, but, incomplete paraparesis and neurogenic bladder were unavoidable.



Discussion: In spite of a correct perioperative management of the antiplatelet and anticoagulant drugs(1,3), SH is a serious outcome after EA. Other RF should be considered. Early diagnosis is essential(3) and SH should be suspected if there is any abnormality during postoperative surveillance after EA.
References:
1. Reg Anesth Pain Med 2018;43 263-309.
2. Eur J Anaesth 2010;27:999-1015.
3. Scand J Pain 2018;18(2):129-150
Learning points: Efficient perioperative management of antithrombotic therapy is needed(1,2), although other RF related to SH should be contemplated. Vigilance and a robust regimen for monitoring are required in order to detect early signs of SH and avoid neurological damage.

03AP07-1
Bilateral erector spinae plane block provides analgesia in patients undergoing laparoscopic bariatric surgery: a report of six cases

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Background: Bariatric surgery poses an important challenge to the anesthetist who needs to treat significant postoperative pain in patients who are at high risk for opioid-related postoperative respiratory complications. Multimodal analgesia is the gold standard for videolaparoscopic (VLS) bariatric surgery. In erector spinae plane block (ESPb) local anesthetic is injected under ultrasound guidance into the fascial plane deep to the erector spinae muscle and spreads in a craniocaudal fashion over several levels, resulting in somatic and likely visceral analgesia[1].
Case Report: Five patients underwent gastric bypass surgery and one sleeve gastrectomy (body mass index 38-49 kg/m^2), all with VLS approach under general anesthesia. In all cases ultrasound-guided ESPb was performed preoperatively bilaterally at T8 level with ropivacaine 0,375% 40-60 ml. All patients received morphine 0,1-0,15mg/kg adjusted body weight IV, ketorolac 15mg IV and paracetamol 1g IV intraoperatively. The postoperative analgesic regimen was composed by fixed paracetamol 1g IV 3/die and ketorolac 15mg IV or tramadol 100mg IV when required. Total postoperative analgesic consumption at 24 hours was: 30mg ketorolac for 3 patients, 15mg ketorolac and 100mg tramadol for 2 patients, 30 mg ketorolac and 100mg tramadol for one patient, who was also given 2mg morphine in the recovery room because of shoulder pain. Pain was evaluated through Numeric Rating Scale 6, 12 and 24 hours after the block (Figure 1).

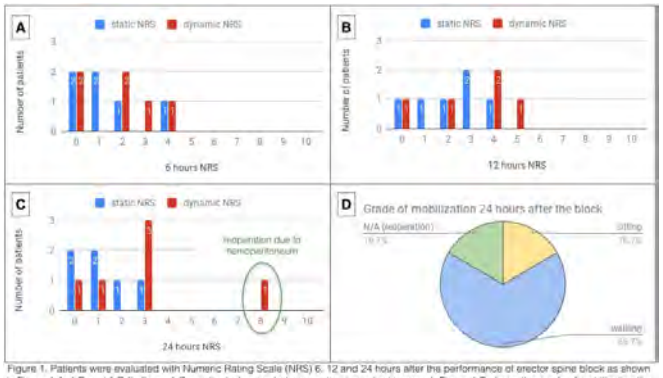

Figure 1. Patients were evaluated with Numeric Rating Scale (NRS) 6, 12 and 24 hours after the performance of erector spine block as shown in Figure 1.A, 1.B and 1.C (in figure 1.C a patient who needed reoperation is marked in green). Figure 1.D shows the grade of mobilization the morning of postoperative day 1 (24 hours after the block was performed).

Discussion: In our experience ESPb is effective in granting analgesia and early mobilization with only minimal opioid consumption, which seems to be lower than the one reported for procedures with comparable postoperative pain (median IV morphine equivalents consumption in 24 hours in our cases was 5mg compared to 17,5 and 7mg respectively[1,2]). No respiratory nor procedure-related complications were observed.
References:
[1]Chin et al. Reg Anesth Pain Med 2017;42:372–6
[2]Chin et al. Anaesthesia 2017;72:452–60
Learning points: ESPb is safe and easy, virtually immune from contraindications, and could become routinely performed in multimodal opioid-sparing analgesia for VLS bariatric surgery.

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03AP07-2
Pecto-intercostal block for pectus excavatum surgery in adults

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Background: Pectus excavatum surgery in adults is less common than in children and they have even more pain. Epidural catheters and intravenous perfusion of morphine are the usual strategies for pain control[1]. We present a patient who underwent a pectus surgery by performing a pecto-intercostal block after general anaesthesia.
Case Report: The patient was a 48-year-old man, 75kg, ASA I. He was proposed to elective pectus excavatum surgery by Ravitch technique[2]. After anaesthetic induction, we performed a pecto-intercostal block[3]. It consists of placing local anaesthetic into the fascia between pectoral major muscle and intercostal muscles in the mid-parasternal region. Thus, anesthetizing the anterior branches of intercostal nerves. We did a single puncture in plane with a 50 mm needle. We injected 15 mL per side of levobupivacaine 0.25% and mepivacaine 1%. All was ultrasound (US) guided by a Sonosite SII® US machine. Sevofluorane and remifentanil (0.05 mcg/kg/min) were used as anaesthetic maintenance guided by BIS. Intravenous conventional analgesia was given and no more opioids were needed during the intraoperative period. The patient was extubated with no complications. Once at post-anaesthesia care unit, we started a perfusion of dexketoprofen and tramadol to control chest pain. He only needed 3 mg of intravenous morphine extra and was send to ward with a VAS 0/10.
Discussion: Interfascial blocks such as pecto-intercostal nerve could be a good alternative for anterior thoracic wall surgery. That way, we can avoid complications due to thoracic epidural catheters insertion and reduce opioid consumption leading to a more comfortable postoperative period. However, further studies should be done.

References:
1. St. Peter, S. D. et al. Epidural vs patient-controlled analgesia for postoperative pain after pectus excavatum repair: A prospective, randomized trial. J. Pediatr. Surg.47,148–153 (2012).
2. Ravitch, M. M. The operative treatment of pectus excavatum. J. Pediatr.48,465–472 (1956).
3. Sifb, F. A new thoracic interfascial plane block as anesthesia for difficult weaning due to ribcage pain in critically ill patients. 38,2014–2016 (2014).
Learning points:1. Pain control of pectus excavatum surgery is usually managed by epidural analgesia or intravenous morphine. 2. US-guided interfascial blocks of thoracic wall are easier to perform and have less complications. 3. Pecto-intercostal block could be a good alternative for pectus excavatum surgery.

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03AP07-3
The erector spinae plane (ESP) block for postoperative analgesia in thoracic surgery by assisted video-thoracoscopy (VATS). A purpose of a serie of cases.

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Background and Goal of Study: Postoperative pain in thoracic surgery is intense, even in video-assisted procedures in which the surgical incision is less. The main objective of this study is to observe in a prospective serie of cases the effectiveness of the erector spinae plane (ESP) block as part of a multimodal anesthesia program in thoracic surgery by video-assisted thoracoscopy (VATS).The secondary objectives were to observe the opioid consumption in the first 24 hours after surgery and the possibility or not to performing respiratory physiotherapy by the patients.
Materials and Methods: The blockade was performed after the anesthetic induction, in lateral decubitus position, except in 2 cases, in which it was performed sitting before induction. It consists in the insertion, under ultrasound control and in plane, at level of the thoracic vertebra T5 and in the caudal skull direction, of a needle crossing the trapezius, rhomboid major and erector muscles of the spine, to deposit in local anesthetic (LA) between the latter and the transverse process. The LA used was levobupivacaine 0.25% 20 milliliters. Only intraoperative opioids were used during the induction (fentanyl 3 mcg/kg).
Results and Discussion: Of the 10 patients analyzed, measure VAS at the time, 4, 8, 12, and 24 hours. All patients received the same postoperative analgesic regimen. The average global VAS per patient was 2. The rescues with morphic chloride were collected in patient's evolutive chart by the nursing staff, if required. We observed that no patient received postoperative opioids. As for the performance of respiratory physiotherapy, the 10 patients could perform both physiotherapy and respiratory incentive due to the low rate of postoperative pain. ESP block is a relatively new technique, of interfascial type, to promote analgesia at level of the thoracic wall ipsilateral to its realization. It is able to cover the metameric territory between T1-T9.
Conclusions: The ESP block emerges as a good analgesic option within a multimodal anesthesia program for VATS thoracic surgery. Presents a low rate of associated complications. It can be done with anesthetized patient. The results of our serie of cases showed a null consumption of opioids by patients. It could suppose a reduction of complications rate such us nausea and vomiting or paralytic ileus. It allowed the early performance of respiratory physiotherapy in the serie of patients studied.

03AP07-4
Influence of injectate volume on paravertebral spread in erector spinae plane block: an endoscopic and anatomical evaluation

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Background and Goal of Study: The paravertebral spread that occurs following erector spinae plane block may be volume-dependent. This study was undertaken to compare the extent of paravertebral spread in erector spinae plane block with different dye volumes.
Materials and Methods: After randomisation, fourteen erector spinae plane blocks were performed bilaterally with 10 ml or 30 ml dye at the level of T5 in seven unembalmed cadavers. Direct visualisation of the paravertebral space by endoscopy was performed immediately after injections. The back regions were also dissected, and dye spread and nerve involvement were investigated.
Results and Discussion: A total of five 10-ml injections and seven 30-ml injections were completed for both endoscopic and anatomical evaluation. No paravertebral spread was observed by endoscopy following any of the 10-ml injections. Dye spread to the spinal nerves at the intervertebral foramen was identified by endoscopy at adjacent levels of T5 (median: three levels) in all 30-ml injections. Upon anatomical dissection, all blocks were consistently associated with posterior and lateral spread to back muscles and fascial layers, especially in the 30-ml injections, which showed greater dye expansion. In one 30-mL injection, sympathetic nerve involvement and epidural spread was observed at the injection site level.
Conclusions: Although paravertebral spread following erector spinae plane block increased in a volume-dependent manner, this increase was variable, and not pronounced. As injectate volume increased for erector spinae block, injectate spread to the back muscles and fascial layers seemed to be more predominantly increased, rather than the extent of paravertebral spread.
References:
Yang HM, Choi YJ, Kwon HJ, O J, Cho TH, Kim SH. Comparison of injectate spread and nerve involvement between retrolaminar and erector spinae plane blocks in the thoracic region: a cadaveric study. Anaesthesia 2018;73:1244-1250.
Acknowledgements: This work was supported by a National Research Foundation (NRF) of Korea grant funded by the Korean government (MSIT) (grant no. 2017R1C1B5074007).

03AP07-6
Opioid-free general anesthesia and PECS blocks for breast cancer surgery: a case report

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Background: Breast cancer surgery is the most common cancer that women suffer from. After surgery patients experience many negative effects such as: acute postoperative pain, postoperative nausea and vomiting (PONV), drowsiness, more opioid requirement and longer post-operative recovery.
Case Report: We are presenting a case report of 45-year-old female patient (height 170 cm, weight 76 kg) scheduled for radical mastectomy with axillary dissection with hypertension and she was smoker (American Society of Anesthesiologists grade III). We decided to give her opioid-free general anesthesia and ultrasound-guided pectoral nerve block (PECS) 1 and 2.Induction to opioid-free general anesthesia was done with 3 mg of midazolam, 76 mg of lidocaine, 150 mg of propofol, 15 mg of ketamine, and 46 mg of roccuronium. Anesthesia was maintained with continuous intravenous (i.v.) infusion of propofol 0.1-0.2 mg/kg/min and continuous i.v. infusion with lidocaine 2 mg/kg/hr and magnesium sulfate 1,5 gr/hr and we performed ultrasound-guided (USG) PECS block (PECSB).For PECS I was given 10 ml of 0.25% bupivacaine and for PECS II 20 ml of 0.25% bupivacaine was administered under ultrasound guidance. Surgery lasted for 90 minutes. Before skin closure, continuous i.v. infusion with lidocaine+magnesium sulfate and propofol were stopped. She was extubated and taken to the post-anesthesia care unit (PACU). In the post-operative period she didn't complain of pain (VAS score was 2-3 during her stay in hospital), didn't require analgesic (paracetamol) or opioids and didn't have PONV. She was discharge from hospital on 4-th postoperative day.
Discussion: Opioid-free general anesthesia in combination with PECSB I and II is safe and effective in breast cancer surgery (1).Patient didn't complain of having pain, PONV and didn't require opioids in the postoperative period.
References:
1. Opioid-free anesthesia for breast cancer surgery: An observational study. J Anesthesiol Clin Pharmacol 2018 Jan-Mar; 34(1): 35-40.
Learning points: In breast cancer surgery multimodal treatment of pain including opioid-free general anesthesia in combination with PECS I and II blocks significantly reduces opioid consumption in the postoperative period and PONV. Opioids should be avoided in cancer surgery because they cause immunosuppression and can stimulate proliferation of cancer cell. They can be avoided by using lidocaine, ketamine, magnesium sulfate and thoracic nerve blocks (PECS I and II block).

03AP07-7
Disposition of the injectate with the erector spinae block as determined by high-definition 3D-CT: A case series

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Background and Goal of Study: The erector spinae block (ESB) is a new interventional analgesia technique that has been increasingly used to treat pain after chest wall surgery.[1] Its analgesic efficacy has been recently reported in case series and randomized controlled clinical trials. Paravertebral spread of the local anesthetics (LA) is thought to be an important mechanism of analgesia,[2] however, to date, this has not been extensively studied in patients. In this case series, we studied the spread of the injectate with ESB using high-definition 3D-CT imaging.
Materials and Methods: After informed consent was given, eight patients requiring analgesia for rib fractures or chest wall surgeries were studied. Six patients received an ultrasound-guided ESB through multihole catheters (Painfusor, Baxter USA), and two were treated with a single-level injection block after surgery. The volume injected in all patients was 19 mL of ropivacaine 0.2% with 1 mL of radiopaque contrast. After confirming clinical efficacy by a NRS reduction of at least 50%, patients were transferred to the CT suite to obtain a 3D reconstruction of the spread of the injectate. Images were reviewed and interpreted by two trained observers.
Results and Discussion: The sagittal view and 3D reconstruction showed a consistent cranio-caudal spread pattern deep and around the paraspinal muscles along 4-6 vertebral levels (Figure 1). The axial view of each level involved (a total of 37) was analyzed to detect the presence of contrast into the paravertebral space. Miniscule spread into the paravertebral space occurred in 11 (30%) of the evaluated levels, without reaching the contiguous spaces (Figure 2).
Conclusions: Although the ESB reduced VAS in all patients, a paravertebral spread, as detected by CT, occurred only in a third of them. Therefore, paravertebral block may not be the sole mechanism of analgesia with ESB. Future studies are indicated to better understand the mechanisms of analgesia with ESB.
References:
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2. Ivanusic J, Konishi Y, Barrington MJ: A cadaveric study investigating the mechanism of action of erector spinae blockade. Regional anesthesia and pain medicine 2018; 43:567-71.

03AP07-8
Ultrasound-guided Intermediate Cervical Plexus Block for Carotid Surgery: safety and effectiveness.

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Background: Carotid endarterectomy (CEA) is one of the most frequently performed procedures in vascular surgery. Locoregional anaesthesia allows reliable neurological assessment and better hemodynamic stability during surgery. We conducted a prospective observational study on efficacy and safety of the ultrasound guided intermediate cervical plexus blockade (US-ICPB).
Materials and Methods: To perform ICPB a linear US probe was positioned on the lateral side of the neck of the patient until common carotid artery bifurcation was identified. Ropivacaine 0,5% 15-20 ml was injected in the posterior cervical space between the sternocleidomastoid muscle and the longus capitis muscle (Fig. 1). The block was completed with the infiltration of the incision line. Intraoperative pain was treated by the surgeon with lidocaine 1%.
Results: We enrolled 60 patients undergoing elective CEA. Primary outcome was block efficacy, secondary outcome was safety. Additional LA was necessary in 20 patients (33%). Both systolic and diastolic pressure did not undergo significative variations. 10 patients (16%) developed hoarseness and 3 (5%) dysphagia. We had no cases of LA systemic toxicity. In addition, diaphragmatic excursion was measured before and after the block with a US scan (Fig. 2) and it was not impaired after the block, thus excluding phrenic nerve blockade.

Discussion: The present work is a prospective, observational, single-centre study designed to report safety and effectiveness of the US-ICPB for CEA. 33% of patients required additional LA. Pain corresponded to the sheath incision, whose innervation is not pertinent to the cervical plexus. The technique we used in our study differs from previously described ones because it does not entail a perivascular injection of LA. We assume that this aspect may help to further reduce the risk of complications. The data concerning blood pressure and heart rate showed no major variations after the block and throughout the operation. The performance of a CPB entails the risk of phrenic nerve blockade and consequent paralysis of the omolateral hemidiaphragm. To exclude such complication, we measured diaphragmatic excursion in order to rule out any onset of hemidiaphragmatic paralysis.
Conclusion: Our experience with US-ICPB with a single injection in the posterior cervical space confirms this technique is effective and safe. It is not associated with increased risk of complications and guarantees adequate haemodynamic stability.

03AP07-9
Lumbar paravertebral blocking within a multimodal analgesia regime for hip arthroscopy in cma

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Background and Goal of Study: Hip arthroscopy is a minimally invasive technique that allows the diagnosis or treatment of lesions at the joint level. One of the main problems we find in the anesthetic management of these patients is maintaining good pain control, in order to perform this technique in an ambulatory regimen.
Materials and Methods: We present a prospective descriptive study (n = 10) after ethics committee approval and the informed consent signed. All patients were diagnosed with femoroacetabular impingement requiring a hip arthroscopy to treat their arthropathy. Prior to surgery, paravertebral block was performed at L1 level inserting a catheter and we administered levobupivacaine 1 mg/kg and lidocaine 1 mg/kg in a total volume of 0,3 ml/ Kg. We used TIVA as general the general anesthesia method, adding 50mg of Dexketoprofen and 0,05 mg of morphine as analgesic multimodal pain control. 60 minutes after surgery we administered 0,5 mg/kg of levobupivacaine by catheter, being removed afterwards. In addition, morphine was prescribed as immediate pain relief on demand. Hospital discharge planning was ibuprofen 600 mg/8h and tramadol drops on demand.
Results and Discussion: The procedure was successfully completed for all patients without complications. The surgical end time was 210 minutes. Eventually, hospital discharge was possible 2 hours after surgery because of good pain management with minimum motor blocking. The sensory block persisted until 36h after. All patients showed good pain control (EVA <2) without using morphine rescues. At home, two patients required rescue analgesia with only 5 tramadol drops.
Conclusions: Adequate anesthetic management is necessary to aid faster recovery and effective analgesic control resulting in less side effects, in order to perform the intervention within an ambulatory regimen. The lumbar paravertebral block as well as multimodal analgesia strategy, could be considered as a suitable alternative for the achievement of this aim.
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03AP07-10
Paravertebral block for analgesia after mastectomy

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Background and Goal of Study: Breast surgery is accompanied by moderate to intense post-operative pain. Post-operative analgesia is based on multimodal analgesia by the combination of several analgesics and local analgesia. The aim of this study was to evaluate the analgesic efficacy of Paravertebral block as a regional anesthesia after mastectomy.
Materials and Methods: In this prospective randomized trial, we included patients undergoing mastectomy. Non-inclusion criteria were: the refusal of the patient, obese patients, spinal malformation, injection site infection, coagulation disorder and allergy to local anesthesia. The anaesthesia protocol was standardized for all patients. The patients were divided into 2 groups : Group 1 : received PVB with injection of 1.5mg/kg of bupivacaine at the end of the intervention Group 2: received placebo. Postoperative analgesia was provided by 0.1 mg/kg morphine 30 min before stopping anesthesia relayed by paracetamol and nefopam. The main outcome of this study was NRS at the rest and during the first 24 hours and the delay of the first analgesic request and the total dose of morphine consumed.
Results and Discussion: In this study we included 41 patients. Only one patient was excluded. Demographic parameters were comparable in both groups. The mean NRS scores during the first 12 postoperative hours were significantly lower for the PVB group (group 1) but no significant difference between the two groups was noted in 24th postoperative hour. The delay of the first analgesic request was 94.5 ± 52.3 min for the group 1 against 25.5 ± 26.6 min in group 2 ($p < 0.001$). The total dose of morphine needed during the first 3 postoperative hours in the recovery room, 7.6 mg ± 0.54 in group 2 versus 4.45 ± 0.28 mg in the group 1 with $p < 0.001$.
Conclusions: paravertebral block was a safe and efficient analgesic technique as it reduced pain scores and decreases the need for opioids. It can be safely used in breast cancer surgery.

03AP08-1
Combined Interscalene-Supraclavicular Ultrasound-Guided Brachial Plexus Blocks for Total Shoulder Arthroplasty in high-risk patients: two different cases reports

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Background: Interscalene block(ISB) is considered an effective technique for total shoulder arthroplasty(TSA). Concerns over diaphragmatic paresis from phrenic nerve block lead the search for alternatives, like perform block more distally along the brachial plexus(BP), and thereby increasing the distance between block location and the phrenic nerve as in the supraclavicular block(SCB). Although these blocks are combined to general anaesthesia(GA) we optimized regional procedural technique to avoid GA risks in two selected patients.
Case report: First patient(SA), female 70yo, chronic heart failure with dilated cardiomyopathy, paroxysmal atrial fibrillation, 30% ejection fraction, NYHA 4, METS lower than 4. Second patient(VR), Male 53yo, BMI 32, systemic hypertension, severe asthma with salbutamol refractoriness, COPD, moderate OSAS needing CPAP, chronic kidney disease. Both of them with indication of reverse TSA. According surgeons' technique we performed a combined ISB-CSB ultrasound(US)-guided BP block in semi-sitting position with arm pulled down. US probe was positioned above the clavicle: first step was locate subclavian artery and, just laterally and above the first rib, C8-T1 roots. Nerve stimulator(NS) was set to 0.4mA and a pulse width to 100μs. Once a muscle twitch of hand was obtained, an injection of 8ml of a mixture of ropivacaine 1% 13ml plus dexamethasone 8mg in 2ml is initiated without reducing the NS current. Second step was tilt up the probe following nerve roots just above the subclavian artery and below the anterior scalene; with the same NS setting we found a muscle twitch of shoulder and injected the remaining solution. During surgery we get a perfect myoresolution and pain control, light sedation was performed because of uncomfortable position; haemodynamic stability, without desaturation or respiratory impairment was recorded during the surgery. Only one night in PACU was needed with a good control of pain with oxycodone/naloxone combination.
Discussion: Performing brachial plexus block more distally allows an optimal anaesthetic and ananalgesic result in TSA, without clinical signs of phrenic nerve paresis, that makes it safer even in patients with respiratory disease. Moreover in these two selected patients we prove that the loco-regional anaesthesia alone is a valid alternative, that allows a less invasive approach in more fragile patients (ASA III-IV).

03AP08-2
Anaesthetic management of a woman with takotsubo cardiomyopathy using a combined spinal-epidural technique

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Background: Takotsubo is a rare condition that mimics myocardial infarction, triggered by an excessive catecholaminergic response to pain or stress. Few perioperative cases have been reported to date. The main consensus is the avoidance of stressful factors throughout the perioperative window.
Case report: A 74 year old woman was admitted to our emergency department with a periprosthetic right hip fracture. Main medical history and medications included atenolol for hypertension and mirtazapine for depression. Upon medical examination the patient showed ST-segment elevation, negative T-waves, high troponin, akinesia of the mid-apical segments of the left ventricle and an ejection fraction (EF) of 35% with no coronaric lesions. Before surgery, a fascia iliaca block was performed and an arterial and central line placed. A spinoepidural needle was advanced in the L3-L4 space with the patient lying on her left side. Spinal anesthesia was induced with bupivacaine and an epidural catheter positioned. Norepinephrine infusion was titrated to keep systolic pressure above 90 mmHg. After one hour the epidural infusion was started. During surgery the patient required two units of blood to compensate losses. Postsurgical epidural analgesia was maintained with 0.1% bupivacaine. The patient was discharged on postoperative day 7 to a rehabilitation complex with systolic function improvement (EF of 45%).
Discussion: Optimal anesthetic management of Takotsubo patients is unknown. Some Authors advocate for the careful perioperative use of betablockers and/or milrinone. The ability to block painful stimuli and surgical stress through regional anesthesia is appealing. However, neuraxial blocks can cause rapid vasodilation and precipitate failing hemodynamics. Vasopressors should be administered under invasive hemodynamic monitoring as they could worsen the condition. Under general anesthesia, vasodilation and pain during laryngoscopy and surgery might be detrimental as well. At the current level of evidence, management of patients with Takotsubo should be planned on a case-by-case basis.
References:
Liu S, et al. Anesthetic Management of Takotsubo Cardiomyopathy: General Versus Regional Anesthesia, J Cardiothorac Vasc Anesth 2008
Learning points: There is no scientific evidence on anesthesiologic management of patients with Takotsubo. Regional anesthesia, when feasible, should be considered in order to reduce perioperative stress to a minimum.

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03AP08-3
Can't break regional anaesthesia: an Osteogenesis imperfecta case-report.

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Background: Osteogenesis imperfecta (OI) is a rare genetical disease with abnormal type1 collagen. Its major phenotypic trait is bone fragility and fracture susceptibility, motivating multiple surgeries during lifetime. Airway abnormalities, spinal fragility/deformations with CNS involvement, thoracic dysmorphology, cardiovascular, hypermetabolic or coagulation anomalies may pose additional challenges to the anaesthesiologist[1]. We present one of the few reports of an OI patient anaesthetized with a nerve block.
Case Report: A 21yo female, with OI type I, was admitted after a car crash, in which resulted unilateral rib fractures, lung contusion, a small pneumothorax and contralateral diaphyseal radial and ulnar fractures – demanding surgery. Preoperative assessment revealed a stature of 1,35m, 39 kg, blue scleral discoloration, past of multiple fractures, dorsolombar scoliosis and asthma. Cardiovascular and neurological involvement or blood dyscrasia were excluded. Once informed consent, careful awake positioning, standard ASA plus temperature monitoring were initiated. After administration of midazolam and fentanyl, an awake, single-shot, US-guided supraclavicular block was performed, with 10ml 2% lidocaine and 10ml 1% ropivacaine. A propofol infusion was titrated for moderate sedation. Multimodal analgesia and PONV prophylaxis were administered intraoperatively. Humeral tourniquet with reinforced padding and reduced insufflation pressure was used. EBL was 350ml. No respiratory, circulatory, skeletal, or temperature related events were recorded and surgery went uneventfully, lasting 3.5h. ABG revealed slight respiratory acidosis, corrected after sedation suspension. The patient was reinterventioned due to a surgical complication and was discharged on postoperative day4.
Discussion: This case presented some challenges: a regional anaesthesia technique was chosen due to concerns with airway manipulation complications (bone fractures and neurological compromise), pneumothorax augmentation with IPPV, asthma and scoliosis-induced restrictive pulmonary disease. Despite hypothetical haemorrhagic risk, anatomy deviations and contralateral iatrogenic pneumothorax, in our point of view benefit still outweighs risk.
References:
1.Goeller JK,*et al.*Curr Anesthesiol Rep.2017;7(2):142-149
Learning points: This case-report aims to highlight the anaesthetic implications of OI, as well its successful management, with the purpose of raising awareness to this rare entity.

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03AP08-4
Continuous erector spinae block catheter in the perioperative analgesic management of total scapulectomy. A Case Report.

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Background: Total scapulectomy (TS) is indicated in case of malignant tumors. TS requires to remove a wide variety of ventral and dorsal muscles, and it is necessary an intensive control of pain. In this context, we used a continuous catheter technique combining both interscalene and erector spinae plain (ESP) blockades.
Case Report: 32-year-old male patient with right scapula chondrosarcoma was scheduled for TS surgery. At the operating room, vital signs were monitorized, we administered midazolam (4 mg) plus fentanyl (50mcg). The interscalene catheter (ISCC) was placed under ultrasounds (US) guidance and 5 millilitres (mL) of lidocaine (Ld) 1% plus 5 mL of bupivacaine (Bp) 0.25% was administered. When the patient was undergoing general anaesthesia, he was moved to lateral decubitus and, under US guidance, the ESP catheter was placed at the T4-T5 level; it was then administered 10 mL of Ld 1% plus 10 mL of Bp 0.25% followed by an 8 mL/hour continuous perfusion of Bp 0.1%. The surgery duration was 4 hours. Invasive arterial pressure, cardiac output, systolic volume and systolic volume variation were monitorized by the FloTrack system®. The patient was hemodynamically stable and there was no need of blood products or vasoactive drugs. Before extubation 5 mL of Bp 0.25% was administered by each catheter plus intravenous morphine 0.05 mg/kg and 50 mg of desketoprofen. Upon awakening the patient presented a 0/10 on Visual Analogue Scale (VAS). As surgeons needed to evaluate his neuromuscular function the ISCC was not used during the postoperative period (PO) and a Bp 0.1% continuous perfusion at 6mL/hour through the ESP catheter was prescribed. During 1st and 2nd day of PO the patient assessed 0-1/10 on VAS, so the catheters were removed, and usual analgesia was started. One week after surgery he was discharged of the hospital with no complications.
Discussion: ESP block compared to epidural anaesthesia has a lower rate of hemodinamic changes and a quicker learning curve. During PO, the ISCC was not used demonstrating that the ESP blockade provides adequate analgesia for these kinds of surgery and preserves the evaluation of the neurologic function with a lower use of intravenous drugs.
References:
Forero, M., Adhikary, S., Lopez, H., Tsui, C. and Chin, K. (2016). The Erector Spinae Plane Block. Reg Anesth Pain Med 41(5), pp.621-627
Learning points: ESP is a recent block. We present its effectiveness in shoulder surgery so further studies could be performed.

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03AP08-5
Caudal block in young female after correction surgery of severe scoliosis

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Background: Caudal block anesthesia it's a procedure often used in pediatrics to relief peri-operative pain. The good results of this technique, together with low incidence of complications, make it a good anesthetic choice for children going under surgery below belly button (dermatomes T10-S5), as seen in repair of inguinal hernia, orchidopexy and correction of hypospadias. Nevertheless, this technique is used more often in children under the weight of 30 kg (about 10 years), because in older children the achievement of the block can be technically harder and because, in this cases, only the sacred dermatomes are effectively blocked.
Case Report: Female patient, 15 years, ASA III, 65 Kg proposed to surgical correction of right ischia ulcer. Personal background of tetraparesis due to ischemic spinal cord injury after severe scoliosis correction surgery (column instrumented at several levels), moderate restrictive syndrome, epilepsy, cognitive delay. Anesthetic approach: after sedation with propofol 1mg/kg and spontaneous ventilation maintenance, the patient was put in left lateral decubitus and, under aseptic conditions, the epidural space was searched at caudal level with anatomic references and 20 mL of ropivacaíne 7,5% were administered. After 20 minutes the

installation of blockage was verified, with no nociceptive response (tachycardia, blood pressure rise) to stimuli. Surgery went with no complications and in the end the block was complemented with 1000 mg of intravenous paracetamol . The post-operative period went with no complications and no need of rescue analgesia.
Discussion: The performance of caudal epidural block in older children, besides being potentially harder, it's an alternative anesthetic approach. Ultrasound may be useful in the application of this technique in populations of an higher age range. Realization of epidural caudal block can be used as an alternative to lumbar epidural in children with previous instrumentation of the column, having always in mind the limitations of this technique. Nevertheless, this technique can be part of opioid-sparing and opioid free strategies in severe respiratory disease, as we see in this clinical case.
References:
PATEL, Davandra; Epidural analgesia for children, Continuing Education in Anaesthesia, Critical Care & Pain | Volume 6 Number 2 2006
Learning points: Caudal block anesthesia as an alternative anesthetic approach in older children

03AP08-6
Can ultrasound-guided thoracic plane blocks change the lymphatic drainage during breast cancer surgery? Case Report.

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Background: Breast cancer is the most common cancer affecting women. Numerous options exist for perioperative anaesthesia and analgesia preventing acute perioperative pain, persistent pain and potentially cancer recurrence.[1] As a matter of fact, local anaesthetic deposition can affect local lymphatic drainage [2] as well as the dye spread pattern, that is crucial to guide surgical decision. The aim of this case report was to show a change of the surgical plan when the patent blue, utilized to mark the sentinel node, did not color the axillary (sentinel) node after ultrasound-guided thoracic plane blocks (PECS 1, 2 and SAM).
Case Report: A 60-year-old woman, ASA 2, 63kg, diagnosed with right-sided breast malignancy was scheduled for total mastectomy with sentinel lymph node biopsy and breast conservation surgery reconstruction using a tissue expander. Informed consent was obtained. Besides general anaesthesia, we performed uneventful ultrasound guided PECS 1, 2 and SAM blocks with 20mL ropivacaine 0.2 % for each one. After the thoracic blocks, the surgeon infiltrated the skin with patent blue, as usual, to color the sentinel node. They performed mastectomy and were looking for the sentinel node that did not color. The patent blue did not reach the axilla. Many possibilities could explain this fact but, at that moment, we thought about the local anaesthetic effect done at PECs blocks. The surgical team did total axillary clearance. Surgery lasted 2h. Total anaesthesia management was uneventful. After extubation she was sent to the PACU for 1 hour. VAS was 0 at the end of surgery and at PACU discharge. 24 h latter (VAS=O). She was discharged from the hospital on the first PO with oral analgesics on demand. Her experience with pain control was satisfactory. A week later the pathology study of the axillary nodes showed many lymph nodes compromised.
Discussion: Many situations can interfere with the drainage of patent blue. Local anaesthetic effect? Volume compression? Further clinical investigations are necessary to establish a correlation between thoracic plane blocks and local lymphatic function.
References:
1. Andersen KG et al. Persistent pain after breast cancer treatment: a critical review of risk factors and strategies for prevention. J Pain 2011;12:725–46. 2.Kwon S et al. Effect of lidocaine with and without epinephrine on lymphatic contratile activity in mice in vivo. J Anesth 2016;30(6):1091-94.
Learning points: Breast cancer anaesthesia complication

03AP08-7
Epidural caudal block in 86-years-old patient with severe cardiovascular disease proposed to correction femur neck fracture

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Background: Caudal epidural block involves placing a needle through sacral hiatus to deliver medications into the epidural space. This procedure it's useful when anesthesia of lumbar and sacral dermatomes is necessary and used primarily in young children to surgical anesthesia and analgesia and in adults to manage chronic pain. In children it has a high successful rate (>96%), but in adults its only 68-75%.(explained by relative difficulty in localizing the sacral hiatus but also because only the sacred dermatomes are effectively blocked in adult populations).
Case Report: Female patient, 86 years, ASA IV proposed to correction surgery of femur neck fracture. Patient with history of cardiorespiratory arrest in recent low. Other personal background: caquexia, severe mitral rheumatic stenosis; cardiac failure with EF <20%, ischemic heart disease and chronic renal failure (creatinine clearance <50 mL/min). Anesthetic strategy: after placing an arterial catheter for invasive AP measure, patient was sedated with sevoflurane and positioned in left lateral decubitus. Under asseptic conditions, the epidural space was searched at caudal level with anatomic references. 15 mL of ropivacaine 7,5% was administered. The block was tested, and after no nociceptive response the surgery went through. It was necessary to reinforce anesthesia after one hour with 5 mL of ropivacaíne 7,5%. Surgery went with no complications. The patient was admitted in a prolonged recovery unit, with cardiovascular stability and no pain. The post op went with no complications.
Discussion: Epidural caudal block in adults can be an alternative choice with more CV stability in severely ill patients. Besides being potentially harder, ultra-sound and fluoroscopy may be useful in the application of this technique in adult populations as they have the potential to improve the technique and minimizes the rate of failure. Realization of epidural caudal block can be used alternatively to lumbar epidural block in geriatric population with severe CV disease, having always in mind the limitations of this technique in patient selection.
References:
Najman, IE – Caudal Epidural Anesthesia: An Anesthetoc Tecnique Exclusive for Pediatric Use? Is it possible to Use it In Adults? What is the role of the ultrasound in the context? ; Rev Bras Anestesiol 2011
Learning points: Caudal epidural block is an alternative anesthetic approach with more CV estability in severely ill old patients

03AP08-8
Anesthetic management of a patient with subtrochanteric hip fracture six days post -myocardial infarction

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Background: Operation is the accepted treatment for the vast majority of proximal femoral fractures. Data from studies in hip fracture surgical patients with recent myocardial infarction (MI) suggest increased mortality rates at 1 and 6 months post –MI. (1) Current literature lacks evidence regarding the possible role of anesthetic management in patients with hip fracture and recent MI.
Case Report: An 83-year-old female patient presented with subtrochanteric hip fracture, but surgery was postponed because of non-ST anterior MI. After the initial control of acute myocardial crisis, 6 days after MI, having explained the risks and benefits of the procedure to the patient and having obtained informed consent, the patient was scheduled for hip fracture repair. At the operating holding area we performed ultrasound guided fascia iliaca compartment block (FICB) (30 ml ropivacaine 0, 5%/ 8 mg dexamethasone) to facilitate perioperative analgesia. During the 40 minute procedure, induction and maintenance of anesthesia were uneventful except for an episode of bradycardia –hypotension during the placement of the patient on the operating table, which was managed easily with ephedrine. No complication occurred in the postoperative period and the patient walked on the second day after surgery. One week later she was discharged from hospital.
Discussion: This case report serves as a reminder of this difficult decision –making surgical condition making a suggestion of a possible safe anesthetic plan. Central neuraxial anesthesia is contraindicated in this group of patients due to the necessity of continuation of antiplatelet therapy. FICB provides an effective and safe analgesic method in the perioperative period, which has been shown in a number of randomized controlled trials.(2) Our case also suggests that FICB may contribute to early postoperative mobilization and positive patient outcome.
References:
1. Komarasamy B, Forster MC, Esler CN, Harper WM, Hall AP. Mortality following hip fracture surgery in patients with recent myocardial infartion. Ann R Coll Surg Engl. 2007 Jul; 89(5): 521-5
2. Steenberg J, Møller AM.Systematic review of the effects of fascia iliaca compartment block on hip fracture patients before operation. Br J Anaesth. 2018 Jun;120(6): 1368-1380. Review
Learning points: 1. Hip fracture surgery following MI has been associated with increased mortality. 2. FICB provides a safe analgesic tool facilitating early postoperative mobilization.

03AP08-9
Total spinal block after single shot epidural anesthesia

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Background: Total spinal block occurs when there is an unintentional blockage of the whole spinal cord and parts of brainstem. Clinical features consists in bradycardia, hypotension, unconsciousness, apnea and mydriasis.
Case Report: 69-year-old male, diabetic, admitted for a ileostomy closure, with BP 130x80mmHg and HR 60bpm. We performed sedation with 2mg of Midazolam and unique puncture of epidural space L1/L2 with Tuohy 18G needle and the loss of resistance technique. There was no reflux of blood ou CSF after aspiration. We then injected 25cc of a solution with Ropivacaine 0,6% and Sufentanil 20mcg. Patient was positioned in horizontal dorsal decubitus. After about 15 minutes, patient had difficulty of speech and weakness of superior limbs that rapidly deteriorated to apnea, unconsciousness and fixed mydriasis. In that moment, MAP was 55mmHg and etilefrine 2mg was administered. Orotracheal intubation was performed after bolus of Propofol 80mg. BIS was installed and kept between 40-60 with Sevoflurane, with no suppression rate at EEG. Surgery went on for 50 minutes, without intercurrences. Sedation was turned off and patient woke up after about 40 minutes. In that moment, BIS was 92 and SR=0. He was following commands, with stable vital signs and motor and sensitive block up to T6 level. He was extubated and transferred to the PACU. 3 hours later, he had recovered completely from the blocks, with no complaints or neurologic deficits.
Discussion: There are few cases of total spinal block in the literature, most of them related to peripheral blocks near the spinal cord and neuraxial blocks in parturients and/or using epidural catheters. Techniques of aspiration and test dose reduce the risk, but do not eliminate it. Installation time is usually of a few minutes, but may reach up to 30 minutes. In that case, even without aspiration of CSF and with a single and uneventful epidural injection, total spinal block occurred. BIS was important to monitor level of consciousness and SR to monitor central nervous system hypoperfusion.
References:
Beyas SG, özocak H, Ergönenç T, Erdem AF, Palabryik O. Total spinal block after thoracic paravertebral block. Turk J Anaesthesiol Reanim. 2014 Feb; 42(1): 43-45
Learning points: Before a case of sudden loss of consciousness and instability after regional anesthesia, anesthesiologists should always consider the possibility of total spinal block, regardless of the patient features or how the block was performed.

03AP09-1
Effect of Peribulbar anesthesia with adrenaline versus without adrenaline on retinal thickness in patients undergoing elective cataract surgery

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Background and Goal of Study: The toxic effect of local anesthetia on retinal integrity was previously investigated in animal studies but not in human. The aim of this work was to study the effect of local anaesthesia with lidocaine, versus local anaesthesia with lidocaine with exta administration of adrenaline, on retinal layers thickness measured by Optical coherence tomography (OCT) in patients undergoing elective cataract surgery.
Materials and Methods: This is a prospective randomized trial that was carried out on 60 patients undergoing elective cataract surgery by phacoemulsification under local anaesthesia with lidocaine. Patients were randomly assigned into two groups; the first group received local anaesthesia with lidocaine 2% with extra administration of adrenaline (30 participants) (Adrenaline group) and the second group received local anaesthesia with lidocaine 2% only (30 participants) (control group). Retinal thickness was measured for all participants preoperative and one week post-operative using Optical Coherence Tomography
Results and Discussion: Regarding OCT findings in patients in Adrenaline group, there was a statistically significant postoperative decrease in superior (P-value=0.028), inferior (P-value=0.017), or average retinal thickness (P-value=0.021). In control group, there was also a statistically significant postoperative decrease in superior (P-value=0.032), inferior (P-value=0.046), or average retinal thickness (P-value=0.028). On comparing OCT findings in adrenaline and control group, there was no statistically significant difference between groups regarding the decrease in superior (P-value=0.325), inferior (P-value=0.642), or average retinal thickness (P-value=0.291)
Conclusion: Local anaesthesia with lidocaine induced significant decrease in retinal thickness. The extra administration of adrenaline to lidocaine didn't affect the post anaesthetic changes occurred in retinal thickness.

03AP09-2
An innovative intra-needle ultrasound system facilitates paravertebral block and intercostal nerve block - a porcine model

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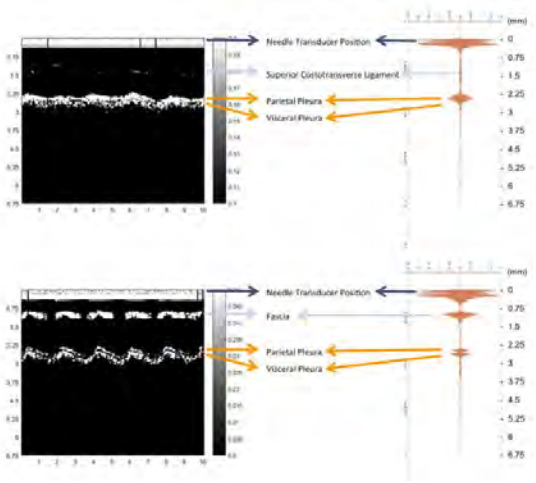
Background and Goal of Study: Intercostal nerve block (ICNB) and paravertebral block (PVB) are commonly used for analgesia in thoracic surgery and pathology. During ultrasound-guided ICNB and PVB, tracking the tip and trajectory of needle could be difficult. Using porcine model, we tested an innovative method for PVB and ICNB using an intra-needle ultrasound (INUS) transducer as image guidance.
Materials and Methods: The INUS transducer with 20MHz frequency was made from a single lead magnesium niobate–lead titanate crystal. It fits into a regular 18G epidural needle and generates A-mode ultrasound image at the needle tip (figure 1). Another 2D surface ultrasound was used to estimate the needle entry point and target depth for ICNB or PVB. Then, the 18G epidural needle embedded with INUS transducer was inserted and advanced until proper position reached for ICNB or PVB according to anatomy identified by INUS. Saline was then injected and success of blockade was defined as ideal saline spreading confirmed by surface ultrasound.
Results and Discussion: While advancing the needle, INUS successfully identified intercostal muscles, ribs, costotransverse ligament, and elaborate structure of visceral and parietal pleura. Original A-mode signal and reconstructed M-mode were presented (figure 2). Pleura showed a distinctive INUS signal as a flickering and respiration-sensitive waveform. Using pleural INUS signal as landmark, thirteen of fourteen attempts of ICNB and five of six PVB were successfully done by non-medical students and confirmed by an experienced anesthesiologist.
Conclusion: INUS is a promising tool for ICNB and PVB by identifying structure in high resolution while advancing the needle. Since it monitor the anatomy from the needle tip, it defines a new method and increases safety and successful rate. Clinical trial is needed for further investigation.



03AP09-3
Neuraxial ultrasound made ridiculously simple

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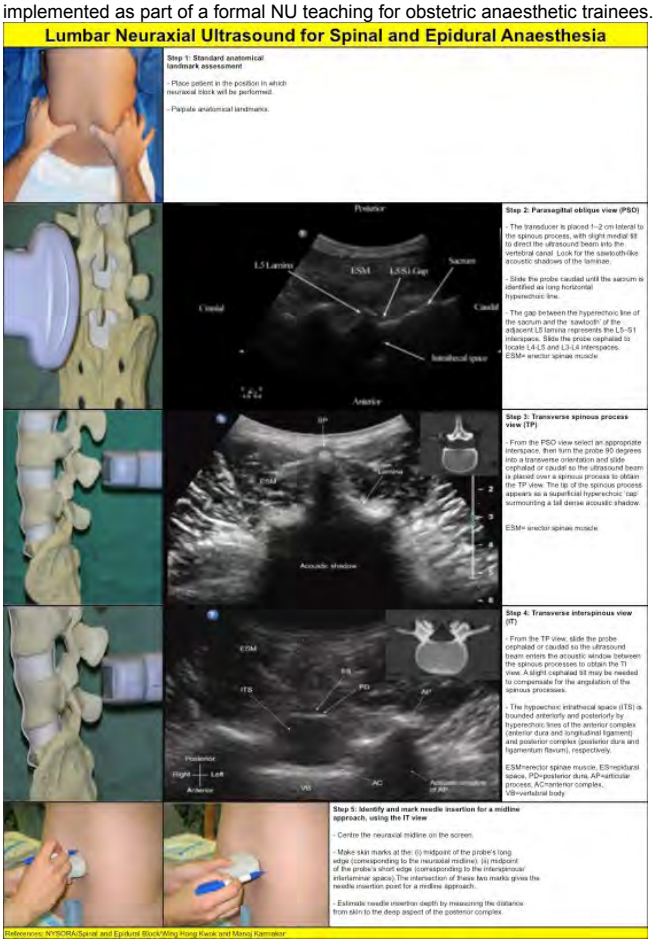
Background and Goal of Study: Neuraxial ultrasound (NU); 1) Can more accurately determine a lumbar interspace than palpation of surface landmarks alone (grade IIa), 2) Can predict the depth of epidural space with a high degree of accuracy (grade Ib), 3) May improve epidural success rate of junior anaesthetists and lower the number of attempts by experienced anaesthetists (grade Ib)[1]. The aim of this project is to promote NU use by introducing solutions to overcome the main challenges standing against its application in practice.
Materials and Methods: In August 2018 an online survey was submitted to 110 anaesthetists covering general theatres and obstetrics in the largest teaching hospital in Scotland to investigate the obstacles for under usage of NU. The survey was open for 1 month with a total response of 47%(55).
Results and Discussion:

What is your level?	Consultants 65% Trainees 35%
Do you have access to an US machine with curvilinear probe in your department?	Yes 100%
Have you received any training in the use of US for neuraxial scanning?	Yes 32% No 78%
I use the US for neuraxial anaesthesia:	Never 74% Only if the procedure is difficult 22% Routinely 4%
How confident are you in using the US for neuraxial scanning?	Confident 22% Not confident 88%
I think the use of US for neuraxial anaesthesia should be added to the RCoA training curriculum?	Yes 77% No 33%
In your opinion, what are the main barriers to the use of NU?	Education/training 80% Time consuming 7% Not useful 13%

To overcome lack of training/education challenges; we have introduced a NU practical reference guide that is printed and attached to our US machines and implemented as part of a formal NU teaching for obstetric anaesthetic trainees.



Conclusion: Lack of education/training is the biggest obstacle for under usage of this safe, non-invasive technique. Introducing quick practical reference guides and regular teaching could help to overcome this.
References:

1- Perlas A. Evidence for the use of ultrasound in neuraxial blocks.Reg Anesth Pain Med. 2010 Mar-Apr;35(2 Suppl): S43-6.

03AP09-4
Hirudotherapy – a lifesaving alternative

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Background: The viability of free tissue flaps is enhanced by the immediate postoperative use of anticoagulant therapy. Hirudotherapy has proven to be a promising option when proper anticoagulation is not possible.
Case report: A 48 years old man, a smoker, was operated on an emergency basis for a type IIIC open fracture of the first three left toes and of the left forefoot. Postoperatively, a 10/10 cm area of necrosis on the dorsal aspect of the forefoot was noted, which required reintervention with a pedicled radial flap transfer. Being under axillary block and spinal anaesthesia, the use of anticoagulants was forbidden during the first 12 hours, which is why we initiated hirudotherapy, after written informed consent was obtained from the patient.
Discussion: The first leech was applied immediately after surgery and every 6 hours during the first day; others were applied every 12 hours in the following 5 days, continuing with one leech per day until the 10th day[1]. The saliva of Hirudo medicinalis contains more than 100 bioactive substances, including coagulation inhibitors, platelet aggregation inhibitors, vasodilators, anaesthetic, antimicrobial and anti-inflammatory agents. Hirudin is the main and most potent anticoagulant responsible for inhibition of thrombin. Prophylactic treatment with antibiotic and continuous monitoring of blood parameters were necessary. The contraindication of heparin use immediately in the postoperative period was overcome by the use of leeches with local anticoagulant qualities. The patient's progress was favourable. The viability of the flap was established by using clinical instruments and colour Doppler ultrasonography.
References:

1. Herlin C. et al. Leech therapy in flap salvage: systematic review and practical recommendations. Ann Chir Plast Esthet, 2017.

Learning points: Hirudotherapy is a safe, easy to use, beneficial and cost-effective treatment modality to save reattached body parts and flaps in reconstructive plastic surgery. The survival of the flap turned out to be crucial for the attempt to save the leg from amputation.

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03AP09-5
Virtual reality hypnosis distraction to improve tolerance to regional anaesthesia performance.

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Background and Goal of Study: Regional anaesthesia (RA) performance may be stressful and painful1. For that purpose, intravenous sedation (IVS) has some adverse effects1,2. Virtual reality hypnosis distraction (VRHD) could be valuable alternative by decreasing anxiety and procedure related pain1-3. In this prospective randomized controlled trial, we tested the hypothesis, the VRHD decreased at least of 50% the IVS requirement during the RA.
Materials and Methods: 60 patients (power tested) scheduled for orthopaedic surgery under RA were randomized in 3 groups according to the used of VRHD. In group 1 (Tab), patients received only standard IVS (SUF 5 µg + MDZ 2mg). In group 2, patients received VRHD only during RA and IVS only if behavioural pain score (BPS)>3. In group 3, patients receive VRHD before and during RA and IVS if BPS>3. The OncomfortTM VRHD software included hyper vision 3D virtual reality glasses and headphones. Primary objective was to decrease of 50% the IVS with VRHD. Data between groups were compared using Welsh's, Chi-square, Fisher and ANOVA tests and presented as mean ± standard deviation or percentage. p<0.05 was considered as significant.
Results and Discussion: Table just below depicts the whole results.

	Group1 N-20	Group2 N-20	Group3 N-20	p-value	Group2 vs Group3 p-value
Demographics • Age (Years) • Female (n)	43.7 ± 16.5 7 (28%)	49 ± 18.4 8 (32%)	50.2 ± 17.0 10 (40%)	0.44 0.96	
Intravenous sedation (n)	20 (100%)	5 (25%)	2 (10%)	0.000000007	0.4
GS (AVS)*	9.0 ± 0.9 (9.0)	9.2 ± 0.8 (9.0)	8.6 ± 1.0 (9.0)	0.089	
Comfort (AVS)** during RA***	8.1 ± 1.5 (9.0)	8.0 ± 1.6 (8.5)	8.3 ± 1.0 (8.0)	0.833	
Comfort after RA (AVS)	8.4 ± 0.9 (8.0)	8.3 ± 1.6 (9.0)	8.5 ± 1.0 (9.0)	0.803	
Heart rate (bpm) before RA	71.9 ± 13.3 (70)	67.7 ± 9.1 (67.5)	70.0 ± 8.1 (70)	Between groups difference: F=1.184 – p=0.314 Between times difference: F= 8.297 – p= 0.006 Interaction: F= 1.399 – p= 0.255	
Heart rate (bpm) after RA	71.8 ± 12.9 (71)	65.7 ± 11.0 (64)	65.9 ± 8.2 (66)		

* Global Satisfaction (analogic visual score 0 to 10)
** Comfort Score (analogic visual score 0 to 10)
*** Regional Anaesthesia

VHRD decreased significantly the IVS. The comfort, heart rate and patient's satisfaction remain unchanged.
Conclusion: VRHD reduced significantly IVS requirement with similar usual comfort and satisfaction during RA.
References:
1. J Pain 2006; 7: 843-50
2. J Anesthesiol 2017; 70: 439-45
3. Anesth Analg 2007; 104: 1199-208

03AP09-6
The Analgesia nociception Index variations predicts hypotension after spinal anesthesia

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Background and Goal of Study: Hypotension commonly occurs after spinal anesthesia. Its severity depends on sympathetic blockade magnitude and the basal sympathetic tone, and may be delayed up to 20 minutes after spinal injection. Early prediction of hypotension allows early prevention and treatment. However, reliable predictors of hypotension are lacking. The Analgesia Nociception Index (ANI) is a non-invasive continuous parameter derived from the spectral analysis of the ECG variations, that appreciate the sympathetic-parasympathetic balance (1). He hypothesized that ANI variations between the supine and the sitting position, which reflect sympathetic activation, may predict hypotension after spinal anesthesia
Materials and Methods:In this, prospective observational monocenter study, 93 ASA status 1-3 patients who underwent scheduled orthopedic surgery under spinal anesthesia were included. ECG, peripheral oxygen saturation, and the ANI were continuously monitored. Non-invasive arterial pressure was measured every 2 minutes and hypotension was defined as a decreased > 20% of systolic arterial pressure. ANI variation (Δ ANI) was defined as ANI in sitting position – ANI in supine position. Δ ANI prediction for hypotension was determined by a ROC curve. Data are expressed as mean ± SD, or number (%)
Results and Discussion: Mean age was 54±19 years, and mean BMI 27±5 kg/m^2. Sixty patients (65%) experienced hypotension of which 8 (9%) patients received sympathomimetic agents. ANI decreased from 75±15 in the supine position to 41±12 in the sitting position; p< 0.05. The ROC curve analysis shows that a Δ ANI> 38 has an AUC of 0.7 [0.6 – 0.8]; p<0.01 with a positive predictive value of 78% and a negative predictive value of 45%.
Conclusion: This study shows that ANI variation between the supine and the sitting position predicts hypotension after spinal anesthesia in orthopedic surgery. Further studies are required to confirm these results in other clinical settings
References:
1.Daccache G, Jeanne M, Fletcher D. The Analgesia Nociception Index: Tailoring Opioid Administration.
Anesth Analg. 2017 Jul;125(1):15-17.

03AP09-7
Epidural pressure changes according to the head position; a consideration of another mechanism of dry tap.

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Background and Goal of Study: Dry tap is a rare but serious problem for lumbar puncture including spinal anesthesia. It has been explained as fibrosis of the bone marrow. However, the mechanism has been investigated insufficiently, and anesthesiologists can encounter dry tap even in young patients. Previously we reported a method to confirm epidural puncture by using modified Queckenstedt-test (1). Epidural pressure usually corresponds to the pressure in the subarachnoid space. In this study, therefore, we investigated the pressure of the epidural space by changing head position to elucidate the mechanism of dry tap.
Materials and Methods: Patients were adult, and they had no systemic complications. They received epidural anesthesia at thoracic portion for surgery. In the lateral position, epidural puncture was performed. After calibration of pressure monitoring at the level of epidural puncture, operation table tilted for head-up and head-down. The epidural pressure was monitored in three positions; horizontal position, 5-degree head-up position and 5-degree head-down position. Wilcoxon test was used for statistical analysis. A p value <0.05 was considered statistically significant.
Results and Discussion: Seven patients, 5 male and 2 female, participated in this study; 62.7±16.2 year-old, 161.5±8.2 cm in height and 62.2±8.3 kg in weight. Epidural puncture was performed between Th6/7 and Th 10/11. The epidural pressure decreased in all patients significantly from 9.7±2.1 mmHg to 6.7±1.3 mmHg by head-down (p=0.028). On the other hand, the epidural pressure increased significantly to 11.3±2.6 mmHg by head-up (p=0.043). These results clearly indicate that the epidural pressure changes according to the head position, as it may be influenced by the pressure of spinal fluid. In addition, our results suggest the possibility that the pressure of subarachnoid space might become around zero or less when the head position is much lower comparing to the puncture portion. Therefore, dry tap might be prevented by head-up position.
Conclusion: The epidural pressure changed according to the head position. The risk of dry tap might be decreased by the head-up position as the epidural pressure may depend on the pressure of spinal fluid.
Reference:
1. Yokoyama T, et al. Epidural puncture can be confirmed by the Queckenstedt-test procedure in patients with cervical spinal canal stenosis. Acta Anaesthesiol Scand. 2008;52:256-61.

03AP09-8
Effects of alpha-lipoic acid as adjuvant on the control of acute pain and levels of oxidative stress biomarkers in surgery for femoral fracture repair

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Background and Goal of Study: New adjuvant drugs for the multimodal analgesic regimen may be reasonable to decrease postoperative pain scores, total opioid consumption and side effects of orthopedic procedures. Lipoic acid is already used as a treatment for neuropathic pain, but there is no evidence of its effects on acute pain. We aimed to evaluate the effects of lipoic acid as an adjuvant for the control of postoperative acute pain and the changes in the levels of oxidative stress markers.
Materials and Methods: The study was conducted as a randomized clinical trial; 30 patients were randomly divided into 02 groups of 15 subjects. 1) The control group (CG) - using spinal anesthesia with heavy bupivacaine, morphine and 2) Lipoic Acid Group (LAG) - received 600 mg of lipoic acid one hour before the surgical procedure and spinal anesthesia with heavy bupivacaine associated to morphine. We analyzed the time to first rescue analgesic, the rescue opioid consumption, the degree of satisfaction of the anesthetic technique, the pain intensity 24 hours after anesthetic blockade and the markers of oxidative stress immediately and 24 hours after the surgical procedure.
Results and Discussion: The groups were similar for demographic data. The time to request the first rescue analgesia, opioid consumption, satisfaction with the anesthetic technique and the degree of acute postoperative pain were similar between the two groups. Regarding the oxidative stress markers, the levels of lipid peroxidation immediately after the surgical procedure was lower in the LAG group [15.14 (± 1.14)], compared to the GC group, [19.24 (± 1.39); P< 0.05]; and after 24 hours of the procedure the levels were similar between the groups. There was no difference, immediately or after 24 hours of procedure, in the nitrite and reduced glutathione (GSH) levels between the groups.
Conclusion: Altogether, our findings suggest that alpha lipoic acid decreases the level of lipid peroxidation, a marker of oxidative stress, after a surgical procedure. However, ALA does not interfere in the control of acute postoperative pain or opioid consumption.

03AP10-1
Case report of a rare cause of postoperative transient tetraparesis after peridural catheter placement.

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Background: Epidural anesthesia is a standard procedure in combination with general anesthesia for major visceral surgery. Fortunately, severe complications are rare, but in particular, epidural hematomas are feared due to the risk of spinal cord compression. In the literature, the rate of complications related to epidural anesthesia ranges from <10% for transient paresthesia to 0.0006% for serious epidural hematomas wich signs of compression.
Results and Discussion: We report on a 73-year-old patient who underwent Whipple surgery for proven pancreatic cancer. In addition to standard monitoring, the patient received an epidural catheter inserted at the level of Th 6/7 under local

anesthesia for postoperative pain management. The operation was uncomplicated, and the patient could be extubated a few minutes after surgery ended. The neurological examination revealed significant symmetrical force reduction (force: M3) of the upper limbs and paraplegia of the lower limbs, both of which did not exist prior to the induction of anesthesia. Although the epidural catheter had been placed without any complications, we promptly performed an MRI examination and supplemented with MRI diffusion. We were able to exclude an epidural hematoma. The tip of the epidural catheter was located at the neuroforamina Th6. We were surprised to find an absolute spinal canal stenosis C4-C6 with signs of chronic vascular damage to the A. sulcocommissuralislevel of C 4/5. Already by the end of the MRI examination, the patient was able to move his arms without any restrictions (froce: M5) and the paresis of the lower extremities was clearly decreasing. Two hours after extubation, lower limb force was fully restored (force: M5). The further postoperative course was aggravated by persisting delirium over several days.
Conclusion: Preoperatively, the patient reported no neurological complaints. The catheter insertion and the operation were uneventful. After the operation we revealed significant force reduction. Despite the epidural catheter placement, we decided to perform an imaging procedure. After excluding epidural hematoma and catheter failure via the MRI scan, chronic vascular damage remained as the cause of the patient's transient tetraparesis. The duration of the operation, performed over approximately 5.45 hours with the patient in the same supine position, could have been a trigger. Apart from a passing delirium, no further neurological complaints were registered.

03AP10-2
Axillary dissection performed with serratus plane block plus intravenous sedation - a case report

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Background: Axillary dissection is associated with chronic pain and altered shoulder mobility. Recently, some thoracic ultrasound-guided interfacial blocks were described, including the serratus plane block[1]. These blocks were associated with a reduction in postoperative pain scores following breast surgery but have not been evaluated as the main anaesthetic technique in melanoma patients undergoing axillary dissections.
Case report: An 84-year-old man (74 kg, 1.70 m) was scheduled for left axillary dissection due to a stage III cutaneous melanoma. Continuous ECG, S_pO_2, non-invasive blood pressure, and capnography were monitored and maintained clinically stable throughout the whole procedure. Sedation was performed with propofol TCI (0.8-2 mg/dL, 442 mg), fentanyl (75 µg), and dexmedetomidine (50 µg in 20 minutes, slow infusion). Ultrasound-guided serratus plane block was performed as described by Blanco with a solution of 40 mL lidocaine 1% and epinephrine 5 Âµg/mL. Dispersion of local anesthetic over the serratus muscle reached the axilla according to ultrasound imaging. The procedure lasted 85 minutes (Figure 1a - operative field) and surgery was uneventful. When asked about operative conditions, the main surgeon described being "extremely satisfied." Spread of the local anesthetic was assessed immediately after the operation in the post-anesthetic recovery room (Figure 1b - sensory block). On the first PO day, patient did not have any complaints and did not experience any pain, even with 90° arm abduction. He was then discharged. There were no relevant post-operative events.
Discussion: Ultrasound-guided serratus plane block was described in 2013 by Blanco and colleagues and has since been frequently used in order to improve analgesia and reduce perioperative narcotic consumption in chest wall procedures[1].
References:
1. Blanco R, Parras T, McDonnell JG, Prats-Galino A. Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. Anaesthesia 2013; 68:1107-1113.
Learning points: Use of the serratus plane block as the main anesthetic technique is a possible and promising option for axillary lymphadenectomy procedures.

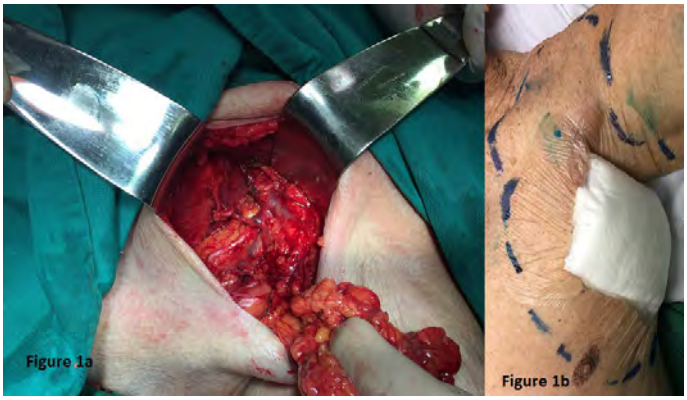
Figure 1a

Figure 1b

03AP10-3
Application of caudal anesthesia in X-ray endovascular surgery

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Background: Due to the rapid development of X-ray endovascular surgery techniques, the question of its anesthetic tactics remains open. In our work, we used caudal anesthesia (CA) as a strategy for perioperative protection in endovascular interventions of obliterative atherosclerosis of the lower extremities (OAL) and uterine artery fibroid.
The goal of the work. The optimization of anesthesia during cylinoplasty of the vessels of the lower extremities and embolization of the uterine arteries (EUA) by using of CA with solution of bupivacaine and buprenorphine.
Materials and Methods: The study was divided into two arrays. The first part included 30 women who were randomly assigned to two groups. All patients performed a planned EUA of uterine fibroids. For patients in the experimental group, at the stage of preparation for operative delivery perioperative protection (30 minutes before the operation), a single-dose CA of 0,125% bupivacaine (LONGOCAIN®) in combination with 0,12 mg of buprenorphine in a volume of 40 ml. The second part included 40 patients who were randomized to two groups. All patients performed plainly cylindrical plastic vessels of the lower extremities with OAL. For patients of the experimental group, at the stage of preparation for operative delivery (30 minutes prior to the operation), single-dose of 0,125% bupivacaine (LONGOCAIN®) in combination with 0,12 mg of buprenorphine in a volume of 30 ml. Patients of the control group received intraoperative analgesia with fentanyl at a dose of 1.5-2 µg / kg / hr and a Diazepam dose of 10 mg.
Results and Discussion: In patients of both cohorts, usage of CA was sufficient to provide intraoperative antinociceptive protection. In women after EUA in the CA group, the pain level of VAS in the time intervals from the first to third hour after surgery was reliably less than three times that of women in the control group. After 8 hours in 2 times. Intraoperatively for 60% patients of the control group we used to add fentanil at a dose of 1-1.5 µg / kg. In first 3 hours after the operation the level of VAS was 2 times lower in the CA group. Among the complications of EA, we observed nausea at 7% and pruritus at 3.5% of patients.
Conclusion: Caudal analgesia with bupivacaine solution with buprenorphine is not only highly effective, but also a sufficiently safe method of perioperative analgesia for endovascular interventions.

03AP10-4
Massive pulmonary embolism(PE) in the operating room. Case#1.

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Background: The rate of deep vein thrombosis following foot and ankle procedures is typically between 0.2% and 3.5%, and the rate of symptomatic PE is even lower, ranging from 0% to 0.2%. The incidence of venous thromboembolic events varies based on the level of injury and inherent patient factors.
Case Report: A 28-year-old, BMI 34.7 kg/m^2, ASA I, male was scheduled for osteosynthesis(closed fracture of the external and internal ankles of the right tibia). Sciatic nerve blockade performed. The patient complained of lack of air, pain in the abdomen and chest, confusion, shortness of breath to 30-40 per minute, SpO_2 drop from 99 to 85%. NIBP fell from 140/90 to 70/50 mm Hg, sinus tachycardia -130 bpm. The patient briefly lost consciousness, there was transient twitching of the upper limbs, so toxic effect of local anesthetic was suspected. Lipid resustitation gave no effect. ECG: ventricular tachycardia, multiple ventricular extrasystoles. NIBP = 60/30 mm Hg. Ventricular fibrillation, defibrillation, CPR was started. Tracheal intubation, mechanical ventilation began. The separation phenomenon of decrease $PETCO_2$ 2-5 mm Hg and increase $PaCO_2$ 88 mm Hg was noted. Massive PE was suspected. UFH 5000 IU heparin had no effect. Emergency thrombolysis with ongoing CPR was initiated, and 5 minutes later the cardiac activity was restored (total duration of CPR 25 min). The patient was transferred to the ICU on a ventilator. The next morning, the patient already was conscious without any neurological disorders, and was extubated. After 1 week, ankle osteosynthesis was performed under spinal anesthesia. After 10 days, the patient was discharged.
Discussion: Massive PE in the operating room is very rare. We did not find a description of the clinical cases of thrombolysis in the operating room on the background of CPR.
References:
1. R. Auer, J. Riehl. The incidence of deep vein thrombosis and pulmonary embolism after fracture of the tibia: An analysis of the National Trauma Databank /Journal of Clinical Orthopaedics and Trauma 8 (2017) 38–44

2. Mao et al. Management of intra-operative acute pulmonary embolism during general anesthesia: a case report. BMC Anesthesiology (2017) 17:67
3. Hanslow SS, Grujic L, Slater HK, et al. Foot Ankle Int. (2006); 27:693–695
Learning points: With massive PE, thrombolysis ensures the effectiveness of cardiopulmonary resuscitation. Better prophylactic regimens taking into account all risk factors are required in lower extremity fractures.

03AP10-5
Spectacular Response after Left Stellate Ganglion Block in Patient with Refractory Ventricular Tachycardia Case Report

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Background and Goal of Study: Cardiac sympathetic denervation can be a treatment option for patients with refractory VT.
Materials and Methods: A 52 years old male admitted 4 month previously with following diagnosis: "Electrical storm. Unicameral implanted cardioverter defibrillator (2014)". He was treated with amiodarone but he developed thyrotoxicosis. Actual medication: diuretic, (-) ECA, β-blockers and sotalol. Despite antiarrhythmic medication ventricular tachycardia persisted. During hospitalization he had undergone several VT ablation procedures: a first endocardial ablation 3 month previously followed by a repeated endocardial with epicardial ablations. Electrical storm persisted and the condition of the patient was not significantly improved. The patient was proposed as ultimate therapeutic resort for sympathetic denervation of the cord. In order to evaluate the success of the procedure the cardiologists suggested a pharmacological denervation test by performing a left stellate ganglion block (SGB). So we practiced left SGB with a mixture of 5 mL 1% ropivacaine and 5 mL 1% lidocaine. Due to a friendly neck anatomy we used the "blind" approach and slowly inject the amount of the mixture of local anesthetics. At the end of the injection the VT converted in sinus rhythm (for the first time in the last 2 months). After 3-4 minutes ESV reappeared with tendency to systematization but at lower rate that before the procedure. 12 minutes from the procedure the sinus rhythm has reinstalled and lasted for 14 hours. After that period ESV have reappeared and after 16-17 hours the patient has re-entered in VT.
Results and Discussion: We thought that lidocaine was responsible for the initial sinus conversion and after 12 minutes was the ropivacaine. This response was strongly suggestive that the patient will benefit from surgical denervation and the surgery was planned in three days. We repeated the left SGB in the morning of surgery, prior the anesthesia induction, so the patient regained the sinus rhythm before surgery and the anesthesiologist can use the vasopressor medication without the stress of proarrhytmogenic side effects. As we suspected the patient has benefited the procedure.
Conclusion: Left stellate ganglion block is a very simple, easy to perform procedure which strongly evaluate the success of surgical cardiac sympathetic denervation.

03AP10-6
Minithoractomy Post-Surgical Analgesic Control With Incisional Catheters Connected To An Anesthetic Local Elastomeric Pump

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Background and Goal of Study: Effective control of postoperative pain has become an essential part of perioperative care. The type and location of surgery is the most relevant factor related to post-surgical pain. Patients are increasingly older and have greater comorbidity. The use of a multimodal strategy allows more effective pain control with less side effects.
Materials and Methods: A descriptive study was conducted over a period of 6 months. Patients who undergone a minimally cardiac surgery through minithoracotomy incision were enrolled (n=15). Intraoperatively we placed a multiperforate catheter over the surgical incision connected to a L-bupivacaine 0,125% elastomeric pump during 48h. Within a multimodal analgesia regimen we prescribed acetaminophen 1gr/8h and rescue analgesia with morphine. Primary outcomes were VAS score at 24 and 48h after surgery and opioids consume. Secondary outcome was surgical wound infection.
Results and Discussion: Fifteen patients were enrolled in the study. The ninety-two per cent of the patients refers soft pain (EVA ≤ 3) and between them the fifty per cent of the patients refers no pain (EVA =0) during the first 48h after surgery. Only one of them required rescue analgesia with 3mg of morphine. No surgical wound infection were reported.
Conclusion: The use of multiperforate catheters connected to an anesthetic local pump over the surgical incision within a multimodal approach could promoted an effective and safe method for pain control after surgery and prevent side effects due to pharmacotherapy. It would be necessary more studies to cofirm this hypothesis.

03AP10-7
The erectorspinae plane block in scapular lipoma surgery: A case report.

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Background: The erectorspinae plane block (ESP) was first described on 2016 by Forero et al as an easy and safety technique. From this publication a great variety of indications have been described, including chronic pain management and as an intra and post-operative pain management alternative in the multimodal approach. We have failed to find any case of this technique for scapular surgery so we show a case of a 51 years old woman undergoing a scapular lipoma surgery under this block and general anesthesia.
Case Report: 51 years old woman, body mass index 26,72 Kg/m2, ASA physical status I, with a 7cm soft tissue nodular tumor, ultrasound and clinically compatible with a left scapular lipoma. Before the surgery we performed the ESP with the patient lying face down, ultrasound guided we find the spinae process of T2 using the linear probe (S-NerveTM4-13 MHz, SonoSite, USA) and approximately 3cm laterally we find the transverse process and then we rotate the probe in the longitudinal direction with an in plane approach, cephalad oriented needle (UltraplexR 360 22G de 80mm), 15ml 0,25% L-bupivacaine were used. After a standar monitorization we proceed with the general anesthesia, using propofol 150mg, fentanyl 150ug and rocuronium 40mg, orotracheal intubation was performed with no complications and sevofluorane 1-1,5% for the anesthetic maintenance, no additional fentanyl were needed during the procedure. In the post-operative recovery room we evaluate the pain with an analogic visual scale (AVS) being of 0-1/10 in the next 2 hours.
Discussion: In this outpatient surgery case we find in this technique a safety alternative in the multimodal pain management approach, getting a good result, allowing to manage the pain in the first 24 hours with non-opioid analgesics. In the absence of more studies to confirm their effectiveness the ESP could be a good alternative for this surgery.
References:
1. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The erectorspinae plane block: A novel analgesic technique in thora-cic neuropathic pain. Reg Anesth Pain Med. 2016;41:621-7
Learning points: Considering the innervation of the scapular area and the probable action mechanism of this block we decided to perform it in this surgery with a good result.

03AP10-8
Arterial injury during total hip arthroplasty: A rare but severe complication.

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Background: Total hip arthroplasty (THA) is one of the most common orthopedic procedures, which is often performed in the elderly. Vascular injuries (thrombosis, vessel lacerations, pseudoaneurysms and arteriovenous fistulas) are rare complications (0.08-0.3%) with serious consequences (mortality 7%, limb amputation 15% and fasciotomy 15%).[1,2]
Case report: 38-year old woman with Perthes disease was scheduled for THA under combined peridural and general anaesthesia. Intraoperatively we observed sudden major bleeding with haemodynamic instability. Massive transfusion protocol was activated (8 packed red blood cells, 1 platelet pool, 1l of fresh frozen plasma, 4 g of fibrinogen concentrates, 1g tranexamic acid), and vasoactive drugs were necessary. Treatment of coagulation disorder was guided by thromboelastography. Haemostasia was achieved without identification of a clear vascular injury and surgery was continued. The patient was tranferred to the postoperative care unit under sedation and mechanical ventilation. 12 hours after the procedure it was noted that the patient's left inferior limb was tense and oedematous with mottling and cyanosis and distal pedal pulse was absent. Computed tomography angiography (CTA) showed thrombosis of the common and superficial femoral arteries and avulsion of the deep femoral artery. A femoral-superficial femoral bypass was placed and leg fasciotomy was performed.
Discussion: Injury of big vessels during THA is a serious but, fortunately, a rare complication. Even if the bleeding is controlled, early CTA is indicated when vascular lesion is suspected. Close monitoring of the limb is necessary to assess clinical features of acute ischemia. Epidural analgesia and sedation of patients may hinder clinical detection of ischemia but it should not delay the diagnosis[3]. In our case epidural catheter was not used after surgery but even so the diagnosis was too late.
Learning points: 1.Arterial injuries due to THA are rare, but can rapidly lead to life-threatening complications.2.High clinical awareness for acute arterial injury should be present during and after THA.3.Regional anesthesia may have delayed diagnosis of acute limb ischemia.4.Most patients require early bypass or endovascular treatments for restoring limb perfusion.
References:
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03AP10-9
Is Pecs II Block enough for Anesthesia? – a case report

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Background: Pectoral Nerves (Pecs) block is routinely used for analgesia after breast surgery. The Pecs II block is achieved by injection of local anaesthetic in the fascial plane between the pectoralis major and minor muscles and a second injection in the plane between the pectoralis minor and serratus anterior muscles. We present a case we used this technique as primary anaesthesia in a patient presenting for a simple mastectomy.
Case Report: An 86-year-old female, ASA IV, presented for a simple mastectomy due to breast carcinoma. The patient had a history of ischemic cardiomyopathy conditioning poor systolic function, atrial fibrillation, hypertension, pacemaker and von Recklinhausen neurofibromatosis. She was chronically medicated with anticoagulant drugs. The Pecs II block was achieved by using 30 mL levobupivacaine 0.5% under moderate sedation (RASS -3/-4) with Ketamine 0.5 mg Kg-1 and Remifentanyl target controlled infusion. After testing the block and local complementation with Lidocaine 1% (total 20mL), the surgery was completed uneventfully. The Remifentanyl infusion was stopped and the patient was admitted in the PACU without pain and hemodynamically stable. After 1 hour, she was transferred to the ward. The remaining postoperative course was uneventful and the patient was discharged after 3 days.
Discussion: Regional anaesthesia has very few cardiovascular side-effects compared with general anaesthesia. Pecs block is a safer alternative to neuroaxial and paravertebral blocks, especially in patients in use of anticoagulant drugs. Although it is well established as an analgesic technique, a few cases have been reported of Pecs block as primary anaesthesia technique for breast surgery. Considering the risks of general anaesthesia in a patient with poor cardiac function and in need of urgent surgery, we have considered Pecs block as primary anaesthesia. Avoiding general anaesthesia in our patient, allowed a fast discharge from hospital without the need of ICU admission.
References:
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Learning points: 1.Pecs block is a safe peripheral nerve block and is an effective analgesia technique for breast surgery. 2.Pecs block with sedation could be an alternative to general anesthesia for breast surgeries, especially in patients with high anesthetic risk.

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03AP10-10
VATS without GA: A Case-series

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Materials and Methods: We retrospectively reviewed medical records of patients who underwent VATS under regional anesthesia/nerve blocks with sedation in three private hospitals from April 2014 to mid- December 2018. VATS are conducted in these hospitals by the same anesthesia team and operated by a single surgeon. Sixty-six patients included in the case-series were either considered high-risk for general anesthesia or required minor to intermediate surgery. Two of these patients required intra-operative insertion of supraglottic airway while none required emergency endotracheal intubation or conversion to thoracotomy during the procedure.
Results and Discussion: Sixty-six patients underwent successful VATS under locoregional anesthesia with sedation at our set-up from April 2014 to mid-December 2018. The procedures included pleural biopsies, pleurodesis, empyema drainage, biopsies for mediastinal masses, lung tumors and apical infiltrates, all performed under video-assistance. There was no perioperative mortality or unanticipated ICU admission.
Conclusion: VATS under regional anesthesia and IV sedation, in our experience, has shown a lot of promise due to an overall reduced incidence of perioperative morbidity and mortality. With the understanding that the necessary equipment and staff should be available if the need for an unanticipated endotracheal intubation arises during a procedure, we would advocate opting for regional anesthesia for VATS whenever the opportunity presents, due to its enormous benefits over general anesthesia

Obstetric Anaesthesiology

04AP01-1
Re-audit on category 3 Caesarean section during out of hours: Did a challenging nuisance respond to new sense?

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Background and Goal of Study: Category 3 Caesarean section (C/S) during out of hours setting can be challenging and unsafe requiring careful planning, effective communication and appropriate decision making to avoid risks while managing labour ward simultaneously. NICE guidance supported by RCOG and RCoA recommends 4 categories of C/S, the timing of category 3 C/S can be controversial. Audit: An quality improvement audit was performed earlier in 2016 to analyse category 3 C/S over 30 months period from January 2014 to August 2016. Results revealed 11,235 deliveries during this period of which 3145 (28%) were C/S. 202 (6.4%) were delivered by category 3 C/S out of these 42 (20.7%) patients had category 3 C/S between 2100-0600 hrs and 5 (16%) patients had some maternal complications during their delivery required level 2 critical care management. Appropriate proactive planning, effective communication between the team, revise handover protocol and senior input were introduced to address this challenging and unsafe practice. Our goal in this re-audit is to look at any improvement in dealing with category 3 C/S during out of hours after implementation of above strategies.
Materials and Methods: Re-audit: An quality improvement re-audit designed and registered with audit department in our hospital. Maternity procedure record system was looked to record total number of category 3 C/S performed over 6 months period from April 2018 to September 2018. All category 3 C/S caese performed between 2100-0600 hours during this period were analysed for indications of their category, timing of C/S, maternal complications and neonatal outcomes.
Results and Discussion: Data revealed 2251 deliveries during this re-audit period. 643 (28.5%) parturients were delivered by C/S. Category 3 C/S were 31(4.8%) but only 1 (3.2%) parturient had category 3 C/S performed between 2100-0600. No maternal complications were recorded and neonatal outcomes were favourable in all cases. Although delivery by C/S has gone up by 0.5% but there were significant drop in total category 3 C/S by 1.6% and category 3 C/S performed between 2100-0600 by 17.5%.
Conclusion: Implementation of new strategies with timely senior input definitely overcome the challenging nuisance of category 3 C/S during out of hours.

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04AP01-2
Does Spinal Anaesthesia Affect Huff Strength in Parturients Under Elective Caesarean Section?

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Background and Goal of Study: Spinal anaesthesia in parturients under caesarean section is a method of choice, but some complain about shortness of breath after surgery. A study reported that 14% of these patients verified by chest computed tomography, having pulmonary atelectasis after the procedure. This might due to spinal block has effect on huff strength resulting in the difficulty of mucus expel from the lungs. As Mini Wright peak expiratory flow meter is a bedside device used to assess breathing exercise by its peak expiratory flow rate (PEFR). As a result, investigators would like to know how spinal block affect huff strength in parturients under elective caesarean section.
Materials and Methods: The PEFR was recorded in 161 healthy term pregnant women (38-42 weeks of gestational age) receiving elective schedule for caesarean section three times; preoperative, immediate after spinal block and before discharge from the recovery room. The measurement was performed in all parturients with 15 degree left lateral tilt position and the highest PEFR achieved in three successive attempts. The spinal anaesthesia with 0.5% hyperbaric bupivacaine (10.75 – 11 mg) and morphine (0.15 - 0.2 mg) was performed under the supervision of anaesthesiologists and standard anaesthesia monitoring.
Results and Discussion: The sensory blockage showed the height of T4 (T6-T3) with the surgical time of 51.5 ± 14.8 minutes. The PEFR appeared to decrease significantly after spinal block (285.53 ± 55.21 L/min to 238.70 ± 49.69 L/min, $p < 0.001$) and seemed to sustain till the time of discharge from the recovery room (235.40 ± 47.29 L/min, $p = 0.493$). This implied that though the patients fulfilled the discharge criteria, the level of sensory block was not yet improved. In addition, there were no any other factors influenced on the change of PFER in these parturients.
Conclusion: Spinal anaesthesia might affect huff strength in parturients under elective caesarean section as evidenced by the decrease of PEFR till the time of discharge from the recovery room.

04AP01-3
Hyperbaric bupivacaine 0,5% versus hyperbaric prilocaine 2% in scheduled caeserean section under spinal anesthesia: a randomised controlled clinical trial

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Background and Goal of Study: Scheduled cesarean (c-) section is routinely performed under spinal anesthesia using hyperbaric bupivaine (HB) combined with opioids. Despite rapid onset, good quality anesthesia, HB provides a long duration motor block (MB) and is related to maternal hypotension. Hyperbaric Prilocaine (HP) is an intermediate local anesthetic (LA) who has shown its efficiency in ambulatory surgery. Based on preliminary results, we aimed to investigate whether intrathecal HP may be an interesting alternative to HB. We hypothesized that HP offers a shorter MB, rapid rehabilitation and less side effects than HB.
Materials and Methods: After approval by the local Ethics Committee and signed informed consent, 40 ASA I/II parturients were enrolled in a prospective, double-blind, parallel design, multicenter, randomized clinical trial (NCT02973048;Eudra CT:2016-003010-26). They were randomly assigned to receive spinal anesthesia using HB 10mg or HP 50mg, with 2,5µg of sufentanil and 100µg of morphine. Epidural catheter was used as backup. The primary outcome was the time of MB regression (modified Bromage scale score 1 to 6). Secondary outcomes included: time to obtain successful T4 sensory block, duration of sensory block, onset of MB, maternal side effects (hypotension, bradycardia, nausea/vomit, rehabilitation, urinary retention), baby's parameters (Apgar, ombilical pH, methemoglobinemia), obstetrician/maternal/midwife satisfaction. Continuous data were compared by means of T-test or Wilcoxon signed rank test, means±standard deviation or medians [Q_{25}-Q_{75}] are reported. For count data, Pearson Chi^2 test was performed to compare proportions. P<0,05 was considered significant.
Results and Discussion: Demographics and surgical data were comparable between groups. MB was significantly shorter in HP comparing to HB group (130 [117.25–167] min vs 182.5 [143.75–250.25] min respectively; p=0,006). T4 sensory block was successfully obtained in all patients, after 11.25±2.69min in HP and 9.75±3.43min in HB group (p=0,1324). Duration of sensory block was 166.68±32.25min in HP and 212.3±50.19min in HB group. Maternal hypotension was more pronounced in HB group (90% vs 55%; p=0.0336). Side effects, babies' parameters and global satisfaction were not statistically different between groups.
Conclusion: Prilocaine provides efficient anesthesia for c-section and shorter motor block than bupivacaine. It may be an alternative anesthetic choice in this setting.

04AP01-5
Risk factors for maternal hypotension after spinal anaesthesia for elective Caesarean section: a retrospective study of 725 patients

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Background and Goal of Study: Hypotension after spinal anaesthesia for caesarean section can lead to maternal and fetal complications including neonatal acidosis, but only few studies have investigated the risk factors of hypotension in this setting. Since 2018, guidelines have proposed a consensual definition of hypotension that should lead to urgent corrective treatment. The aim of our study was to determine the risk factors of hypotension after spinal anaesthesia for caesarean section, according to this new definition.
Materials and Methods: Monocentric retrospective study. Caesarean sections performed exclusively under spinal anaesthesia between January 1st, 2011 and December 31st, 2016 were included. An automated co-infusion of ephedrine and phenylephrine was used for haemodynamic stability. Intraoperative anaesthetic data were extracted from a computerised data warehouse, and maternal, obstetrical, fetal and neonatal data were manually collected from the computerised medical file. The primary endpoint was the occurrence of arterial hypotension, defined as a systolic blood pressure (SBP) drop below 80% of the baseline measured before spinal anaesthesia. After bivariate analysis, values with $p < 0.2$ were included in multivariate analysis (logistic regression using modified Poisson's law).
Results and Discussion: 725 patients were analysed. Mean (SD) age and body mass index (BMI) were respectively 32 (5) years and 25.4 (6.0) kg/m2. The incidence of hypotension was 60.3%. BMI ≥ 40kg/m2 (RR = 1.3; 95%CI 1.07 - 1.50), baseline SBP (RR = 1.01 per unit; 95%CI 1.007 - 1.014), baseline heart rate (RR = 1.007 per unit; 95%CI 1.003 - 1.01), neonatal weight (RR = 1.13 per kg; 95%CI 1.04 - 1.20), multiple pregnancy (RR: 1.24; 95%CI 1.02 - 1.50), and chronic alcohol consumption (RR = 1.3; 95%CI 1.06 - 1.60) were associated with maternal hypotension in multivariate analysis. Increased baseline sympathetic tone, insufficient weight-adjusted vasopressor administration, compression of the vena cava, and toxic autonomic neuropathy could explain these results. Age, chronic hypertension, diabetes mellitus and induction-to-birth time were not associated with hypotension.
Conclusion: Our results are consistent with previous studies that have used other definitions of hypotension. Patients at high risk of hypotension should benefit from reinforced preventive measures. Further studies are needed to evaluate the impact of such targeted preventive strategy.

04AP01-6
Indications and outcomes of general anesthesia for cesarean section in a Lebanese university hospital: A retrospective study.

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Background and Goal of Study: For most anesthesiologists, the clinical experience with general anaesthesia (GA) for caesarean section is very low because it is unfrequent. GA is mostly performed for emergency grade 1 caesarean section and due to a lack of time to apply a neuraxial anesthesia technique [1,2]. In a retrospective study, we included all the Caesarean sections performed under GA in our institution aiming to improve the management of the mother and the newborn (NN) in these cases.
Materials and Methods: This is a retrospective observational study including 91 patients who underwent cesarean section under general anesthesia at the Hôtel Dieu de France University hospital in Beirut, between December 2011 and December 2016. We evaluated obstetrical and anesthesia indication, along with maternal and neonatal outcomes.
Results and Discussion: A 4% caesarean section was performed under general anesthesia for a total of 34 % caesarean section rate during the same period. The average age of the patients is 33 years, the average parity is 3.4 deliveries, and 68% of deliveries were premature. The most common indication for cesarean section in our series is invasive placental implantation (48% of cases), followed by repeat caesarean section (21% of cases). The most frequent indication of GA for CS is the use of hysterectomy for scheduled CS (70%) and failure of locoregional anesthesia (ALR) for urgent CS (34%). 11% of patients had a postoperative complication, hemorrhage being the most common. 3% of patients had a complication related to GA, namely intubation failure and hypothermia. Prematurity (27%) and neonatal respiratory distress (14%) are the most common complications in newborns.
Conclusion:Caesarean section under GA exposes the mother and the fetus to considerable morbidity and mortality, but this however could be related to the indication of the cesarean and to prematurity. Maintaining proper indications and the programming of this intervention should improve the fetomaternal outcome.
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04AP01-7
Choice of anaesthetic agents for caesarean section under general anesthesia: a French national survey of current practices

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Background and Goal of Study: Caesarean section (CS) under general anesthesia (GA) is a rare event (5,7% of CS in France (French National Perinatal survey 2016)). There is currently a debate around the choice of hypnotic agent for this indication: on one hand thiopenthal, the historical gold standard for rapid-sequence induction [1] but associated with administration errors in emergency situations [2] and on the other hand propofol, nowadays more familiar but not licensed during pregnancy. In this context, we conducted a survey of current French anesthesiologists' practices for induction of CS under GA.
Materials and Methods: An online survey was sent to 3930 anesthesiologists via two French anesthesiologists society: the French obstetrical anaesthesia association (CARO) and the French anaesthesia and intensive care society (SFAR). Data analysis was done with Excel (Microsoft). Data are presented in number (%).

Results and Discussion: 932 responses were recorded (response rate 23,7%). 482 (51,7%) had over 10 years of experience in obstetrical anesthesiology, 511 (54,8%) worked in level 3-2B maternity unit, and 185 (19,8%) spent more than 50 % of their time in obstetric anaesthesia. Responders declared that routine induction agent of choice for CS under GA was propofol for 427 (45,8%), thiopental for 211 (22,6%), and one or the other depending of the situation for 293 (31,4%). Propofol was favored because of a best knowledge of the drug (341 (79,9%)) and maternal safety (262 (61,4%)). thiopental was favored, because of the official guidelines (158 (74,9%)) and using the drug licensed for this indication (84 (39,9%)). 568 (60,9%) responders never use thiopental outside of obstetrical anesthesia.
Conclusion: French anesthesiologists' practices have already changed: the proportion of propofol users is greater than thiopental users for induction of CS under GA. In many other countries this change has been forced by thiopental shortage. This increasing global experience and available literature data, even though limited [3], are reassuring. Thus, it may be time to officially recognize this use.
References:
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04AP01-8
Category 1 caesarean section communication, time mandates efficiency.

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Background and Goal of Study: Decision to advance to category 1 lower segment caesarean section (Cat 1 LSCS) indicates an immediate threat to the life of the parturient or foetus and as such LSCS should be performed as expeditiously as possible. Effective communication is paramount to precipitate this process while maintaining a safe environment and application of appropriate anaesthetic techniques. The aim of this study is to identify aspects of Cat 1 LSCS communication which could be improved and contribute to patient care.
Materials and Methods: Prospective data collection was undertaken between 01/02/18 and 30/05/18 in The Coombe Women's and Infant's University Hospital (8166 live births, 2016). Data collection took the form of a proforma completed by the attending anaesthetist while in theatre at the time of the Cat 1 LSCS. Times were recorded pertaining to time of initial decision of decision to proceed with cat 1 LSCS, Time of anaesthetist bleeped, time of arrival of patient in theatre, time of knife to skin(KTS), time anaesthetist was certain of category of LSCS, mode of anaesthesia, foetal and maternal complications.
Results and Discussion: 29 Cat 1 LSCS were recorded. Mode of anaesthesia:9 spinal; 9 epidural bolus; 11 general anaesthetic. Mean time from decision to bleep was 1.3±0.4min (mean±SEM); mean time from bleep to arrival in theatre was 9.0±0.8min; mean time in theatre before KTS was 5.9±0.5min and mean decision to delivery time was 18.6±1.5min. Mean time from bleep to anaesthetic personnel awareness of Cat 1 LSCS was 3.4±0.8min. 76% had anaesthetic history was taken. Communication between obstetric and anaesthetic personnel occurred in 34% of cases. Anaesthetic staff attempts to reply to the bleep via phone were unsuccessful on 85% of occasions.
Conclusion: Current communication pathways are not fit for purpose. Succinct, timely communication could enable safer application of appropriate anaesthetic techniques by improved history taking and higher proportion of neuroaxial techniques, while also reducing anaesthetic ambiguity regarding category of LSCS. Paramount to the safety of the patient is the interdisciplinary flow of information. Implementation of official interdisciplinary communication strategies would inform the anaesthetic practitioner of the emergent nature and patient specific concerns. Review of data generated by a subsequently implemented communications system is currently being undertaken.

04AP01-9
Patients prefer spinal anesthesia without long lasting neuraxial narcotics over general anesthesia for repeat cesarean delivery despite increased post-delivery pain and pruritus

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Background and Goal of Study: Spinal anesthesia (SA) conveys significant benefit to the parturient undergoing cesarean delivery (CD), but is not used with the same frequency in Eastern European hospitals as those in Western Europe. We recently began a project to increase the use of SA for CD at the University Clinical Center of Republic of Srpska (UKCRS). We instituted a post-delivery quality improvement survey, developed in partnership with Kybele Worldwide to analyze patient satisfaction and common side effects after general (GA) or SA for CD during our project period.
Materials and Methods: Data collection were approved by the Ethical Commitee of UKC RS. Propofol, succinylcholine, with inhaled sevoflurane, IV fentanyl were administered for GA. SA used intrathecal 12 mg of 0.5% isobaric bupivacaine, 15 ug of fentanyl. Post CD pain relief used systemic ketoprofen and tramadol. De-identifed patient data were collected by a blinded UKC RS Quality Improvement team on the first postoperative day, July-September, 2017. Patient demographics, number previous CDs, anesthesia with previous CD, nausea score, vomiting (N/V), puritus, and verbal analog scale 0-10 score (VAS) of post CD pain and satisfaction were recorded. Students t, chi square, Mann Whitney U tests were used where appropriate.
Results and Discussion: The survey included data from 157 patients; 123 received GA (79%), 34, SA (21%) Age, height, weight, parity, and number of previous CDs did not vary between groups. Overall satisfaction scores (VAS; 9.6 - GA vs. 9.5 – SA; p = 0.87) incidence of nausea scores (0.68 SA vs, 0.46 GA p= 0.29), and vomiting (8.9 % SA vs. 5.8% GA, p = 0.43) were not different between groups. The patients' overall post CD VAS pain scores were higher in the SA group (5.5 vs. 4.2 in GA), P = 0.05) as well as the incidence of pruritus 50% SA vs. 3.3% GA P<0.001). Among patients who receive GA before, all stated that they would prefer SA for future CD.
Conclusion: Overall satisfaction scores for both group of the patients was very high. Overall incidence of common side effects was low. The patients in SA group had higher pain scores and more pruritus, thus emphasizing the need for adoption of long acting neuraxial opioids for post CD pain relief at our institution. Despite increased post CD pain and pruritus, parturients would prefer SA over GA for a subsequent CD.

04AP01-10
Association between blood pressure values and operation times of emergency caesarean sections

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Background and Goal of Study: Managing maternal blood pressure (BP) is an important task for anaesthesiologists to maintain placental blood flow while providing anaesthesia during a caesarean section . Recent studies suggest that adverse events during general surgery increase at night. Some authors argue that limited human resources and disturbance of normal circadian rhythms affect the performance of physicians. Therefore, we investigated the relationship between the lowest values of systolic, mean, and diastolic BP with the timing of emergency caesarean sections (specifically, whether they occurred during the day time or night time).
Materials and Methods: Following IRB approval and registration, we conducted a retrospective analysis using the anaesthesia information monitoring systems (AIMS). We included patients who underwent emergency caesarean sections at Yokohama City University Medical Center from 1 January 2013 to 30 August 2018 . In total, 359 caesareans were performed during the day time (8 a.m. to 5 p.m.), and 259 were performed during the night time (8 p.m. to 8 a.m.) We investigated the lowest value of systolic, mean, and diastolic BP, along with the Apgar score at 1 and 5 minutes (Ap1 and Ap5), during anaesthesia. We assessed the variables using Mann-Whitney U tests; P-values <0.05 were considered statistically significant.
Results and Discussion: A total of 618 patients were included in the analysis. There were no significant differences between groups in terms of physical characteristics and intraoperative blood loss. The lowest value of each BP measurement was significantly lower at night compared to during the day. The median (IQR) systolic BP at day time and at night time was 87 (77–99) mm Hg and 83 (75-94) mm Hg, respectively (p=0.0047). The median (IQR) mean BP at day time and at night time was 53 (44-63) mm Hg and 50 (44-59) mm Hg, respectively (p=0.0253). The median (IQR) diastolic BP at day time and night time was 35 (27-45) mm Hg and 32

(27-41), respectively(p=0.0456). Ap1 and Ap5 scores were also significantly lower at night time. The median (IQR) Ap1 during the day time and at night time was 8 (7-8) and 8 (5-8), respectively (p=0.0232). The median (IQR) Ap5 at day time and at night time was 9 (9-9) and 8 (7-8), respectively(p<0.01).
Conclusion: We found that maternal BP was lower in emergency caesarean sections performed during the night. Additionally, Apgar scores were also lower at night.

04AP02-1
Sublingual microcirculation in pregnant women with or without pregnancy-related cardiovascular risk factors during pregnancy and postpartum period

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Background : Microcirculatory changes in pregnancy has been described. [1] But the information of postpartum microcirculation changes is limited. This study is to compare pregnancy and postpartum microcirculation in women with/ without pregnancy-related cardiovascular(CV) risk factors like pre-eclampsia(PE), gestational hypertension(GH), and gestational diabetes(GDM).
Materials and Methods: From Jan. 2018 to Aug. 2018, two groups of pregnant women with/without pregnant CV risk factors scheduled for cesarean section were included. Sublingual microcirculation images were obtained using an incident dark-field video microscope (CytoCam, Braedius Medical, Huizen,the Netherlands) on the day before delivery and the third day after delivery. The resultant video clips were analyzed by the semi-automated analysis software package Automated Vascular Analysis(AVA)3.0. Microcirculatory parameters microvascular flow index(MFI), total vessel density(TVD), perfused vessel density(PVD), and proportion of perfused vessels(PPV) were investigated.
Results and Discussion: 7 women with pregnancy-related CV risk factors (1 PE, 2 GH, 4GDM) and 15 health pregnant women were enrolled. Their baseline characteristics (age, BMI and gestational age) were similar. **In CV-risk group, the postpartum MFI was significant higher 2.72±0.22 compared to antepartum phase 2.45±0.21 (*P*=0.034).(Table1) Compared between the health and CV risk group, postpartum MFI was also higher in CV-risk group significantly (2.38±0.2 vs. 2.72±0.22, *P*=0.0019) (Fig1.).** While there is no significant difference for the TVD, PVD and PPV between antepartum and postpartum in both group, or between the CV-risk pregnancy and health group.
Conclusion: We concluded that microcirculatory change after delivery might be more significant in woman with pregnancy-related CV risk factors.
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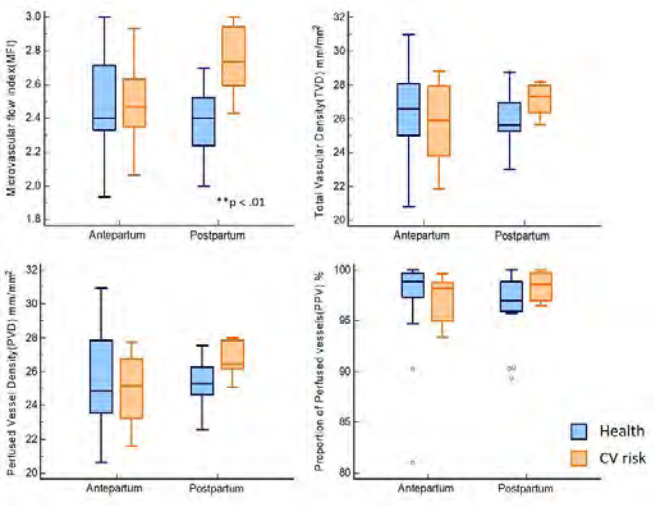
Table1. *Microcirculatory parameters in both groups during antepartum and postpartum period*

	Health (n=15)			Pregnancy related CV risk (n=7)		
	Antepartum	Postpartum	*p*	Antepartum	Postpartum	*p*
MFI	2.51±0.34	2.38±0.2	0.184	2.45±0.21	2.72±0.22	0.034*
TVD(mm/mm^2)	26.54±2.65	26.25±1.42	0.655	25.4±2.2	26.74±1.28	0.26
PVD(mm/mm^2)	25.65±2.88	25.51±1.47	0.834	24.8±1.99	26.26±1.46	0.224
PPV(%)	96.56±5.02	96.52±3.59	0.97	97.56±2.51	98.09±1.64	0.658

Date are presented as mean±SD.
*p<0.05



04AP02-2
Preeclampsia, even higher blood pressure than expected

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Background: Preeclampsia occurs in 3-5% of pregnancies and demands close monitoring of both mother and foetus. In cases where intravenous antihypertensive medication is needed it is imperative to have a valid measure of the arterial blood pressure (BP).
Case Report: We present the case of a 38y.o ASA II woman G3P2C0 pregnant with twins at week 35+1 and scheduled for an emergency caesarean section due to severe preeclampsia. In her medical history she had a gastric by-pass surgery, hypothyroidism and depression. She was diagnosed with preeclampsia at week 34+2 and home-managed with oral medication (labetalol 200mgx3 and nifedipine 10mgx1). 4 days later she returned to the emergency department with dyspnoea and a thorax tomography was done to exclude pulmonary thromboembolism; due to rising BP a caesarean section was performed the day after. She arrived to the operating room with a non-invasive blood pressure (NIBP) of 185/115mmHg, the patient received magnesium sulphate 4g bolus, hydralazine (four 5mg boluses) and invasive blood pressure (IBP) monitoring started through a 20G sensor in the right radial artery. The IBP showed a much higher BP compared to the NIBP (245/120 vs 175/105mmHg) and a sodium nitroprusside infusion started, with good results. The patient later received spinal anaesthesia with 12mg hyperbaric bupivacaine, 20mcg fentanyl and 100mcg morphine, the nitroprusside infusion was stopped and a phenylephrine infusion started a 0.4mcg/kg/min for BP management. The patient stayed at the anaesthesia recovery unit for 18h and discharged from the hospital at day 5.
Discussion: In the study by Wax[1] NIBP was generally higher than IBP during periods of hypotension and lower than IBP during periods of hypertension. Studies also show that different types of automated BP measurement systems underestimate the BP in women with preeclampsia[2]. Since most women with preeclampsia only have NIBP we should consider that we might be underestimating the severity of their preeclampsia and they could be in greater risk for complications.
References:
1. 1.Wax DB, LIN HM, Leibowitz AB. Anesthesiology 2011;115:973-8. 2.Penny JA et al. Lancet 1997;349:1518
Learning points: We must acknowledge that we might be underestimating the BP of preeclampsia patients. In case of severe preeclampsia, the early introduction of IBP gives us a better grip of the true BP and decreases morbidity and mortality in the group of patients.

04AP02-3
Microcirculation and preeclampsia: prognostic value of near-infrared spectroscopy (NIRS) during a brachial vascular occlusion test

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Background and Goal of Study: Preeclampsia is characterized by maternal endothelial dysfunction and capillary flow impairment, especially in severe forms. NIRS during a vascular occlusion test (VOT) is a non-invasive method for the analysis of microcirculatory oxygenation, endothelial function, and capillary perfusion. As preeclampsia evolution is often unpredictable, a relevant prognostic tool would be useful. The objective of this study was to assess at admission of preeclamptic patients: 1) the prognostic value of NIRS+VOT for predicting complications, 2) whether NIRS+VOT parameters correlate with their time of occurrence.
Materials and Methods: Monocentric observational prospective study. NIRS measurements were performed at thenar eminence with InSpectra® monitor (Hutchinson Technology®). VOT was performed in the ipsilateral arm inflating a cuff 40mmHg above systolic arterial pressure, then released when StO2 reached 40%. Baseline StO2, occlusion slope, reperfusion slope and ischemia area (see figure) were measured at admission and delivery (within 24 hours). Patients were excluded if one of the two measurements was missing. Two groups ("stable" (sPE) and "worsened" (wPE) preeclampsia) were created, according to French 2009 guidelines severity criteria. Student test and Pearson correlation coefficient were used for statistical analysis.
Results and Discussion: 52 patients were analyzed. Mean (SD) term at admission was 31.6 (3.6) weeks, 90% of patients received anti-hypertensive medication, and median inclusion-to-delivery time was 5 [0;17] days. sPE and wPE groups included 30, and 22 patients, respectively. Occlusion slope was the only parameter significantly different between the two groups (10.7 (2.7) vs 12.8 (3.4) %/min in sPE and wPE, respectively, p=0.002). The area under the ROC curve of occlusion slope at admission to predict worsening of the disease was 0.68 [0.52 – 0.83]. For

a cut-off value of 11.3 %/min, sensitivity, specificity, negative and positive predictive values were 68, 69, 74 and 63%, respectively. No significant correlation was found between occlusion slope value and admission-to-delivery time (r=0.11, p=0.46).
Conclusion: At admission of preeclamptic patients, occlusion slope was the only NIRS+VOT predictive parameter of disease worsening, but its prognostic value is limited. Furthermore, this technique does not seem to predict the time of worsening.

04AP02-4
Preeclampsia severity and early-onset impact on microcirculatory profile using near infrared spectroscopy on thenar eminence during a vascular occlusion test

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Background and Goal of Study: Preeclampsia (PE) is a human-specific disease with a high morbidity. Despite endothelial dysfunction seems to play a key role in its pathogenesis, literature is still scarce about microcirculation. Unlike other techniques, near-infrared spectroscopy (NIRS) during a vascular occlusion test (VOT) is a non-invasive, quantitative and reproducible method to assess microcirculation and endothelial function. As microcirculation could be particularly impaired in severe and early-onset PE, the objective of this study was to evaluate the impact of these situations on NIRS+VOT parameters.
Materials and Methods: We conducted an observational, prospective and monocentric study. InSpectra® monitor was used at admission to measure baseline tissue oxygen saturation (bStO2) at thenar eminence, reflecting global microcirculation. VOT was performed in the ipsilateral arm inflating a cuff 40mmHg above systolic arterial pressure, then released when StO2 reached 40%. During VOT, occlusion slope (OS), reperfusion slope (RS) and ischemia area (IA) were measured, respectively reflecting oxygen extraction and perfusion, adaptive vasodilation to ischemia and capillary recruitment (see figure). Severe (sPE) and non-severe (nsPE) PE were defined according to French 2016 guidelines. Early-onset PE (ePE) were defined by term < 34 weeks, and were analysed as a subgroup of sPE. Wilcoxon-Mann Whitney test was used for statistical analysis.
Results and Discussion: 77 patients were analyzed: 33 in sPE and 44 in nsPE group. In sPE group, patients received more anti-hypertensive drugs (91 vs. 55%, p=0.001) and PE onset was significantly earlier (32 vs. 34+5 weeks, p=0.007). No significant difference was observed between sPE and nsPE regarding NIRS measurements, but there was a trend among the sPE group for a higher OS (12.7 [9.8;14.3] vs. 10.6 [8.9;12.4] %/min, p=0.07) and for a lower IA (8.4 [3.6;12.4] vs. 11 [6.1;14] units*min, p=0.06). In ePE subgroup, we found a significantly higher bStO2 (88 [81.8;90.1] vs. 83.1 [81.7;84.8] %, p=0.007) and lower IA (6.2 [2.4;10.6] vs. 9.5 [8.8;14.3], p=0.04).
Conclusion: Our results suggest an impairment in microcirculatory flow and ischemic capillary recruitment in sPE. These abnormalities seem to be more significant when PE is early and severe at the same time. Post ischemic adaptive vasodilation seems to be preserved, regardless of the onset or severity.

04AP02-5
Anaesthetic management of a 27-week pregnant woman presented with possible HELLP syndrome, acute kidney injury and severe hypokalaemia: A case report.

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Background: A 45-year old woman in IVF twin pregnancy, partial HELLP, acute kidney injury (AKI) and hypokalaemia presented for emergency C-section.
Case Report: The patient was admitted with epigastric pain, limb oedema, vomiting and oliguria but without hypertension. Her medical history included gastric bandage 11 years ago. Ultrasound revealed that one fetus was dead and the other in distress. HELLP (PLT=204K/μL, AST=80U/L, ALT=78U/L, LDH=617U/L, UA=18.2mg/dL), AKI (Cr=2mg/dl, U=42mg/dl, spot urine protein=1013mg/L) and hypokalaemia (**K=1.7mEq/L**) were diagnosed. In the OR standard monitoring, IBP measurement and FloTrac were placed (baseline **CI=1.2 l/min/m2, SV=19ml**). Heart U/S did not reveal abnormalities. Goal-directed fluid therapy and potassium replacement was initiated. After 1.8l of crystalloids and 52mEq of K, CI was 2.1, SV=48, K=2.4. Despite rapid sequence induction and 8-hour nil by mouth, regurgitation was observed. Hypotension and bronchospasm occurred, treated with crystalloids, noradrenaline, FiO2=100%, deepening of anaesthesia and bronchodilators. After 4L of crystalloids and 91mEq of K, the patient remained anuric and K=2.3mEq/l. She was transferred to the ICU. Potassium, fluid replacement and HELLP treatment continued. The transtubular potassium gradient indicated gastroenteral loss probably due to excessive vomiting. Clinical course improved over the next 2 days and she was referred to a bariatric surgeon for possible band slippage.
Discussion: Incidence of HELLP is 0.5-0.9% and is related to maternal and fetal mortality and morbidity. Typical symptoms are epigastric pain, nausea, vomiting and oedema. Complete HELLP includes haemolysis, increased liver enzymes and thrombocytopenia. In our case emergency C-section was imperative due to a dead fetus, HELLP and AKI. Hypokalaemia suggested a co-existing pathology.
Although post bariatric surgery pregnancies are related to lower maternal morbidity, they can be complicated from the band. Our patient suffered from HELLP, AKI and gastric band migration. All the above augmented the risk of maternal and fetal mortality posing an anaesthetic challenge.
References:
1. Harreiter J et al.Management of Pregnant Women after Bariatric Surgery. J Obes. 2018 Jun 3;2018:4587064
2. Dusse LM et al.Revisiting HELLP syndrome. Clin Chim Acta. 2015 Dec 7;451:117-20
Learning points: Electrolyte disorders and hypovolaemia can occur in post bariatric surgery pregnancies. Follow-up at short intervals is recommended.

04AP02-7
Perioperative management of an eclamptic parturient with Reversible Cerebral Vasoconstriction Syndrome for urgent caesarean section.

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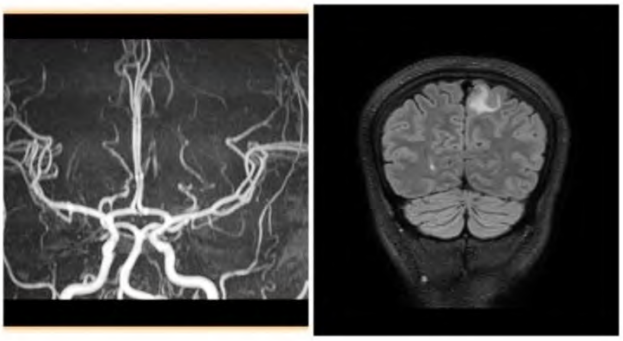
Background: Reversible Cerebral Vasoconstriction Syndrome (RCVS) is an important but often under recognized cause of cortical subarachnoid haemorrhage, characterised by reversible, segmental, multifocal vasoconstriction in cerebral arteries. Clinical symptoms include headache, nausea, vomiting and seizures.
Case Report: A 31 years old primigravida, at 36 weeks of gestation was transferred to our hospital after an episode of generalised tonic clonic seizures. She was a refugee with no previous medical history. She was confused with BP 190/110 mmHg and moderate proteinuria. Intravenous treatment with 20 mg hydralazine iv, followed by 10mg/hr, plus magnesium sulfate 4gr followed by 1 gr/hr iv maintained satisfactory control of BP.An urgent caesarean section was decided. A rapid sequence induction with thiopental 4mg/kg, remifentanyl 1μg/kg and suxamethonium 1,5mg/kg was followed. Anaesthesia maintained with O_2/N_2O (50/50) and endtidal 1% sevoflourane. Within 5 min of induction, a baby was delivered with Apgar scores 7 and 8 at 1 and 5 minutes, respectively. After the umbilical cord was clamped,0,5 mg fentanyl, 5 IU oxytocin, morphine 10mg and acetaminophen 1gr were administered intravenously. Patient was extubated and transferred to the HDU and neurologist consultation was sought. Physical examination was unremarkable. Brain MRI scan with a TOF angiography set the diagnosis(picture below). Patient was treated with calcium channel blocker (verapamile) and was discharged 7 days later uneventfully. Three months later another follow up MRI angiography was normal.
Discussion: Alterations in cerebral vascular tone occur spontaneously or may be associated with exposure to vasoactive substances like sympathomimetic and illicit drugs, uncontrolled hypertension and pregnancy. Typically RCVS has a self-limiting course but can be associated with posterior reversible encephalopathy syndrome (PRES) in the setting of eclampsia.
Learning points: 1.Main clinical manifestations of RCVS include thunderclap headache, nausea, photophobia, blurred vision. 2. MRA is required to differentiate from PRES. 3. Reversibility of cerebrovascular findings within 1-3 months is the rule for RCVS.



04AP02-8
C-Section on a Preeclamptic Woman with Kidney Transplant with Berger Syndrome and Protein S Deficiency. Case Report.

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Background: IgA nephropathy (IgAN), has still no universal consensus regarding its specific therapeutic management. It is one of the most common causes of renal hypertension. Recurrence is common after transplantation. The onset of hypertension, proteinuria and oedema during the third trimester is almost synonymous with pre-eclampsia (PE). It is a common disorder complicating approximately 4.6% of pregnancies.
Case Report: We present a case of a 35 y/o woman, 33 weeks' gestation, admitted to our hospital because of headache, tinnitus and deteriorated renal function over last 2 weeks. She had a kidney transplantation in 2014 (due to Berger's syndrome) receiving immunosuppression with tacrolimus, azathioprine and corticoids since then and a protein S deficiency treated with low molecular weight heparin. On admission she presented arterial hypertension, a drop in glomerular filtration and increasing proteinuria, accompanied with Creatinine was 1.3 mg/dl with proteinuria of 0.3 mg. In the following days she presented ascending creatinine levels and hypertension that could barely be controlled with labetalol, proteinuria and hyperuricemia. Mild preeclampsia was diagnosed. At 35+1 weeks' gestation pregnancy was interrupted. Spinal anesthesia was performed. C-section was performed without complications and the newborn weighted 2020 g with an apgar of 7/9. In the postpartum period creatinine levels decreased and blood pressure return to normal values. Both, mother and child were discharged four days later. After three weeks from discharge her renal function deteriorated. A renal biopsy showed a slight cellular rejection. Solumedrol treatment was initiated.
Discussion: Was it PE, a renal transplant rejection or IgAN recurrence? The degree of proteinuria increases substantially during pregnancy in nearly all types of underlying renal disease, mimicking an acute kidney rejection. The significant increase in blood pressure and proteinuria in third trimester may imitate PE, although IgaN patients are at particular risk of developing PE, on the other, hand deficiencies of protein C and free protein S are unlikely to be etiopathogenetic for PE. In conclusion our patient hadn't PE, it was a transplant rejection.
References:
Morton, A. Imitators of preeclampsia: A review. Pregnancy Hypertens. 6, 1–9 (2016).
Learning points: Preeclampsia imitators should be suspected in patients when previous renal illness is present

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04AP02-9
Successful anesthetic management for cesarean section in a pregnant woman with severe symptomatic aortic valve stenosis

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Background: Aortic valve stenosis (AS) is a rare condition in pregnant women that worsens with pregnancy. Since guidelines recommend that women with symptomatic severe AS who wish to become pregnant should have a valve intervention before conception, there are few reports of cesarean section of pregnant women with severe AS.[1) 2)] A case of a pregnant woman with severe symptomatic AS who underwent cesarean section is presented.
Case Report: A 29-year-old woman presented to us for delivery. She had undergone aortic valve replacement (AVR) for AS due to a congenital bicuspid aortic valve when she was 19 years old. However, she still had symptomatic AS and moderate aortic regurgitation when she became pregnant because of malfunction of the artificial valve. When she was 21 weeks' pregnant, she had class III heart failure (NYHA), so we suggested AVR before delivery, but she refused. Finally, the peak aortic velocity was 6.48 m/s and the mean pressure gradient was 107 mmHg when she was 26 weeks 1 day pregnant, so we decided to perform cesarean section at 27 weeks 2 days. General anesthesia rather than spinal and/or epidural anesthesia was chosen to ensure persistent afterload and maintain blood pressure. Induction was performed with fentanyl, midazolam, and rocuronium, using landiolol to decrease the heart rate. When the cesarean section was completed, transversus abdominal plane block and rectus sheath block were performed for postoperative analgesia to avoid increasing the heart rate. The patient was extubated in the operating room and transferred to the intensive care unit.
Discussion: Patients with severe AS are at high risk during pregnancy. The risk increases throughout pregnancy, given the continued hemodynamic changes, including increased intravascular volume, decreased afterload, and increased heart rate. In the present case, spinal and/or epidural anesthesia could have been relatively contraindicated. However, general anesthesia is a safe and effective procedure, allowing high intraoperative hemodynamic stability in a pregnant woman with severe symptomatic AS.
References:
1. Euro Heart J. 2018; 39: 3165-3241
2. J Am Coll Cardiol. 2014; 63: e57-185
Learning points: There have been few reports of pregnant women with such severe AS, as in the present case. For caesarean section of a pregnant woman with severe AS, we learned that general anesthesia with peripheral nerve block appears relatively safe.

04AP02-10
Pheochromocytoma and caesarean section: a real anaesthetic challenge

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Background: Pheochromocytoma (PCC) is a rare cause of hypertension during pregnancy. Morbidity and mortality are about 58% when undiagnosed(1). Fetal risks are mainly due to the vasoconstrictive effects of catecholamines(2). In the third trimester, the compression by the gravidic uterus tends to become symptomatic2, hence clinical management followed by caesarean section (CST) is the preferred approach for delivery(3).
Case Report: A 32yo female, G2P1, ASA III, was diagnosed with PCC at 28 weeks gestation. Preeclampsia routines were negative. Ultrasonography revealed a left sided adrenal mass later confirmed by MRI. Urinary vanillylmandelic acid was 23,2mg/24h. Clinical management with alpha followed by beta-blockade was started, with phenoxybenzamine and propranolol, respectively. An elective CST was scheduled at the 37th week of gestation. General anaesthesia was planned. Standard ASA monitorization was applied and an arterial line was placed. The first registered blood pressure was 174/109 mmHg. The patient was positioned with left uterine displacement and given IV Ranitidine as bronchopulmonary aspiration prophylaxis. A Remifentanil perfusion was started followed by a rapid sequence intubation. Sevoflurane was used for anaesthesia maintenance. Delivery used forceps, avoiding fundal pressure. After placental expulsion 10 UI Oxytocin were given. There was no need for vasoactive agents since there wasn't any major haemodynamic instability. For postoperative analgesia, Paracetamol, Ketorolac and Morphine were administered. The patient was admitted at the post anaesthetic care unit, clinically stable. Therapeutic alpha and beta blockade was maintained, and she underwent laparoscopic surgical adenoma resection two weeks later.
Discussion: The main goals in the management of PCC in pregnancy are early diagnosis, avoidance of a hypertensive crisis during delivery and definitive surgical treatment. CST is the preferred mode of delivery, followed by surgical resection, when the tumour is diagnosed at latter weeks of gestation.
References:
1. Obs Anaesth Crit Care. 2017;7(1):20–5
2. Ann Endocrinol (Paris). 2017;78(5):480–4
3. Obstet Med. 2010 Jun;3(2):83-5
Learning points: Antenatal diagnosis and imaging methods for tumour localization, early and adequate preoperative adrenergic blockade and multidisciplinary team planning are essential for successful treatment of PCC during pregnancy. Anaesthetic management is challenging and needs a good teamwork.

04AP03-1
Golden hour for fibrinogen transfusion to improve post-partum hemorrhage

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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 treatment 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 divided 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: Early administration of fibrinogen seems to reduce blood loss and transfusions after uterine atony in cesarean section delivery.

04AP03-2
Retrospective cohort study to investigate the utility of a hybrid operating room with invasive radiology for management of placenta accreta spectrum

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Background and Goal of Study: Prophylactic balloon occlusion may reduce hemorrhage and transfusion rates for women who have suspected placenta accreta spectrum (PAS) based on antenatal ultrasound scans/clinical suspicion. We report planned use of a hybrid operating room (hOR) with invasive radiology (IR) prior to cesarean delivery for women who desired uterine preservation despite suspected PAS.
Materials and Methods: This retrospective study was approved by the Tel Aviv Medical Center Review Board (0218-18-TLV). Outcomes of suspected PAS cases were identified from the electronic medical record, and maternal, obstetric and perioperative characteristics are reported using descriptive statistics.
Results and Discussion: Ten women with suspected PAS who desired uterine preservation were identified since availability of the hOR. Nine women underwent spinal anesthesia for the angiography balloon insertion followed by general anesthesia for cesarean delivery; one underwent both procedures under combined spinal epidural. Balloon occlusion was achieved in all women after delivery of the fetus and prior to placental manipulation. Characteristics are presented in the Table; all women had at least one ultrasound characteristic of PAS. Mean cohort estimated blood loss (EBL) was 750(354)mL. Three women (75%) with PAS, confirmed surgically or pathologically, avoided hysterectomy. A total of 10 packed red blood cell (PRBC) units were given among all 10 suspected PAS cases; 5 of these units were given to the woman who underwent hysterectomy. No units were administered to the other confirmed PAS cases. Complications from the IR included one thrombus requiring thrombectomy and two cases of self-limiting groin hematomas.
Conclusion:Selection of the patients in this cohort may account for biased low EBL and transfusion rates, however we demonstrate reliability of the IR technique, and in 3 cases of PAS, hysterectomy was avoided with minimal blood loss and without PRBC administration.

Table

	N= 10
Maternal age at surgery (years)ǂ	35.8(4.6)
Gestational age at surgery (weeks) ǂ	35.3(0.5)
Gravidity n ∫	3(2-5)
Parity n ∫	1(1-1)
Prior abortions n ∫	1(0-3)
Number of prior cesarean deliveries ∫	1(1-1)
Placenta previa n, %	8, 80%
Ultrasound details (n, %) Lacunar spaces Loss retroplacental space Myometrial invasion Increased vascularity Myometrial thickness/disruption	 6, 60% 3, 30% 5, 50% 1, 10% 2, 20%
Length of anesthesia (including IR and cesarean) mins	97.7(62.9)
Hysterectomy performed	4, 40%
Pathology confirmation of PAS diagnosis	4, 40%
Hemoglobin preoperative (g/dl) ǂ	11.7(0.8)
Hemoglobin postoperative (g/dl) ǂ	11.1(0.9)
Peak heart rate (perioperative) bpm ǂ	113.5(15.3)
Peak systolic blood pressure (perioperative) mmHg ǂ	161.7(16.4)

Key: n=number; bpm=beats per minute; ǂ mean(standard deviation); ∫ median(interquartile range); PAS=placenta accreta spectrum; IR=invasive radiology

04AP03-3
Mechanisms and influence of anaesthetic agents on contractions of the pregnant rat myometrium in vivo

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Background: In myometrium smooth muscle, it is reported that the muscle tone is regulated by changes in intracellular Ca^{2+} concentration [1], but the involvement of the myofilament Ca^{2+} sensitivity is unclear. The aim of this study was to investigate the mechanisms of anaesthetic agents on contractions of the pregnant myometrium.
Materials and Methods: Pregnant rats were anaesthetized and fetuses were removed. A balloon to measure myometrial contraction was inserted into the uterus. Myometrial contractions in response to dexmedetomidine (6, 30 mcg/kg/h) in the presence or absence of indomethacin were measured to clarify the influence of myofilament Ca^{2+} sensitivity through arachidonic acid pathway. To investigate the effect of propofol or sevoflurane on the myofilament Ca^{2+} sensitivity, protein phosphorylation of Myosin Phosphatase Targeting subunit 1 (MYPT1) was measured with Western blotting in the presence or absence of propofol (10^{-5} M) or sevoflurane (5%). The ratio of phosphorylated MYPT1 to total MYPT1 was used as an indicator of myofilament Ca^{2+} sensitivity. Statistical analysis was performed using the unpaired t-test or one–way ANOVA tests with Tukey's multiple comparisons test. P values < 0.05 were considered statistically significant.
Results: The enhancement of myometrial contraction force by dexmedetomidine was abolished by the administration of indomethacin (Figure 1).

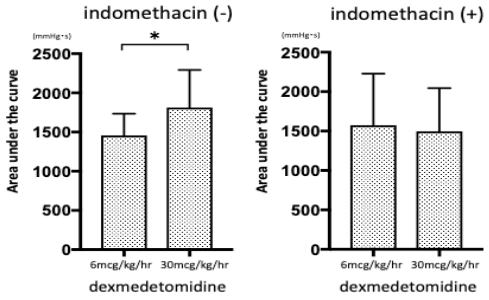

Figure 1. Effect of indomethacin on myometrial contraction enhanced by dexmedetomidine (n=6) (*p＜0.05).

Oxytocin significantly increased the ratio of phosphorylated MYPT1 to total MYPT1 (n=6, p < 0.05). sevoflurane, not propofol, attenuated oxytocin-induced MYPT1 phosphorylation (n=6, p < 0.05) (Figure 2).

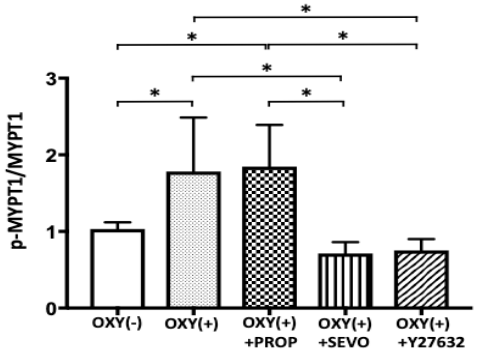

Figure 2. Western blot analysis (n=6).
p-MYPT1: phosphorylated Myosin Phosphatase Targeting subunit 1, OXY: oxytocin (20nM)
PROP: propofol (10^{-5}M), SEVO: sevoflurane (5%), Y27632: Rho-kinase inhibitor (10^{-6}M), * p＜0.05

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Conclusions: Sevoflurane may inhibit oxytocin-induced myometrial contraction through inhibition of myofilament Ca^{2+} sensitivity. Arachidonic acid may play an important role in the enhancement of myofilament Ca^{2+} sensitivity induced by dexmedetomidine.
References:
1. Can J Anaesth 2002; 49: 62.

04AP03-4
A retrospective study of anaesthesia management in parturients with placenta previa with or without placenta accreta

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Background and Goal of Study: Abnormal placental attachment such as placenta previa (PP) or placenta accreta (PA) can result in increased morbidity and mortality due to the risk of severe postpartum haemorrhage. Moreover, the incidence of PP and PA have been increasing which is probably as a result of higher frequency of cesarean delivery, increased maternal age, and assisted reproductive technology. The aim of this retrospective study is to review PP cases, determine prognostic factors and evaluate anaesthetic management strategy.
Materials and Methods: From 2016 to 2018, 46 women with PP were examined. Demographic data, risk factors, surgery and obstetric characteristics, anesthetic techniques, blood transfusions and outcomes were recorded.
Results and Discussion: The mean patient age was 35.4 years-old (± 3.8). 3 patients were diagnosed with PA while 43 patients had PP. Risk factors were present in 37 patients: 17% had undergone curettage previous: multiparity was seen in 11%, and in vitro fertilization (IVF) 11%. Regional anaesthesia was the preferred technique in patients with PP (91%), of which 63% received spinal anaesthesia, 24% epidural, and 4% combined spinal-epidural (CSE). 4 further patients received general anaesthesia. Treatment of patients with PP saw 65% undergo cesarean delivery while 35% delivered vaginally. Of the cases which had massive obstetric hemorrhage, 4 patients needed a Bakri balloon tamponade, 3 needed vascular embolization and 1 patient had to undergo a hysterectomy. A worse prognostic was seen in 13 % patients owing to factors such as multiple transfusions, administration of vasoactive drugs and admittance to the ICU. In our patients, a relationship between the use of general anesthesia and poor prognosis has been observed (p=0.005). This association can be explained due to general anesthesia being administered at some point during the surgery, and being necessary after regional anesthesia in most patients with hemodynamic instability. No risk factor for PP has been associated with poor prognosis.
Conclusions: From the data above, placental insertion abnormalities require anesthetic and obstetric coordination. We found that regional anesthesia was our method of preference for placenta previa and can be safe in patients who are lacking any abnormally invasive placentation.

04AP03-5
The impact of mode of foetal delivery on post-partum haemorrhage: a retrospective cohort study

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Background and Goal of Study: Post-partum haemorrhage (PPH) still remains the first cause of maternal mortality worldwide. Foetal delivery mode, seems to have an impact on mother's outcome, however, it is still under debate. Indeed, caesarean section (C-section) has been related to increased intraoperative bleeding and post-partum haemostatic hysterectomy, whereas, in some studies vaginal delivery has been related to increased post-partum morbidity and mortality. The aim of the study was to investigate whether the mode of delivery is associated to post-partum haemorrhage.
Material and Methods: We included 268 women presenting post-partum haemorrhage in a retrospective cohort study after institutional committee approval (Years 2008-2012). Patients were allocated to two groups, the vaginal delivery (Gr. 1) and caesarean delivery group (Gr. 2). PPH was defined as a blood loss volume of 500 mL in the vaginal - and of at least 1000 mL in the caesarean group or the need for 2 transfused red blood cells packs. Severe PPH (SPPH) was defined as a total blood loss of at least 1500 mL during the first 24H after delivery or the need for massive blood cells transfusion of 4 or more packs. The primary endpoint was to compare blood losses between both groups : data from lost blood measures, tranfused blood products such as red blood cells, fresh frozen plasma, fibrinogene or blood platelets was obtained. A secondary endpoint was to identify PPH known risk factors such as diabetes, pre-eclampsia, HELLP-syndrome, hypertension, uterine abnormalities, ethnicity, etc. Finally, we examined whether these factors were predicitve of PPH/SPPH. Calculated p-values < 0,05 are significant.
Results and Discussion: On a total of 268 patients admitted over the study period, 124 went through caesarean section (46,3% of all PPH) and 144 endured natural childbirth (53,7% of all PPH). Among the 178 patients suffering from SPPH 90 were in Gr. 1 and 88 in Gr. 2. There was no significant difference between both groups for blood losses, nor for the amount of red blood cells transfusions received. Uterine inertia (OR 7.9; IC95% 3.65-19.09), placenta retention (OR 2.32; IC95% 1.04-5.6), and placenta previa (OR 3.01; IC95% 1.21-8.55) are predictive variables for SPPH.
Conclusion: Our data suggest that the mode of foetal delivery is not related to post-partum haemorrhage. However, C-section increases the likelihood of severe post-partum haemorrhage. Placenta abnormalities are predictive for the occurrence of SPPH independently of the delivery mode.

04AP03-7
Uterotonics - PPH : What's the obstetricians' view?

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Background and Goal of Study: Oxytocin is routinely used during cesarean section for uterine contraction. Dosage, time and rate of administration vary, depending on the obstetrician. The aim of this study is to assess obstetricians' knowledge concerning the more common uterotonics such as oxytocin, ergonovine and carbetocin. On the other hand to investigate decision making process and prioritization when managing postpartum hemorrhage (PPH).
Materials and Methods: 44 obstetricians, both trainees and specialists, were asked to complete anonymously a questionnaire on the properties, dosing, timing, route of administration and side effects of commonly used uterotonics. When considering side effects beside correct choices, wrong ones were offered purposely, reflecting common confusion between clinicians. They were also asked to prioritize their drug interventions when managing PPH. After anonymous data collection, statistical analysis and graphical representation was performed using Mat lab toolkits.
Results and Discussion: Almost half of the responders had less than 5 years of clinical experience, which means that they lack either knowledge or experience. The majority of responders tend to overdose prophylactic oxytocin during ceasarean section (5 IU bolus), while only 9% know the correct timing of administration. Although they are aware of its pharmacokinetics, they underestimate its side effects considering even hypertension as one of them. Concerning ergonovine, they are aware of common side effects, but a surprisingly high percentage considers tetanic contractions as well. As for carbetocin, confusion exists mainly over its hypotensive effect. 45% believes that carbetocin infusion causes hypertension. PPH management prioritization revealed important knowledge gaps. While uterotonics are correctly their first choice, FFP is still considered as the first and second choice. Tranexamic acid is regarded as second choice only by a 16% of responders, despite their tendency to administer fibrinogen in a higher proportion.
Conclusion: The need of further education and training on the pharmacologic properties of commonly used uterotonics and published PPH management algorithms is prevailing, among the younger obstetricians mainly. Literature update and close co-operation with the anesthetic team may lead to better management and correct decision making for safer maternal outcome.
References:
WOMAN trial, Bhattacharya S et al,2013

04AP03-8
The monitoring of respiratory depression with remifentanil in foetoscopic laser photocoagulation; Using continuous respiratory monitoring system

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Background: Foetoscopic Laser Photocoagulation (FLP) is a surgical procedure for twin-to-twin transfusion syndrome (TTTS). Remifentanil (REMI) is used for foetal anaesthesia during the procedure, although it occur maternal respiratory depression[1]. CapnostreamTM 20P (Medtronic, Minneapolis, MN, USA) can measure accurate end-tidal (ET) CO2 using sidestream sampling system for continuous respiratory monitoring. We present two cases where paturients with TTTS were managed with REMI and monitored by the above respiratory system in FLP.
Case Report: Case-1: A 36-yr-old, G3P0 woman (BMI 33.1) at 24 weeks gestation was diagnosed as TTTS and underwent FLP. She received combined spinal-epidural anaesthesia with bupivacaine 7.5mg intrathecally and catheter was placed. After confirming maternal and foetal condition, 0.1μg/kg/min of REMI was administered for foetal anaesthesia. Oxygen was supplied by nasal cannula. In the baseline, respiratory rate (RR) was 20/min, and ETCO2 was 30mmHg. ETCO2 increased at 10min after infusion, and the maximum was 37mmHg. RR decreased gradually, and RR<10/min occurred several times. Foetal heart rate (FHR) was normal range during procedure and she immediately recovered after procedure. Case-2: A 28-yr-old, G3P0 woman (BMI 22.4) at 17 weeks was underwent FLP. She received the same anaesthetic management as above. REMI was administered at 0.1μg/kg/min. The baseline of ETCO2 and RR were 25mmHg and 20/min. ETCO2 increased at 15min after infusion and the maximum was 30mmHg. RR gradually decreased at the same time as ETCO2, and the minimum was 6/min at 40min after infusion.She recovered immediately.
Discussion: In these 2 cases, increase of ETCO2 and decrease of RR began at 10 to 15min after infusion although the maximum ETCO2 and minimum RR were different. It was caused by patient's character, pregnant weeks and changes of blood volume and stroke volume which affect REMI concentrations. In pregnant human, pharmacokinetics and pharmacodynamics (PK/PD) of REMI is not well-known. Continuous ETCO2 and RR monitoring might help to detect maternal respiratory depression and presume PD/PD of REMI. Further investigations about PK/PD of REMI and the effect on maternal and foetal condition is necessary.
References:
1.Van de Velde M,et al. Anesth Analg 2005,101:251-258.
Learning points: Continuous ETCO2 and RR monitoring were useful to detect maternal respiratory depression in the procedure using REMI.

04AP03-9
Use of Tranexamic Acid (TXA) in the prevention of Postpartum Haemorrhage (PPH) in triplet pregnancy: case report

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Background: Multiple gestation, due to the uterine distension caused, is a risk factor for PPH, the main cause of maternal morbidity and mortality. The increase in fibrinolytic activity in the immediate postpartum period, associated with the existence of risk factors for PPH, has resulted in an interest in the use of TXA in its prevention and treatment (1).
Case Report: 37 years pregnant, past medical history irrelevant, Gesta 3 Para 2, proposed for elective caesarean section at 32 weeks. A subarachnoid block was performed by sequential technique in L3-L4. Administered 10 mg of levobupivacaine and 0.002 mg of sufentanil. An epidural catheter was inserted for postoperative analgesia. 1g of TXA (10 mg/kg) was administered for 30 minutes, starting 5 minutes before the surgical incision. The first birth occurred 10 minutes after initiation of TXA administration. After the third birth, 40 units of oxytocin diluted in 1000 ml of saline were started. The caesarean section occurred without anesthetic or surgical complications. Blood losses were 600 ml intraoperatively, and insignificant in the postoperative period.
Discussion: It is essential to identify pregnant women at increased risk of PPH in order to prevent its occurrence. TXA is a fibrinolysis inhibitor, used to control severe PPH at a dose of 10 mg/kg perfused over 10 minutes. Administered intravenously, its peak concentration is reached immediately, with a half-life of 2 hours. Several studies report the efficacy of TXA in reducing blood loss and the use of blood components, without a significant increase in thromboembolic events (1). However, in the present there are no effective dosage nor timing guidelines, so the discussion of clinical cases may be helpful in guiding future events. In this case, the amount of blood loss was similar to the estimated loss in elective cesareans without risk factors for PPH, and free of adverse effects related to the administration of TXA. However, further studies are required to develop guidelines for the use of TXA in preventing PPH.
References:
1. Novikova N, et al. Tranexamic acid for preventing postpartum haemorrhage. Cochrane 2015.
Learning points: Identification of risk factors for PPH and their prevention are fundamental. Available evidence suggests that TXA may be a safe and effective alternative in elective caesarean section with a high risk of PPH in order to prevent bleeding in the intra and immediate postoperative periods associated with other uterotonic drugs.

04AP03-10
Takayasu arteritis for caesarean section: anaesthetic management of the pulseless disease

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Background: Takayasu's arteritis (TA) is an endarteritis involving the aorta and its main branches, with a varying degree of narrowing, occlusion, or dilatation, thus resulting in perfusion abnormalities and multiorgan dysfunction (1). Anaesthesia for caesarean section (CST) in these patients can be complicated by severe uncontrolled hypertension, stenosis of major blood vessels, and difficulties in monitoring arterial blood pressure (BP) (2). We present a case of a CST in a parturient with TA with multiorgan involvement.
Case Report: Female, 21yo, ASAIII, 37w+2d of gestation, G2P1 (previous eutocic labour), diagnosed with TA since 2015, proposed for a CST. History of ischemic stroke with right sided neurologic deficits and ascending aorta-posterior cerebral artery bypass; mild cardiac, renal, and retinal involvement, and currently on acetylsalicylic acid and corticosteroids. Pre-anaesthetic evaluation revealed a Mallampati IV. Blood tests were normal. A preoperative echocardiogram showed no significant cardiac dysfunction. In the operating room, monitoring was according to ASA guidelines. Two units of erythrocytes were available. Left tilt was maintained. Invasive blood pressure monitoring was attempted on both upper limbs with no success, due to inability to palpate pulse. Intravenous access was secured with two large bore cannulas. A combined spinal-epidural with ropivacaine and sufentanil in the sitting position was performed, with a coload bolus of 500mL of crystalloid. Hypotension was managed with ephedrine 10 mg, followed by a noraepinephrine perfusion. Non-invasive BP was very difficult to access. Clinical ,monitoring was kept with continuous neurological assessment. The remaining procedure was uneventful. Blood loss was estimated in 500 mL.
Discussion: In TA patients the main anaesthetic concern is BP management. This patient already showed risk factors for cerebral hypoperfusion. Due to the disease physiopathology, monitoring can also represent a great challenge. Spinal block with low doses of local anaesthetic and opioid ensures reliability and fast onset of anaesthesia, with less impact on hemodynamics, and allows for a continuous neurological assessment.
Learning points: BP control is the main concern in the anaesthetic management of these patients; Neuraxial anaesthesia is the best strategy as it allows cerebral function to be easily assessed.
References:
1. Anesth Essays Res. 2011 Jan-Jun; 5(1):98–101
2. J Obstet Anaesth Crit Care 2015;5:90-2

04AP04-1
Dripping tuohy needle after combined spinal epidural anaesthesia for caesarean section.Is it of the same importance as dural puncture? A 4 year retrospective analysis in a national tertiary hospital

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Background and Goal of Study: Accidental dural puncture with the Tuohy needle (ADPwT) is a common and important complication during combined spinal-epidural anaesthesia (CSEA) in obstetric population. This may occur either during the identification of the epidural space with the Tuohy needle, after the withdrawal of the intrathecal needle and even during the catheter insertion. Sometimes only a few drops appear at the edge of the Tuohy needle after the withdrawal of the intrathecal pencil point needle. The goal of this study was to investigate the clinical effect of this case.
Materials and Methods: Between March 2014 and September 2018, 8018 caesarean sections with CSEA were performed in our hospital. Overall 68 ADPwT were reported.In 51 cases there was an obvious ADPwT (groupA) while in 17 parturients only a few drops of fluid appeared at the edge of the Tuohy needle after the withdrawal of the intrathecal pencil point needle (group B). An evaluation of the clinical outcome was performed between these two groups using the chi-square test.
Results and Discussion: No differences in age, weight, height, weeks of gestation, depth of the epidural space or the urgency of the caesarean section were identified. The overall rate of ADPwT was 0,84%. Eighteen patients in group A (35%) experienced postural puncture headache (PDPH). Of those eight classified their PDPH as severe, ten as mild, while thirty three reported no symptoms. Six of the patients with severe symptoms consented to active treatment with epidural blood patch with no further complications. All seventeen patients in group B reported uncomplicated recovery (PDPH rate 0%), p<0,0001, relative risk is 0,6471 (95%CI 0,5283-0,7925). Probably the dural puncture was not severe enough to produce clinical complications, but one may say that a weakness of our study is the absence of fluid biochemical tests where the ADPwT is not obvious, to confirm that the dripping liquid is celebrospinal.
Conclusion: A statistical significant difference is observed in clinical outcomes between obvious and not so obvious ADPwT in our hospital. More research is needed to confirm our findings. If ADPwT after the pencil point needle withdrawal or during the catheter threading, has no clinical complications, then information given to the parturient should be updated.

04AP04-2
Postdural puncture headache after labor epidural analgesia: lessons learned from proactive surveillance

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Background and Goal of Study: Postdural puncture headache (PDPH) is common after labor epidural analgesia (LEA); usually after identified accidental dural puncture (ADP), often requiring epidural blood patch (EBP). We report lessons learned from proactive surveillance to identify PDPH cases in our busy labor ward.
Materials and Methods: Retrospective IRB approved study (0605-18-TLV). For 2017 we identified ADP, PDPH and/or EBP through codes in the electronic medical records (EMR). For 2018 we implemented prospective surveillance for ADP, PDPH and EBP. In addition to EMR search, we interviewed anesthesiologists reporting ADP, and followed up reports of ADP, PDPH and EBP. We also read EMR free text for all cases. We report number of cases with codes for ADP, PDPH, EBP. If a woman had for example ADP plus PDPH she was counted as one case. We present descriptive statistics and relative risks (RR) were calculated for ADP, PDPH, EBP reported in 2018 compared to 2017.
Results: In 2017 and 2018(Apr-Oct) there were 5569 and 5606 labors; LEA rate 63.1 and 65.4% respectively. We identified 11 ADP/PDPH/EBP cases in 2017, 10

through EBP code and 1 through PDPH code (no EBP done); none had ADP code (5 had free text report); 7 had PDPH symptoms reported in free text. We identified 48 ADP/PDPH/EBP cases in 2018 through surveillance. No additional cases were identified through EMR codes. 33 women had ADP code; 33 had PDPH free text report and 26 had EBP code, Table 1. In 2018 there was a 6.5X rise in the incidence of identified ADP/PDPH/EBP compared to 2017; 9X increased RR for ADP code, 8X increased RR for report of PDPH symptoms and 3.5X increased RR for EBP performed.
Conclusion: Proactive surveillance identified more ADP/PDPH/EBP cases in 2018 than were identified in 2017. Since no practice changes were made, besides proactive surveillance, the incidence should not have changed. The free text in the EMR is unsearchable, so EMR codes should be used. Importantly, 15 cases had PDPH symptoms without recognized ADP, highlighting the importance of surveillance after LEA. We plan to continue surveillance and to expand to include postdischarge telephone consults.

Table

	N= 10
Maternal age at surgery (years)ł	35.8(4.6)
Gestational age at surgery (weeks) ł	35.3(0.5)
Gravidity n ∫	3(2-5)
Parity n ∫	1(1-1)
Prior abortions n ∫	1(0-3)
Number of prior cesarean deliveries ∫	1(1-1)
Placenta previa n, %	8, 80%
Ultrasound details (n, %) Lacunar spaces Loss retroplacental space Myometrial invasion Increased vascularity Myometrial thickness/disruption	 6, 60% 3, 30% 5, 50% 1, 10% 2, 20%
Length of anesthesia (including IR and cesarean) mins	97.7(62.9)
Hysterectomy performed	4, 40%
Pathology confirmation of PAS diagnosis	4, 40%
Hemoglobin preoperative (g/dl) ł	11.7(0.8)
Hemoglobin postoperative (g/dl) ł	11.1(0.9)
Peak heart rate (perioperative) bpm ł	113.5(15.3)
Peak systolic blood pressure (perioperative) mmHg ł	161.7(16.4)

Key: n=number; bpm=beats per minute; ł mean(standard deviation); ∫ median(interquartile range); PAS=placenta accreta spectrum; IR=invasive radiology

04AP04-3
Sphenopalatine Ganglion Block with or without Greater Occipital Nerve Block and Trigger Point Infiltration Significantly Improves Pain Scores in Obstetric Patients with Post-Dural Puncture Headache

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Background and Goal of Study: Post-dural puncture headache (PDPH) is a common complication following neuraxial techniques. The gold standard for the treatment of PDPH is the epidural blood patch (EBP). EBP has a high success rate but is an invasive technique with a not insignificant rate of complications. Recently, there has been increased interest in less invasive regional techniques for the treatment of PDPH, namely with sphenopalatine ganglion block (SPGB), greater occipital nerve block (GONB) and trigger point infiltration (TPI). The aim of the study was to evaluate the analgesic efficacy of SPGB, with or without GONB and TPI, in the treatment of PDPH in obstetric patients.
Materials and Methods: After local ethics committee approval, a retrospective study was conducted including all patients with PDPH treated with SPGB with or without GONB/TPI at our institution between April 2016 and December 2017. Data was retrieved from electronic clinical records and included: demographic data, American Society of Anesthesiologists physical status, anaesthetic technique and numeric pain score (NPS) before and after treatment. Exclusion criteria included losses in follow-up and inadequate documentation of medical records. SPSS Statistics (v22.0 IBM®) was used for data analysis. A Wilcoxon signed-rank test was used to evaluate the efficacy of SPGB/GONB/TPI in reducing pain scores.
Results and Discussion: During the study duration, 42 cases of PDPH were managed with SPGB with or without GONB/TPI as first-line treatment. Of these, 27 patients received 1 course of SPGB/GONB/TPI and 15 received 2 courses. We observed a significant improvement in the NPS after the first course of blocks (Z = -4,875; p < 0.001), as well as after the second course of blocks (Z = -2.389; p = 0.017). In addition, a >50% improvement in pain scores was observed in 85.7% of patients after the first course of blocks and, but only in 69.2% of patients after the second course of blocks. Some (9) of these patients would go on to require EBP for satisfactory treatment due to symptom recurrence, but none following spinal anaesthesia.
Conclusions: This data shows that SPGB, GONB and TPI are effective non-invasive techniques for relieving the pain component of PDPH in obstetric patients, avoiding the need for EBP in many cases, including all cases of PDPH following spinal anaesthesia. Further evidence from controlled trials is needed to minimise confounders in retrospective analyses such as this.

04AP04-4
The Addition of Greater Occipital Nerve Block and Trigger Point Infiltration to Sphenopalatine Ganglion Block for Treatment of Obstetric Patients with Post-Dural Puncture Headache Improves Pain Relief and Reduces Discharge Delay compared to Sphenopalatine Ganglion Block Alone

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Background and Goal of Study: Post-dural puncture headache (PDPH) is a common complication following neuraxial techniques. The gold standard for the treatment of PDPH is the epidural blood patch (EBP). Sphenopalatine ganglion block (SPGB) is currently being used as a noninvasive treatment modality. Also under investigation, to a lesser extent, are greater occipital nerve block (GONB) and trigger point infiltration (TPI). We believe that is worth considering adding GONB/TPI to SPGB in the treatment of PDPH when patients present with symptoms located in the occipital or cervical regions, as these areas are not covered by a SPGB. The aim of the study was to evaluate whether GONB/TPI adds value to the treatment of PDPH in obstetric patients, namely on pain relief and PDPH-related discharge delay.
Materials and Methods: PDPH treatment protocols at our institution are under review. In 2016 the management protocol for PDPH included conservative treatment, SPGB and EBP. In 2017 GONB/TPI was added for patients with occipital or cervical symptoms. To evaluate whether adding GONB/TPI to the treatment protocol was beneficial, we compared the 2 years studied. After local ethics committee approval, a retrospective study was conducted on patients with PDPH between April 2016 and December 2017. Data was retrieved from electronic records: demographic data, American Society of Anesthesiologists physical status, anaesthetic technique, numeric pain scale before and after treatment, complications, duration of hospital stay, delay after obstetric discharge. Exclusion criteria included losses in follow-up and inadequate documentation of medical records. SPSS Statistics (v22.0 IBM®) was used for data analysis.
Results and Discussion: In total, 50 patients were treated for PDPH. We found a statistically significant difference in the number of patients experiencing >50% improvement in pain score after the first intervention, favouring the use of GONB/TPI (p = 0.032). We found no difference in the need for EBP. We observed a significant difference (p = 0.003) in the PDPH-related discharge delay, favouring the use of the treatment protocol including GONB/TPI.
Conclusions: Our results indicate that the addition of GONB/TPI to PDPH management improves the overall success of treatment, probably due to better pain relief in occipital and cervical regions. Further evidence from trials focusing specifically on GONB/TPI is required to provide a more accurate assessment of this technique.

04AP04-5
Postdural Puncture Headache Resistant to Treatment with Blood Patch may be a Symptom of Subdural Hematoma

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Background: Accidental dural punction with Tuohy needle during epidural catheter insertion causes PDPH in more than 80%. If it is resistant to conservative therapy after 24 to 48h „blood patch“ is indicated and it is successful in 85%(1).
Case Report: We show the case of a 38 year old parturient woman who gave birth to a healthy female child in epidural analgesia. Epidural catheter placement was traumatic and the accidental dural puncture was suspect. 8 h after delivery she experienced orthostatic headache.. It was released by NSAID and rest in bed until the next morning, and then it came back. As standard conservative therapy failed, 40 h after delivery blood patch was performed releasing headache antil nex morning when she weaked up with mild headache and, for short period, she had blurred vision (lat. Diplopio) Neurologist set the indication for MR scan of the brain although the neurological status was normal. On MR scan lamelar subdural haematoma was find. Neurosurgeon suggested conservative therapy and MR control after 4 weeks. Headache lasted for nex two days with no other neurological symptoms and she was discharged from the hospital 9th day after delivery. On MR control after 4 weeks subdural haematoma was dissolved.
References:
1. Choi JS, Chang SJ. A Comparison of the Incidence of Post-Dural Puncture Headache and Backache After Spinal Anesthesia: A Pragmatic Randomized Controlled Trial. Worldviews Evid Based Nurs. 2018 Feb;15(1):45-53.
Learning points: Our case shows that even discrete neurologic alterations of short duration after failed „blood patch“ in case of PDPH could be signe of serious underlying condition such as subdural haematoma. It is possible that this complication sometimes remains undiagnosed.

04AP04-6
Persistent headache in a parturient: postdural puncture headache or something more sinister?

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Background: One of the uncommon complications reported after unintentional dural puncture is cerebral venous sinus thrombosis (CVST). We report a case of CVST after no obvious dural puncture in a postcesarean section patient
Case Report: A 32-year old primigravida underwent cesarean section (CS) under a combined spinal-epidural (CSE). She had a medical history of panic attacks and depression. On the second postpartum day, the parturient developed orthostatic headache. Although there was no evidence of dural puncture during the CSE technique, due to the orthostatic nature of the headache, it was considered as postdural puncture headache and treated accordingly. Symptoms subsided and the parturient was discharged on the fifth post CS day in good condition with instructions to seek immediate consultation in case of recurrence of symptoms. Three days later, her next of kin informed the attending anaesthetist that the parturient was feeling unwell and that her headache had returned, having lost its orthostatic component. The parturient however refused to return to hospital for reassessment. Over the next few days, her next of kin assured the anaesthetist, who insisted on readmittance, that the headache improved but that the parturient started behaving strangely and refusing interaction with the newborn. A psychiatrist was consulted by the family that diagnosed anxiety disorder based on the parturient's previous medical history and suggested anti-anxiety medication. On the seventh postpartum day, the parturient was urgently readmitted to hospital, unable to speak and looking catatonic. Major postpartum depression was diagnosed by the attending psychiatrist and antidepressive medication was initiated. However, on the first readmission night, the parturient developed tonic-clonic seizures and an urgent brain CT-scan revealed multiple left-sided infarcts with haemorrhagic foci. CVST was diagnosed, low-molecular weight heparin was started and the parturient's situation improved dramatically
Discussion: CVST is attributed to cerebral venous dilation and intracranial hypotension in the setting of postpartum hypercoagulability and can have a deleterious outcome if unsuspected and untreated
Learning points: This case of misdiagnosis emphasizes the need for urgent neurological consultation in the puerperium in case of new or recurrent neurological symptoms. CVST should be considered in the differential diagnosis, especially in case of atypical clinical presentation

04AP04-7
An ineffective epidural blood patch: finding of a plica mediana dorsalis.

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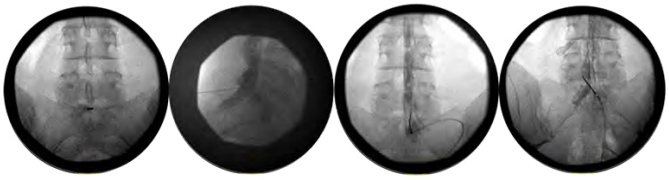
Background: The epidural blood patch (EBP) is indicated as the treatment of postdural puncture headache (PDPH). There are many causes that can justify the ineffectivity of an EBP: injection of insufficient blood volume, coagulopathy, anesthesiologist's lack of expertise, anatomic variants of the epidural space. We report a hitherto undescribed cause of an EBP's ineffectivity: the plica mediana dorsalis.
Case report: A 36 year-old post-partum patient was diagnosed with PDPH one day after an accidental dural puncture (ADP). Pharmacological treatment was prescribed but there was no headache improvement and bilateral tinnitus appeared. An EBP was performed 24 hours later. Shortly after its performance, tinnitus disappeared but headache did not improve. Given the partial inefficacy of the EBP, a magnetic resonance imaging scan was performed, which ruled out any intracranial pathology. Finally, 4 days after the ADP a second EBP was performed, this time, under fluoroscopic guidance. The radiological sequence is displayed in image 1. The finding of a unilateral epidurogram after a medial approach is indicative of the presence of a plica mediana dorsalis (PMD) (image 1B and 1C). After the performance of the EBP under fluoroscopic guidance, the patient referred mild headache in the upright position. She was followed-up in our pain clinic and reported a complete resolution of the PDPH.
Discussion: The PMD is a band of connective tissue situated at the dorsal midline of the epidural space. It connects the dura mater and the ligamentum flavum,dividing the epidural space. The presence of a PMD has anesthetic implications: it increases the probability of an ADP (the epidural space narrows in the midline, the dural sac is less mobile and the loss of resistance sensation is worse) and it acts as a longitudinal barrier that can prevent the diffusion of local anesthetics or blood (causing unilateral analgesia or an ineffective EBP).
Learning points: Anatomical variants of the epidural space can be a cause of unilateral analgesia and also a cause of an ineffective EBP. EBP performance under fluoroscopic guidance should be considered for a safe identification of the epidural space.

Image 1: Fluoroscopic images during the EBP performance



A) AP view. Localization of the L5-S1 interlaminar space

B) Lateral view after the medial approach of the L5-S1 epidural space. Correct longitudinal diffusion of the contrast.

C) AP view after the medial approach of the L5-S1 epidural space. There is no contrast difusion to the left

D) AP view after left paramedian approach of the L5-S1 epidural space. Correct diffusion of the contrast.

04AP04-8
Migration of epidural catheter to subaracnoid space after combined spinal block in a pregnant woman with fever – leave or not to leave?

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Background: Combined Spinal-epidural (CSE) technique is widely used for labour analgesia or for Caesarean Section (CSA). Fever during labour or early postpartum is relatively common, and this may influence the decision whether or not to leave the epidural catheter for analgesia after the CSA.
Case report: We report a case of a 39 years old woman, with a 40 weeks pregnancy, first gestation, without pathology (ASA IIG). During labour, at 3cm of cervix dilation, she requested epidural analgesia. The technique, CSE, was performed without intercurrences. Epidural Space was at 5cm from skin, and we left 4,5cm of catheter inside the epidural space. In the subarachnoid blocking we used 4mg of ropivacaíne (0,2%) plus 2,5ug of sufentanil. The pregnant stayed in labour room under supervision and standard monitoring of vital signs, and presented with mild fever (38.0ºC). After 3,5 hours and 3 Programmed Intermittent Epidural Bolus (PIEB) of 10ml of ropivacaíne 1mg/ml plus sufentanil 0,02ug/ml, the obstetrical team decided to make an urgent CSA because of fetal bradycardia. When re-evaluating, the pregnant had motor (Bromage 3) and sensory (until T6) blocks, with hemodynamic stability. When aspirated, the epidural catheter had Liquor. We assumed that the catheter had migrated to the subarachnoid space. The CSA was done without any more medication. In the recovery room, the tympanic temperature was 38.2ºC, which was interpreted as possible Chorioamnionitis, medicated with proper empirical antibiotherapy. Despite the fever, we decided to keep the subarachnoid catheter with the purpose of reducing the probability of headache. The catheter was left for 24 hours (not used for medication), and there was no registration of any symptoms. The analgesic strategy chosen was to use only intravenous drugs.
Discussion: In this case, the team was confronted with a patient with fever after CSA and an accidental subarachnoid catheter. There are some benefits in leaving this catheter. It can cause some degree of inflammation, minimizing the risk of headache due to extravasations of subarachnoid fluid. The fever was interpreted as a response to the inflammation or Chorioamnionitis, and it's quite common during, and after labor.
Learning points: We concluded that, in case of fever, the literature does not support the removal of the epidural or subarachnoid catheters in the puerperium. In the absence of an obvious focus of infection or sepsis, we assume that the fever is part of the inflammatory response parallel to labour.

04AP04-9
Cerebral cavernous malformation during pregnancy: an anesthetic, obstetrical and neurosurgical challenge

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Background: 20% of cerebral cavernous malformations (CCM), a type of vascular malformation, are located in the brainstem. Risk of hemorrhage is about 1-3% per year[1]. Pregnancy hemodynamic and hormonal changes could increase the risk of bleeding. We report the management of a pregnant woman with bleeding effusion of a CCM in the brainstem.
Case Report: A 31-yrs-old woman, at 28 weeks of gestation was admitted for sudden neurological alteration status. Magnetic resonance imaging (MRI) showed recent bleeding effusion in a left sided lesion of brainstem. Fetal pulmonary maturation was performed. At 30 weeks, the patient presented new deficits. MRI revealed an increase in brainstem lesion size. Propranolol was given slightly increased up to 30 mg 3 times a day according on maternal and fetal tolerances to stabilize and more decrease the lesion[2]. But further new neurological deficits appeared at 34 weeks of gestation. Caesarean section was then decided followed by MRI and lesion resection. The rapid sequence induction was performed with remifentanil (1µg/kg), thiopental (7mg/kg) and rocuronium (1,2mg/kg) and was maintained with sevoflurane[3]. Hemodynamic stayed stable during the intubation period and along the procedure. After the birth (Apgar score 9/10/10), carbetocin (100µg) was slowly titrated to obtain uterine contraction without hemodynamic affect. Propofol was used to allow MRI and transfer to neurosurgical operating room. Transesophageal echocardiography was performed with a bubble test to exclude patent foramen ovale to permit a sitting position. Surgery and postoperative course were uneventful.
Discussion: Long-time considered as inoperable, the new micro-neurosurgical approach allows resection of brainstem CCM reducing risk of stepwise neurological deterioration secondary to hemorrhage. But morbidity of surgery remains high. During pregnancy, multidisciplinary discussion (anaesthesiologist, obstetrician, neurosurgeon, neonatologist) is essential. Gestational age, CCM localization and clinical evolution must be taken into account. Anaesthesia protocol has to consider hemodynamic stability.
References:
1. Kalani,J Neurosurgery 2013;118:50-55
2. Zabramski,World Neurosurgry 2016;88:631-39
3. Anson,Int J Obstet Anesth 2015;24:147-60
Learning points: CCM is at risk of bleeding. Resection of brainstem cavernous malformations is challenging. Occurring during pregnancy, a multidisciplinary management is essential for a successful outcome.

04AP04-10
Horner syndrome following internal jugular vein cannulation: a case report

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Background: Horner's Syndrome (HS) results from an interruption of the sympathetic nerve supply to the eye and presents with classical triad of ipsilateral ptosis, miosis and facial anhidrosis. Cases of transient HS have been associated to regional anaesthetic techniques in obstetric population and also following internal jugular venous (IJV) cannulation[1]. We present the case of a puerpera with a transient HS post IJV cannulation.
Case Report: A 32 years-old primipara, without relevant past medical history, was admitted for an urgent c-section due to placenta abruption. The procedure was performed under combined spinal epidural anaesthesia. Epidural analgesia with Ropivacaine was suspended 12h after due to hypotension. 24h later, the puerpera returned to the OR in haemorrhagic shock. GA was induced and ultrasound-guided (US) right IJV cannulation was performed without any technical difficulty or complication. Haemorrhage was controlled and the patient was transferred to the ICU hemodynamically stable without vasoactive drug support. 12 hours after the surgery, right ptosis and miosis were noticed. The patient was assessed by Neurology and Ophthalmology. The IJV catheter was removed and a cranioencephalic and cervical CT scan were performed without any evidence of sympathetic chain damage. The symptoms resolved in 6 months.
Discussion: HS is a rare complication of either epidural anaesthesia or central venous IJV cannulation. It has been documented that HS after epidural anaesthesia is more likely in pregnant women due to physiological and anatomical changes and predisposing cephalic migration of anaesthetic drugs. The symptoms last usually a few hours, depending on drugs pharmacokinetics. In our case, IVJ cannulation was pointed as the most plausible cause. It can occur due to direct trauma to the nerve or from hematoma's pressure. US-IVJ cannulation reduced significantly the occurrence of hematomas but as needle direction may become more medial, cervical sympathetic chain is prone to direct trauma.
References :
1. Suominen P et al. A. Horner's syndrome secondary to internal jugular venous cannulation. Journal of Clinical Anesthesia (2008) 20, 304–306.
Learning points: HS associated to epidural technique in obstetric population and to IVJ cannulation is rare but well documented. US-IVJ cannulation reduces the risk of carotid artery puncture but it is not risk free. Epidural in obstetric population may be a confounding factor when looking for causes to HS.

04AP05-1
Association between pain and psychological vulnerability in women undergoing labour in a prospective cohort study

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Background and Goal of Study: Labour pain is a complex phenomenon governed by somatic and cognitive dimensions which are influenced by an individual's pain and psychological vulnerabilities. Clinically, the identification of these unique factors will enable tailored interventions for labour pain management. Hence, this project aims to identify pain and psychological vulnerability domains associated with greater susceptibility to labour pain. We evaluated the association of pain catastrophizing, central sensitization, fear-avoidance, state and trait anxiety, and perceived stress, with labour pain severity. Moreover, the study aims to investigate demographical characteristics that could influence labour pain severity.
Materials and Methods: 246 women undergoing labour and delivery were recruited and completed self-administered questionnaires. Pain and psychological domains questionnaires (Pain Catastrophizing Scale (PCS), Central Sensitisation Inventory (CSI) and Fear-Avoidance Components Scale (FACS), The State-Trait Anxiety Inventory (STAI), Perceived Stress Scale (PSS)) were completed prior to onset of labour. Labour pain severity was scored with Angle-Labor Pain Questionnaire (A-LPQ) after labour and delivery. Statistical analyses were performed with univariable and multivariable linear regression.
Results and Discussion: Univariable linear regression of pain and psychological domains showed significant association (p-value <0.001) with labour pain severity. Multivariable linear regression adjusted for demographical characteristics revealed that PCS (β = 0.746 [0.122, 1.369], p-value = 0.019) and FACS (β = 0.949 [0.557, 1.341], p-value <0.001) were the most significant pain and psychological domains associated with labour pain severity. Additionally, the Malay ethnicity (β = 24.425 [8.548, 40.302], p-value = 0.003) was found to be a significant demographical factor for labour pain severity.
Conclusion: The findings support the association of pain and psychological domains with labour pain severity, where pain catastrophizing and fear avoidance had the greatest association with labour pain severity. Moreover, the Malay ethnicity was found to be associated with higher labour pain severity. Future studies could integrate pain, psychological and demographical characteristics to establish a risk stratification framework to identify women at higher risk of severe labour pain.

04AP05-2
Persistent childbirth pain in nulliparous women receiving labour epidural analgesia: a prospective cohort study

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Background and Goal of Study: Persistent childbirth pain poses a significant health burden, being associated with poor function and quality of life, postnatal depression and negative effects on breastfeeding and the mother-child relationship. This study aims to characterise persistent childbirth pain and its effects, and to identify risk factors for such pain.
Materials and Methods: A prospective cohort study of 489 patients at KK Women's and Children's Hospital was carried out from 2015-2018 amongst healthy nulliparous parturients at term receiving labour epidural analgesia. Data was obtained from patient surveys and records during the delivery admission. Patients were surveyed again via telephone 5-9 weeks after delivery. The primary outcome is persistent pain, defined as pain beginning at or immediately after childbirth lasting >4 weeks. Univariate logistic regression was used to examine associations between pain characteristics and persistent childbirth pain. A multivariate logistic regression model was developed to identify risk factors for persistent childbirth pain.
Results and Discussion: 39 (8.0%) of 489 patients surveyed 5-9 weeks after delivery had persistent childbirth pain. The presence of persistent childbirth pain, compared to its absence, was associated with: pain when getting up from a chair (33.0% vs 10.9%, p=0.0002), sitting down for >30 minutes (48.7% vs 14.5%, p<0.0001), standing up for >30 minutes (35.9% vs 10.9%, p<0.0001), walking up or down stairs (30.8% vs 9.3%, p=0.0002), carrying heavy bags (35.9% vs 17.1%,

p=0.0054) and doing athletics or sports (12.8% vs 2.8%, p=0.0010); pain affecting sleep (30.8% vs 17.6%, p=0.0481); and seeing a doctor for pain (20.5% vs 6.5%, p=0.0033). Factors associated with persistent childbirth pain were delivery by caesarean section OR (95% CI) 3.04 (1.428, 6.475), higher State-Trait Anxiety Inventory trait-anxiety score 1.048 (1.004, 1.093), incidence of breakthrough pain 2.346 (1.106, 4.976), and increased number of attempts administering labour epidural analgesia 0.393 (0.175, 0.883). The receiver-operating-characteristics (ROC) curve has an AUC value of 0.723.
Conclusion: Patients with persistent childbirth pain are more likely to have pain during daily activities and to seek medical attention for pain. The risk factors identified would need to be refined to help risk-stratify patients at higher risk of persistent childbirth pain.

04AP05-3
Epidural analgesia in labor – maternal satisfaction and complication – retrospective analysis

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Background and Goal of Study: Epidural analgesia (EA) is the method of choice for labor pain relief, administered on patient's demand and if there is an obstetric indication. Goal of study is evaluation of maternal satisfaction i complication of EA.
Materials and Methods: We conducted a retrospective survey on parturients at or beyond 36 weeks gestation, who received epidural analgesia during labor between May and November 2018 at Clinic for Gynecology and Obstetrics UCC of the Republic of Srpska.
Results and Discussion: The study included 100 parturients, 57% were nulliparous, and 14% of them already had birth in epidural analgesia. 24% parturients had fear of epidural analgesia before procedure, 11% experienced itching during and after delivery. Trembling had 15% mothers and nausea and vomiting had 4%. 2% parturients experienced pain throughout the duration of labor, 2% had a pronounced motor block and unilateral block 4% during labor. 4% had urinary retention requiring catheterization of the bladder. 5% experienced a post-puncture headache, 20% felt lower back pain after and 83% of mothers did not feel any symptoms after delivery. Total satisfaction with epidural analgesia was found in 97% of patients.
Conclusion:The results of this analysis serve to further improve the quality of epidural anesthesia in our hospital, with particular reference to maternal satisfaction. The level of overall satisfaction of our patients with the epidural analgesia process was very high.

04AP05-4
Interscapular pain: an unusual but important symptom of epidural labor analgesia.

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Background: It has been reported interscapular pain can occur during epidural analgesia. However, this symptom was not frequently mentioned in the literature and the mechanism remains elusive. It seems to be benign and transient but it might be a sign of potential spinal cord compression.
Case Report: A 25 y/o parturient was planned to have labor analgesia due to regular uterine contraction with strong labor pain. Epidural catheterization at L3-4 was successfully established and labor analgesia was initiated with patient-controlled epidural analgesia (PCEA). After 8 hours of labor analgesia, she complained sudden onset, sharp, and intolerable pain between her scapulae which caused her restless. The anesthesiologist gave her an extra dose of epidural anesthetic but the pain even got worsening during the bolus injection of local anesthetic. The pain made her persistently uncomfortable until she completed the vaginal delivery and discontinuation of PCEA. No more complaints of interscapular pain or neurologic sequelae were told during the following three days of her hospitalization. The total duration of PCEA intervention was 24 hours and the total consumed amount of anesthetic on PCEA was 490 ml.
Discussion: Only few literatures reported upper back pain during epidural analgesia. Of interest, this symptom is typically localized at interscapular region and most of the reported cases were parturient. The most acceptable hypothesis of this pain is a type of radicular pain which caused by compression of thoracic spinal cord due to high pressure in epidural space. In our case, the total infused volume in the epidural space was very high, and the symptom was deteriorated by rapid bolus of epidural anesthetic. The hypothesis of high epidural pressure supported our findings. Fortunately, our case did not develop any neurologic complications after PCEA. The infused volume of epidural space should be cautious. Once interscapular pain occurs it might be a sign of potential spinal cord compression and subsequent neurologic deficits should be alert and monitored.
References:
Can J Anaesth. 2016 Apr;63(4):475-9.
Learning points: Interscapular pain can be an unusual but important complaint during epidural labor analgesia which indicates potential spinal cord compression. Once it occurs the following neurologic complications should be monitored.

04AP05-5
TCI analgesia with remifentanil for labor in a patient with Guillain-Barré syndrome. Case report.

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Background: Labor is one of the most painful experiences. Guillain-Barré syndrome (GBS) is extremely rare in pregnancy and anaesthetic management of labor and delivery isn't well established. An alternative to epidural analgesia, is parenteral administration of opioids. Remifentanil offers pharmacokinetic advantages,[1] but it can cause severe adverse effects.
Case Report: A 37-year-old woman, G2 P1, ASA 2 with 40+3 weeks' pregnancy initiated spontaneous labor. She had history of GBS 9 years ago, with weakness sequelae in her lower right limb. Upon the request of analgesia, we ruled out epidural technique because of the risk of worsening her neurological status. We started TCI (target-controlled infusion) remifentanil at 2 ng/ml, using and exclusive intravenous line, after a bolus of 60 mcg of fentanyl. Supplemental O_2 was administered. Continuous pulse oximetry and noninvasive blood pressure were monitored. Pain intensity level was 8/10 (numerical rating scale of pain) and reduced to 4/10 after the infusion. The patient presented slight sedation between contractions. TCI remifentanil was maintained until vaginal delivery, which was carried out without complications. The newborn didn't require resuscitation maneuvers and his apgar score was 7/9.
Discussion: TCI remifentanil was effective for labor pain relief. The patient didn't show signs of respiratory depression, however, this is a side effect that the anesthesiologist must be aware of. Use of supplemental O_2 is controversial as it could delay respiratory depression recognition. Evidence regarding safety of remifentanil for labor is weak. The actual incidence of adverse events might be underestimated. Also, no TCI remifentanil algorithm has been validated for pregnant women.[2] In patients with history of GBS a careful evaluation by a neurologist is recommended. TCI remifentanil might be useful for labor pain relief when epidural analgesia is not recommended. We suggest a careful titration of the infusion, under strict supervision and monitoring of the mother and fetus.
References:
1. Solek-Pastuszka, et al. Remifentanil for labour pain relief. Anaesthesiol. Intensive Ther. 47, 82–86 (2015).
2. Schwarz, G. L., et al. Remifentanil target-controlled infusion during second stage labour in high-risk parturients: a case series. Acta Anaesthesiol. Scand. 57, 802–808 (2013).
Learning points: TCI remifentanil might be an alternative for labor pain relief when other techniques are not recommended.

04AP05-6
18-hour Remifentanil PCIA in a parturient with von Willebrand disease

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Background: Systemic opioids are an alternative for labouring women for whom neuraxial analgesia is contraindicated. A common approach involves remifentanil patient controlled intravenous analgesia (PCIA), which provides less effective analgesia than epidural. Although remifentanil has a higher rate of maternal sedation, it has a lower rate of neonatal respiratory depression requiring resuscitation at delivery, when compared to fentanyl.
Case Report: A 30 year-old ASA II G1P0 female was admitted in labor at 40 weeks. She was diagnosed with type 1 von Willebrand disease 5 years earlier due to an epidural hematoma after neuraxial anesthesia for a knee arthroscopy, and further neuraxial techniques were discouraged. At the maternity unit, as she felt more intense contractions, at 2-3 cm dilation, a remifentanil PCIA was started (0,5µg/kg bolus, lockout 2min). The analgesic effect diminished as she transitioned to active labor and oxytocin was initiated. 18 hours elapsed till delivery (total of 5mg remifentanil), always with a reassuring CTG and no desaturations or apneas. Analgesia was supplemented with a pudendal nerve block for forceps delivery of a 3010g neonate, Apgar scores were 10 at 1 and 5 minutes. No postpartum hemorrhage has occurred and the neonate remained clinically well in the postpartum unit. Despite poor pain control during active and expulsive phases, the patient reported a high rate of satisfaction.
Discussion: Over the last two decades, remifentanil PCIA has gained popularity in labor analgesia as an alternative to neuraxial analgesia whenever contraindicated. It is known to be superior to other parenteral opioids, although there are major safety concerns. In this case, over 18 hours of PCIA, there was no record of maternal desaturation or apnea. Besides, fetal heart rate remained normal, and given its rapid onset/offset and low potential for drug accumulation, the neonate did not required resuscitation. There are no reports in the literature of its use for such a long period of time in laboring women. More intense pain scores, remifentanil-

induced hyperalgesia and difficulty timing peak remifentanil effect with frequent contractions might explain the reduced efficacy of remifentanil PCIA in the second stage of labor.
Learning points: With proper monitoring, remifentanil PCIA might be safe for both the mother and newborn in cases of contraindication for neuraxial technique and prolonged labor, in spite of poor analgesia.

04AP05-7
Epidural anesthesia during routine childbirth: A 10 years retrospective analysis from the National Birth Registry Austria

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Background and Goal of Study: The objective was to retrospectively analyze a large data set from the National Birth Registry to assess quality of care and potential beneficial and/or adverse effects of epidural analgesia (EA) for normal labor delivery at term in Austria.
Materials and Methods: Data were gathered from the National Birth Registry of Austria between 2008 and 2017. Primiparous women with spontaneous vaginal delivery at term were included. Multiple pregnancies were excluded. Neonatal short-term outcome was assessed by arterial pH and BE in umbilical cord blood depending on receiving EA or not. Associations between APGAR scores, admission to NICU, and perinatal mortality up to day 7 after birth and EA were investigated. Propensity score matched linear regression models of pH and BE with EA as covariate were calculated. Logistic regression models for admission to NICU and perinatal mortality were calculated. Differences in APGAR scores were determined. Childbirth injury, use of instrumental delivery, and duration of labor was analyzed.
Results and Discussion: The study was based on 247.720 primiparous women. Twenty-one percent of women received EA. In 16.9%, an instrumental delivery was necessary. Neonatal mortality was 0.16%. No relevant effect on pH could be determined for EA. Data suggest that EA had an effect on BE without being clinically relevant (mean BE -6.15±3.2 vs -5.89±3.2). The admission rate of neonates to a NICU was higher with EA (OR 1.2 (95%CI 1.14 to 1.26). Receiving EA had no clinically relevant effect on APGAR scores. The frequency of neonates with APGAR score less than seven after five minutes were higher in the EA group (0.6% vs 1.0%) with an OR of 1.56 (CI95% 1.39 to 1.74). EA was significantly associated with perinatal mortality (OR 4.69; CI95% 3.77 to 5.83).
Conclusion: EA remains the gold-standard of pain therapy during delivery. In this representative collective, 21% of parturients where treated with EA in spontaneous vaginal birth at term. Short-term outcome of the neonates was not associated with EA, while a negative effect on perinatal mortality could be demonstrated. Twice as much instrumental deliveries were performed compared to women without neuraxial analgesia. All findings lack the ability to draw conclusions on causality as this is a retrospective data analysis with observational character.
Acknowledgements: We thank Mr. H. Leitner for providing the data of the study.

04AP05-8
Does intrathecal 7,5 mcg sufentanil in labour increase emergency cesarean deliveries?: a pilot study

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Background and Goal of Study: Combined spinal epidural (CSE) for labor analgesia become increasingly popular. In our institution we have been doing it for more than 20 years. In the first stage of labour intrathecal opioids provides a good pain relief with less motor block and patient satisfaction. However, the effect of intrathecal sufentanil on the incidence of uterine hyperactivity and fetal heart rate (FHR) abnormalities remains controversial. Our primary end-point is to study if the administration of intrathecal 7,5 mcg sufentanil increases the incidence of emergency deliveries. Our second end-point is to analyse the impact in maternal - fetal morbidity.
Materials and Methods: A retrospective observational study of parturients undergoing labor analgesia during three months of 2018 was carried out through the registries consultation. There were a total of 392 techniques performed. We divided the parturients into three groups: G1: CSE analgesia with 7,5 mcg intrathecal sufentanil (n=178); G2: CSE analgesia with lower doses of intrathecal sufentanil an local anesthetic (n=182), G3: epidural analgesia (n=16). We then analyzed the occurrence of emergency cesarean within the first hour after technique was performed, the incidence of dystocic deliveries and the newborn's Apgar Score. All data was analized with Chi-Square on Microsoft Office Excell.
Results: The demographic and obstetric data were similar between the 3 groups. On G1 there were no emergency cesarean deliveries as a result of 7.5mcg sufentanil-induced nonreassuring FHR tracings. There was only one cesarean on G2, a pre-term pregnancy with gravidic cholestasis and gestacional diabetes, performed 30 minutes after the technique due to nonreassuring FHR tracings and refractory to salbutamol. Dystocic vaginal deliveries were higher on G1 than on G2 or G3 (37,5% vs 22,9% vs 33,3%, respectively, p = 0.018). Although there is statistical significance on these results, the amount of variables implied can represent an important bias that won't allow us to earn proper conclusions. On the G1 were recorded more newborns with an Apgar Score less than 8 by the 5º minute (9 G1 vs 3 G2 vs 0 G3 newborns).
Conclusions: With these data we can't conclude that sufentanil on 7,5mcg doesn`t lead to emergent cesarean cause we would need a larger sample to imply more conclusions but the results are promising.

04AP05-9
Marfan syndrome (MS) and labor anesthesia: a case report.

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Background: The increased survival of patients with connective tissue diseases confronts us more often with pregnant women suffering these entities. It is important to assess the severity, if aortic dilatation is corrected prior to gestation or not, since major complication during pregnancy and postpartum is the aortic dissection.
Case Report: 45-year-old pregnant woman with MS corrected in2004of aortic root aneurysm. C-section due to total occlusive placenta(TOP)was planned. In follow-up for consultation of high-risk obstetrics, she maintained treatment with metoprolol, aspirine and clexane. During pregnancy she remains cardiological asymptomatic. Highlights pectum carinatum. Monthly controls were carried out. Echocardiogram shows minimal aortic insufficiency aortic arch and abdominal aorta of normal size and flow.Mitral valve with elongated anterior veil and prolapse thereof. After being evaluated by cardiology, obstetrics, anesthesiology and neonatology services, it was decided to perform a cesarean delivery by TOP.Once in the operating room, patient was monitored and spinal anesthesia was performed with 10mg of bupivacaine0.5% isobar and 10mcg of fentanyl at L3-L4.400cc of crystalloids and colloids and an infusion of phenylephrine at 0.5micrograms/kg/min were administered. Carbetocin was administered for adequate uterine contraction. Afterwards, she was transferred to the recovery unit where she remained hemodynamically stable.
Discussion: MS affects 1/5000 people and is due to a mutation in the fribrilin-1gene which is responsible for the organization of elastin. Cardiovascular disease is the major cause of morbidity and mortality and will occur in up to 80% of patients. Among complications we can find: aortic dilatation with/not aortic insufficiency, aortic dissection, mitral prolapse. The disease in pregnancy can get worse in the third quarter due to hemodynamic stress and hormonal alterations making the patient more vulnerable to aortic disease. Follow-up is recommended by a cardiologist performing TTE every6-8weeks.Guidelines do not recommend pregnancy if aortic diameter is>40mm,placing patients on aortic replacement. In case of smaller diameter, treatment with beta-blockers should be initiated. Metoprolol is a safe option during pregnancy. If the patient has undergone surgical repair, a vaginal delivery may be chosen.
Conclusion: Pregnant woman with MS is a high risk patient. A complete cardiological evaluation should be performed and close monitoring to detect any complication.

04AP05-10
An unusual case of acute severe back pain following labour epidural for normal vaginal delivery - a case report.

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Background: Post-partum pubic diastasis is an uncommon complication of delivery. Mostly, it is treated conservatively with regular analgesia and pelvic binders. In rare cases surgical fixation may be necessary.
Case report: We report a case of a 31 year old Caucasian female who developed pubic diastasis following a normal vaginal delivery (NVD). The patient, antenatally well primiparous woman, was admitted to our hospital for NVD. She received uncomplicated epidural analgesia throughout the labour. After a prolonged second stage, she delivered a healthy baby, assisted by forceps. Unfortunately she developed post-partum haemorrhage (PPH) secondary to uterine inversion. It was at this point that patient developed severe back pain with a VAS 10 and any slight movement of legs aggravating the pain. The patient required GA in the operating theatre to reverse the uterine inversion. The back pain got progressively severe in the recovery. An urgent MRI ruled out epidural haematoma and prolapsed intervertebral discs. Later that night the patient developed acute urinary retention and the existing urinary catheter was found to be in false urethral passage. The patients back pain was severe (VAS 10) and it was impossible to position her in lithotomy as any slight movement of lower limbs caused excruciating back pain. The urinary catheter was eventually placed by the Urologist under GA. A plain pelvic X ray performed the following day revealed

pubic diastasis. She was seen by the orthopaedic team and a pelvic binder was placed immediately. With bed rest and regular analgesics she made a full recovery.
Discussion: Acute severe back pain following epidural insertion can point to potentially serious complications. The diagnosis of pubic diastasis was only apparent after the plain X Ray finding.
Learning points: Pubic diastasis is a rare, uncommon complication following NVD. Examination of the patient can be difficult due to the excruciating pain. Early orthopaedic involvement is essential in the management of these patients

04AP06-1
Compuflo assisted training vs conventional training for the identification of the ligamentum flavum with an epidural simulator

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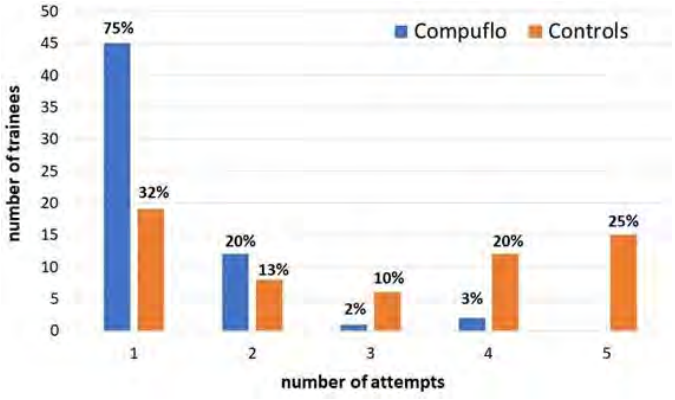
Background: Epidural block is one of the most difficult skills that can be mastered by trainees probably due to the difficulty of recognizing the ligamentum flavum (LF) during the loss of resistance technique (LORT)[1]. The CompuFlo® Instrument can measure the pressure of human tissues in real-time at the orifice of a needle and it has been successfully used in clinical practice to identify the epidural space[2]. The aim of this study was to evaluate whether Compuflo® may help trainees to identify the ligamentum flavum using a realistic Epidural Simulator[3].
Methods: We enrolled 60 trainees who have never performed an epidural block. After having had a standardized learning module on epidural anatomy and technique, each trainee practiced the epidural and the Compuflo®-assisted LORT on the simulator for a maximum of 5 attempts. They were asked to stop the needle entrance whenever they felt a sensation of an increase of resistance due to the penetration of the needle in the LF. The correct position of the needle was verified by an expert instructor. The number of attempts was noted. The Power analysis required a sample size of 60 observations to set 80% test power and a 95% significance. Unpaired T-test was used to evaluate the differences in the number of epidural attempts. A logistic regression model was used to correlate the "success at the first attempt ratio" and the technique used.



Results: The number (median, range) of attempts was 1 (1-1) in the Compuflo®-assisted technique series and 3 (1-4) in the control series (P<0.05). In the Figure the number (%) of trainees plotted vs the number of attempts needed to correctly identify the LF is reported. The odds ratio to identify the LF at the first attempt was 2,82.
Conclusion: Compuflo® assisted training reduced the number of attempts to correctly identify the LF and made the procedure easier for inexperienced trainees. Compuflo® increased three fold the chance to identify the LF at the first attempt during a simulator-assisted training module.
References:
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04AP06-2
Electric Stimulation-guided Epidural Anaesthesia for Caserean Section: A Pilot Study

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Background and Goal of Study: The failure rate of epidural anaesthesia using LOR technique is reported from 10% to 27% [1,2]. The epidural anaesthesia in pregnant women is more difficult, because of obesity, edema, and the softening of subcutaneous tissue including interspinal ligaments due to hormonal change[3]. Our study introduced the use of electric stimulation by using conductive guidewire embedded in catheter (figure 1) as an electrical conductor. We evaluated efficacy and safety of electric stimulation-guided epidural anaesthesia for caserean section.
Materials and Methods: Forty pregnant women (36 to 41 weeks gestation) who were admitted for caserean section were randomly allocated to one of two groups. All patients, who were the American Society of Anaesthesiologists physical status of I or II, were to receive epidural anaesthesia for caserean section. One group (LOR group) with 20 patients underwent epidural anaesthesia using conventional LOR technique only and another group (EES group) with 20 patients underwent epidural anaesthesia using LOR technique with epidural electric stimulation. We compared of success rate (success standard: obtaining pain relief during caserean section after epidural drug administration), maternal satisfaction and 1, 5 minutes-neonatal Apgar score between EES group and LOR group.
Results and Discussion: The success rate of EES group was higher than LOR group; however, there was no significant difference (EES group: 95% vs LOR group: 80%; P > 0.05). Patients of EES group were more satisfied with than those of LOR group (EES group: mean value-4.5 ± 0.5 vs LOR group: mean value-3.8 ± 1.2; P > 0.05). The neonatal Apgar score in two groups had no significant difference.
Conclusion: Epidural anaesthesia using LOR technique with epidural electric stimulation is more reliable than conventional LOR technique for caserean section. However, further well-controlled, prospective trials with appropriate sample sizes are needed to confirm these findings.
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04AP06-3
Maintenance of epidural labor analgesia with the PIEB technique: our routine experience (13.115 cases)

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Background and Goal of Study: Programmed intermittent epidural bolus (PIEB) technique provides better analgesia, reduced local anesthetic consumption, less motor block and higher maternal satisfaction when compared with continuous infusion (1). Approximately 2000 patients have been included in the published studies and have received PIEB for their labor analgesia from 2006 to 2018 (PubMed search), but there are no reports on its routine clinical use. We describe our experience with PIEB as our first choice, routine technique for labor analgesia since 2010.
Materials and Methods: After IRB approval, we retrospectively examined the electronic medical records of 13115 consecutive parturients receiving PIEB (plus PCEA for breakthrough pain: NRS>30) for labor analgesia from January 2010 to September 2018. After having used the GemStar (Hospira) pump in 2010 we have been using the CADD-Solis (Smiths) pump from 2011. The standard analgesic solution was 0.0625% levobupivacaine with sufentanil 0.5µg/mL. The PIEB pump was programmed to deliver 10 mL every hour, beginning 60 minutes after the loading dose (20 mL). The PCEA pump was programmed to deliver 5-mL boluses of levobupivacaine 0.125% with a lockout interval of 10 min; max 3 boluses/h). We reviewed the following: patient demographics, mode of delivery, quality of analgesia (NRS 0/100), occurrence of unilateral analgesia and/or motor block (modified Bromage scale), sensation of painfree uterine contraction (PUC) (NRS scale 0/100), maternal hypotension requiring treatment, physician's intervention and maternal satisfaction (NRS 0/100).
Results and Discussion: 795 parturients were excluded due to incomplete data recordings, leaving 12320 parturients for the data analysis. Results are reported in the table.
Conclusions: PIEB represents the routine method for maintenance of labor analgesia in our institution thanks to its efficacy, excellent analgesia with few episodes of breakthrough pain, almost no side effects and very high maternal satisfaction.
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04AP06-4
Case report: Identification of the epidural space in patients with difficult epidural puncture: use of Compuflo© for blood patch after unintended dural puncture in obstetric patients.

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Background: The loss of resistance(LOR) is the most extended technique to identify the epidural space (ES) for labour analgesia. This technique can be associated with erroneous recognition of the ES. New methods of identification of the ES have recently been designed to reduce incorrect positioning of catheter. Compuflo© is a software-controlled medication delivery device that can measure tissue pressure at the tip of the needle in real time. During epidural punction (EP), it monitors the pressure waveform in the Tuohy needle. When the needle enters the ES, a sudden drop of pressure is immediately observed on the screen. This device permits to decrease the incidence of failed labour epidural analgesia[1,2]. This technique is recommendable in case of difficult puncture, for example when a new EP is necessary to perform of a blood patch (BP) after an accidental dural puncture (ADP).
Case Report: We present the cases of 3 parturients with post dural puncture headache after ADP, in whom compluflo© was used to identify the ES for the BP. The ES identification had been difficult during labour, with multiple attempts. A blood patch was proposed 24-48h after ADP, in absence of response to medical treatment. The Tuohy needle was inserted in the intervertebral ligament and connected to the Compuflo© pump. The ES was identified when a sudden drop of pressure was observed on the screen. Finally, 15-20mL of whole blood were injected into the epidural space. All three patients presented clinical improvement of their headache after the blood patch. None of them needed a second BP.

	Attempts for epidural analgesia	Attempts for blood patch with compuflo©	Time (seconds)	Volume (mL)
Case 1	3	1	105	1.47
Case 2	Not available	1	223.25	2.8
Case 3	Not available	2	340	1.48

Discussion: The use of Compuflo© allows the identification of the ES with great certainty, avoiding “false loss of resistance” associated with repeated punctures, and failed BP. It is a safe technique that reduces the volume of saline or air administered, avoiding dilution of the blood inserted and the accumulation of saline. We think it is a reliable method to be used for BP. Further studies performed to compare the effectiveness of classical LOR technique versus compuflo© for BP would validate our results.
References:
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04AP06-5
High incidence of epidural catheter failure in combined spinal-epidural analgesia for induced abortion: a retrospective observational study

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Background and Goal of Study: Epidural analgesia provides effective analgesia and good satisfaction in women undergoing induced abortion. In our hospital, combined spinal-epidural analgesia (CSEA) is a first choice for pain relief in induced labour. However, we often experience catheter failure in such a practice. Although catheter failure, which can reduce patient satisfaction due to inadequate analgesia, is reported to occur in 0.85–6.8% of epidural analgesia for labour, data regarding catheter failure in CSEA for induced abortion are unknown. Here we examined the incidence and assessed risk factors for catheter failure in CSEA for induced abortion.
Materials and Methods: We retrospectively examined obstetric and anaesthetic data in patients who undergoing CSEA for induced abortion in our hospital between April 2015 and March 2018. Catheter failure was defined as insufficient analgesia or unilateral block, leading to replacement and/or pull back of epidural catheters. On the day before induction of abortion, an epidural catheter was positioned epidurally using a combined spinal-epidural technique after spinal injection with hyperbaric bupivacaine 2.5 mg for cervical dilation, at which point the epidural catheter was disconnected. Once the recovery from spinal anaesthesia was confirmed by anaesthesiologists, patients were allowed to move freely. Following induction of abortion, patient-controlled epidural analgesia was initiated using 0.1% ropivacaine and 2 μg/mL fentanyl. Statistical analyses were performed by using chi-square test and Mann-Whitney U-test.
Results and Discussion: One-hundred twenty patients were enrolled in this study. A total of 33 cases (27.5%) of catheter failure were identified; 21 cases (17.5%) required epidural catheter replacement and 12 cases (10.0%) required epidural catheter-pull back. Median [IQR] time from initial epidural catheter positioning to epidural catheter replacement and epidural catheter-pull back were 1073 [1037–1126] mi, and 1075 [1019–1098] min, respectively. There were no risk factors for catheter failure in obstetric characteristics. The incidence of catheter failure did not differ among providers who performed CSEA; trainees of obstetric anaesthesia, attending anaesthesiologists of general anaesthesia, and obstetric anaesthesiologists.
Conclusion: We observed a higher incidence of catheter failure in CSEA for induced abortion than that previously reported in other patient groups.

04AP06-6
Epidural analgesia and lumbar tinea versicolor – is that a contraindication?

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Background: Epidural analgesia is usually contraindicated in case of skin infection near the site of the puncture [1]. We report a case of epidural catheter placement in the presence of lumbar tinea versicolor with no neurological or infectious sequelae.
Case Report: A woman at 39 weeks of gestation, ASA II, requested epidural analgesia for labor. On physical examination, a diffuse maculopapular rash was noted from the cervical to sacral area of the patient’s back (Figure1), compatible with tinea versicolor. The risks and benefits were discussed with dermatology and with the patient. We performed the disinfection of the skin with chlorhexidine skin solution of 2% and 70% isopropyl alcohol. The woman was positioned in the sitting position and the Tuohy 18G needle inserted at the level L3-L4. A 20G catheter was inserted and we administered 14mL of Ropivacaine 0,2% and 0,01mg of sufentanyl. Analgesia was adequate during labor and she had a cesarean section 20h later for prolonged labor. Epidural catheter was removed 24h after delivery. She was discharged 3 days after partum without neurological or infectious complications.
Discussion: Tinea Versicolor is a fungal infection caused by the yeast Malassezia furfur, globulosa or sympodialis. The typical presentation is of multiple hypo/hyperpigmented maculopapular lesions over the chest, abdomen and back [2]. The rash is normally asymptomatic or may be associated with pruritus. Systemic infection is rare [3]. Epidural analgesia is usually contraindicated in case of infection at the site of needle insertion but the etiology of the infection is important. The absence of rash in an affected patient does not ensure the organism’s absence at the needle insertion site [3]. A careful cleaning of the skin before the puncture, the puncture in territory of healthy skin if possible, and a skin incision at the puncture site should be performed before provision of neuroaxial anesthesia in this patients [1].
References:
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Learning points: Epidural analgesia in a parturient with tinea versicolor in the lumbar area could expose the patient to infectious complications. Malassezia sp. has low pathogenicity and the catheter placement should not be strictly contra-indicated in this context. In this clinical case, we performed a safe epidural analgesia in a women with tinea versicolor.

04AP06-7
Horner’s syndrome following epidural analgesia for labor

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Background: Horner’s syndrome associated with lumbar epidural analgesia is an uncommon complication caused by interruption of sympathetic nerve supply to face and eye [1].
Case Report: A 39 weeks pregnant woman was admitted to our delivery unit and requested epidural analgesia for labor. The woman was positioned in left lateral decubitus, then a Tuohy 18G needle was inserted at L3-L4 level and we administered 14mg of 0.1% ropivacaine and 0,01mg sufentanyl through a 20G catheter. After 20 minutes, the analgesia was successful, but she referred light paresthesia in the left arm and left side of the face and difficulty in opening the left eyelid. After 1 hour, a left sided eyelid ptosis and miosis was evident together with hypoesthesia and paresthesia extending to the left side of the body (including the arm, thorax and leg). She remained hemodynamically stable and, except for

these findings, neurological examination was normal with no motor block, and with no signs of fetal distress. After 2 hours the signs and symptoms disappeared. Neurologist evaluation excluded an acute cerebral event and suggested Horner's syndrome secondary to epidural administration. The labor progressed well and after 3 hours one more bolus of 10mg of 0,2% ropivacaine was administered and there was no recurrence of the clinical signs.
Discussion: Horner's syndrome is characterized by ptosis, miosis, enophthalmos, flushing, conjunctival hyperemia and anhidrosis on the affected side of the face and occurs when the sympathetic nerve supply to face and eye is interrupted [1]. This syndrome associated with labor epidural is a rare, benign and self-limiting condition and its incidence is reportedly 4% in women who had a caesarean section and 1,33% in those who had a vaginal delivery. Signs appear approximately 25 minutes after epidural administration, and disappear in 215 minutes. The anatomical and physiological changes during pregnancy and labor favor cephalic spread of local anesthetics injected in the epidural space which may predispose to development of Horner's syndrome. Some reports noted that placing the catheter epidural in the lateral decubitus position promotes higher levels of epidural anesthesia [2].Fetal and maternal outcomes are usually good.
References:
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Learning points: To safely manage Horner's syndrome after epidural, the anesthesiologist should be aware of its benign features, alarm signs and how to proceed.

04AP06-8
Ultrasound aided spinal anesthesia for C-section in patient with spine instrumentation. Case Report

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Background: Ultrasonography has being widely used for regional blocks and central venous catheterization in recent years among anaesthesiologists and it was found beneficial for neuraxial blocks.
Case Report: We report a case of a 26 y/o woman, 39+1 weeks' gestation, ASA 2, scheduled for C-section due to genital herpes, with a spine instrumentation (SI) from T3 to L3 due to juvenile idiopathic scoliosis. An ultrasound evaluation of the lumbosacral spine was performed using convex probe (3-5 MHz). It was placed at the junction of the sacrum and L5 (sagittal section in the midline of the rachis), then it was moved cephalad to L1-L2, identifying the lumbar intervertebral spaces, choosing as possible puncture site L4-L5, which we marked on the skin with an horizontal line using a marker. Subsequently, it was placed in cross section in said space and intervertebral space and compex dorsal yellow-dura mater ligament were identified. An asymmetry in the facet processes and thinning of the complex was observed, due to spinal rotation because of its underlying disease. Then skin was marked by a vertical line crossing with the previous horizontal line, thus marking the selected puncture site. Distance between the skin and the complex was measured. Using a 22 G needle, the subarachnoid space was reached in the first attempt. A spinal anesthesia was performed with no complications and c-section was carried out normally.
Discussion: Spinal anesthesia for a C-section might be difficult to perform in patients with SI. It remains unclear whether preprocedural ultrasound improves the epidural catheterization technique in parturients with palpable anatomical landmarks undergoing cesarean delivery. Bedside ultrasound may be greatly beneficial in identifying the correct spinal interspace to facilitate regional techniques in patients with poliomyelitis and severe kyphoscoliosis and extensive Harrington instrumentation. Although, there is evidence that the use of preprocedural spinal ultrasound does not improve the ease of insertion of labour epidural catheters as compared with the traditional technique.[1]
References:
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Learning points: Preoperative ultrasonography might be useful to identify the correct spinal interspace in patients with spine instrumentation.

04AP06-9
Neuraxial analgesia in a parturient with undiagnosed moderate thrombocytopenia

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Background: Neuraxial analgesia is the most effective modality for labour pain relief and the standard of care for most cesarean deliveries. Thrombocytopenia, occurring in approximately 1% of parturients, is considered a contraindication to neuraxial techniques due to risk of epidural hematoma, a rare but dreaded complication that can result in permanent neurologic injury.
Case report: A 40 year-old G1P0 female, with no known systemic disease, was admitted in labor at 38 weeks. After checking her third trimester blood tests (hemoglobin 11.5g/dL, 128.000 platelets/mm3), a combined spinal-epidural was performed in latent phase for labor analgesia. Due to low-grade fever, blood tests were requested, revealing a 60.000/mm3 platelet count. Since preeclampsia and HELLP syndrome were ruled out, gestational thrombocytopenia became the most likely diagnosis. A few hours later a C-section was planned because of prolonged labor, and epidural anesthesia was preferred considering the previously functioning catheter. Besides, tranexamic acid 1g and platelets were infused pre-operatively. Thromboelastometry after an uneventful cesarean delivery did not indicate the use of further blood products. No postpartum hemorrhage was noted, and both the mother and the infant were stable. 24-hours postoperatively, hemoglobin was 9.7g/dL and platelets were 112.000/mm3, then the epidural catheter, which was used for subsequent analgesia, was safely removed. No neurologic symptoms were reported within the following weeks.
Discussion: The unknown risk of hematoma has been used to justify the decision to withhold neuraxial techniques. A recent report defined the upper bound of the 95% confidence interval for the risk of epidural hematoma in obstetric patients: 0.2% for a platelet count of 70-100.000/mm3, 3% for 50-69.000/mm3, and 11% for 0-49.000/mm3. Notwithstanding this estimates, the physiologic hypercoagulability of pregnancy and the generally high compliance of epidural space in young patients might be protective factors. When dealing with thrombocytopenic parturients, early communication with the blood bank, adherence to transfusion protocols and obstetric haemorrhage guidelines, are essential to improve the management of these patients.
Learning Points: Platelet counts might fall during the third trimester in healthy parturients**.** Neuraxial techniques might be safely performed in patients with very low platelet counts, but this should prompt an individual risk-benefit analysis.

04AP06-10
Ultrasound-assisted neuraxial technique for labour analgesia: a case report of a difficult epidural

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Background: Scoliosis is a common condition which is more frequent and more severe in female patients. Anesthesiologists face some challenges when considering labour analgesia for such patients. Distortion of surface anatomy, spine surgery and inadequate positioning have to be predicted. In addition, low efficacy of epidural block is often described in the literature. Spine ultrasound (US) has proven to be helpful in guiding the neuraxial technique in scoliosis patients.
Case Report: A 34 years-old parturient, ASA II, at 36 weeks of gestation presented with premature rupture of membranes. She had a severe thoracic and lumbar scoliosis that had been surgically managed at the age of 8years-oldand spinal instrumentation from T4 to L2. US scanning of the lumbar spine was performed to assist on the neuraxial technique. The depth of the epidural space was defined and the tracking of the spinous and transverse processes of the lowest lumbar vertebras was performed. The best intervertebral space and the needle entrance point were marked. After informed consent from the parturient, an epidural technique was performed at L5-S1 level. An initial dose of 0,2% Ropivacaine and Sufentanil was administrated and the local anesthetic was titrated with manual bolus. The parturient referred pain relief with mild paresthesias after a total volume load of 30ml. Additional bolus of 6 ml of 0,2% Ropivacaine were administered during the remaining 2 hours of labour, in order to achieve analgesic confort.
Discussion: Neuraxial analgesia is the technique of choice for parturients due to its benefits for the mother and child. In patiets with scoliosis, the main problems encountered are the technical difficulties in reaching the epidural space, in addition to an often patchy or unilateral installation of the block. However the best approach is not yet defined. In this case report, an epidural blockade was performed to allow careful titration of the block and maintain the analgesia during the entire labour. US guidance has proven to be advantageous in these cases. The identification of the midline and the epidural depth prediction provides important information that reduces the number of attempts and improves analgesia. Nevertheless, the success is dependent on the technician's US guidance skills.
Conclusions: Neuraxial techniques should be regarded as valuable options in labour analgesia management in scoliotic patients. US guidance has proven to be helpful by increasing success rates.

04AP07-1
Relation between postpartum depression, satisfaction with labour period, labor analgesia and newborns health state for primiparous parturients

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Background and Goal of Study: Most of the women experience intensive stress and severe pain during childbirth. Unsatisfying labor period and newborns health may provoke postpartum depression. Our primary goal was to assess the relation between postpartum depression, labor analgesia, satisfaction with delivery period and newborns health state for primiparous parturients.
Materials and Methods: An observational prospective cohort study was carried in a teaching hospital. The satisfaction with childbirth and labor analgesia evaluated by the New Mother Quality of Care questionnaire (NEMOQC). Edinburgh Postnatal Depression Scale (EPDS) was used to estimate postpartum depression level at <72 h and 4 weeks (contacted by phone) after birth.
Results and Discussion: We totally enrolled 266 primiparas after delivery who fit the inclusion criteria. The response rate to EPDS was 95.5 %, to NEMOQC was 64.7%. The visual analog scale (VAS) score for labor pain was 6.13 ± 3.04. Analgesia was used for 62% of parturients. The satisfaction score on pain management was 7.69 ± 2.52. The newborns APGAR score after 1 min. was 8.9 ± 0.91, after 5 min. 9.52 ± 0.65. Ten (3.8%) newborns required oxygen supplementation after delivery. The satisfaction score on newborns health state was 8.81 ± 1.36. Satisfaction score on delivery period was 8.51 ± 1.81. Postpartum depression manifested in 9.8% (n=26) cases within 72 hours, and in 11.3% (n=30) 4 weeks after delivery. There was statistically significant association between satisfaction on newborns state (p=0.00), oxygen supplementation (p=0.00), APGAR scores (p<0.05) and satisfaction on delivery period (p=0.00). There was no statistically significant association between satisfaction on newborns health state and post-partum depression (p>0.05). There was no statistically significant association between labor analgesia and post-partum depression (p>0.05) either. However, there was statistically significant association between satisfaction with labor analgesia and satisfaction on delivery period and post-partum depression.
Conclusion: The higher APGAR scores and the lower necessity for oxygen supplementation for newborn increases satisfaction on newborns health state and satisfaction on labor period. Higher satisfaction on labor period and satisfaction with pain management determines lower postpartum depression rate.

04AP07-3
Regional anesthesia for caesarean section in a patient with tuberous sclerosis: A case report.

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Background: Tuberous sclerosis (TSC) is a rare genetic disease with neurological and multi-systemic affectation[1]. We present the anaesthetic management of a patient with TSC admitted at our tertiary hospital for the delivery of a monochorionic monoamniotic twin gestation.
Case Report: This 28-year old primiparous patient with no relevant clinical symptoms had been diagnosed of TSC in childhood after presenting seizures.The last brain RNM showed non evolutive lesions. She had not presented epileptic crisis since 2014 and was treated with Lacosamide. During pregnancy she suffered from 3 episodes of tension migraine. She was admitted to the hospital for premature rupture of fetal membranes at 31 weeks of gestation, and a caesarean delivery was indicated for bad fetal tolerance. In absence of intracranial hypertension, a Combined Spinal Epidural anaesthesia was performed uneventfully: after locating the epidural space at L3-L4 level with a 18-Gauge Tuohy needle, a spinal anaesthesia (9 mg 0.5% hyperbaric bupivacaine plus 20 micrograms fentanyl) was successfully performed, using 27 G Whittacre needle with the needle-through-needle technique. After 24 hours, she presented a left-sided facio-brachial hypoesthesia and a left hemicranial headache. A brain MRI showed a right frontal cortical bleeding tumor and a 3D brain MRI was performed to precise tumor anatomy. The patient was discharged 15 days after admission. She was proposed for neurosurgery.
Discussion: TSC is a multisystem disease with predominant involvement of the central nervous system. In the absence of contraindications, pregnant women with brain lesions who show no mass effect have a minimum risk of herniation after a dural puncture[2]. Even though post-dural puncture headache (PDPH) is the most common complication after delivery under neuraxial anesthesia, an atypical clinical presentation of headache should trigger an investigation for a differential diagnosis, especially in a patient at risks of neurological complications[3].
References:
1. Causse-Mariscal, et al. IJOA, 2007
2. Warner D., Anesthesiology, 2013
3. Toledo P, et al., Chestnut's Obstetric Anesthesia, 2014.
Learning points: There is little bibliography regarding the anesthetic management of the pregnant patient with tuberous sclerosis. Individual risk should be assessed in those patients with LOES. The differential diagnosis of headaches in the puerperium is very broad and involves potentially fatal pathology.

04AP07-4
Spinal anaesthesia for emergency caesarean section in a patient with a mediastinal tumour and undiagnosed myasthenia gravis presenting in labour

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Background: We report the management of a patient with a mediastinal tumour and undiagnosed myasthenia gravis presenting in labour who underwent caesarean section under spinal anaesthesia. Although she had a good outcome, she could have collapsed from the cardiopulmonary compromise.
Case Report: A 37 year old, 38 weeks pregnant, previously well, presented with a week's history of difficulty with swallowing and breathlessness and rapid weight loss of about 8 kg. She had no pain on swallowing and she could only take sips of water. She also felt a lump in her throat. On examination, she was in the semi-sitting position, and her respiratory rate was 24/min. Her SpO2 was 68% on room air. Her trachea was in the midline. Nasoendoscopy showed no masses. Preliminary clinical diagnosis was a mediastinal mass, probably malignant. It was decided to deliver the baby to relieve the respiratory distress. The emergency LSCS was performed under a spinal anaesthetic. The sensory level was T4 with intrathecal hyperbaric bupivacaine 0.5% 2.3 ml with fentanyl 15 mcg and morphine 0.1 mg. Her pre-spinal BP was 160/80 and HR 105/min. Her SpO2 increased to 99% with oxygen 6L/min post-spinally. She was able to tolerate the supine position. Her lowest intraoperative BP was 90/55 and lowest intraoperative HR was 85/min. Total blood loss was 300 ml. The neonate's Apgar score was 6 at 1 and 5 minutes requiring admission to the neonatal ICU for nasal CPAP. She became unarousable by the end of surgery associated with a flushed face and neck. In the ICU, nearing respiratory arrest, she was intubated. Immediately post-intubation on 100% oxygen gases showed a type 2 respiratory failure (pH 6.822, pCO2 =130, pO2=160, HCO3=15). Over the next few hours, she improved. Her CXR showed a widened superior mediastinum and her chest CT showed a large irregular soft tissue mass in both the anterior and posterior mediastinum. She was transferred to a medical ICU. A biopsy favoured a thymoma. She required ventilation for three weeks, treatment for myasthenic crisis and chemotherapy.
Discussion: When managing a patient with a suspected mediastinal tumour, preparation needs to be made for ventilation and cardiopulmonary bypass, particularly with significant lower airway obstruction. Regional anaesthesia is safer.
References:
Pullerits J, Holzman R. Anaesthesia for patients with mediastinal masses. CJA 1989;36(6);681-8.
Learning points: High index of suspicion. Multi-disciplinary management.

04AP07-5
Anaesthetic management of caesarean section after a Mustard operation complicated by severe bradycardia requiring temporary atrial pacing: a case report.

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Background: Adult congenital heart disease (ACHD) patients sometimes decompensate during pregnancy. While several problems, such as right ventricular failure, are well-known as the long-term complications after Mustard operation, no specific management for such patient has been established so far. We present a case of caesarean section after a Mustard procedure in a patient who suffered from bradycardia in the third trimester.
Case presentation: A 36-year-old parous woman was referred to our hospital at 7 weeks of gestation (GW). She was diagnosed with Taussig-Bing heart (a type of double-outlet right ventricle) at birth. After pulmonary artery (PA) banding, Mustard operation was performed at the age of 6 years. She underwent ablation for atrial tachycardia twice at ages 26 and 34, respectively. At age 30, a first caesarean section was performed at 35 GW. She had no complications throughout the peripartum period. In her second pregnancy, however, she was hospitalized at 18 GW because of subchorionic hematoma. Bradycardia below 40 beats per minute during sleep was noted at 30 GW, and an atrial temporary pacing lead was placed from the right internal jugular vein to the neo-left atrium (anatomical right atrial appendage) at 32 GW. ACHD expert consultants commenced heparinization in consideration of intravenous lead placement and the presence of stenoses in the superior vena cava and bilateral PA. Caesarean section was scheduled at 34 GW and the heparinization was ceased 6 hours before surgery. Spinal anaesthesia was applied after confirmation of normal coagulability. Intra- and postoperative hemodynamics were quite stable under the administration of oxygen and low-dose dopamine. Dopamine was successfully tapered within 4 hours and the pacing lead was removed on the 13th postoperative day (POD). She and her baby were discharged without complications on the PODs 18 and 44, respectively. Permanent pacing is now under consideration for this mother.

Discussion: In this case, severe bradycardia was noted prior to routine Holter electrocardiogram, and temporary pacing was an optimal solution. Although anti-coagulation was required, spinal anaesthesia was safely applied under titration of heparinization.
Learning points: Early hospitalization may help us to address unexpected complications in ACHD parturients. Atrial pacing enabled us to postpone her termination to an acceptable period. Neuraxial block was possible with a careful titration of heparinization.

04AP07-6
Making obstetric anaesthesia more humane

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Background: Currently we have a myriad of anaesthetic techniques available, giving anaesthesiologists the freedom to select those that are safe, efficacious and most suitable for patients. However, in the special set of obstetrics anaesthesia, it is essential to give the best possible conditions for the development of the newborn-mother bond[1].
Case Report: We present the case of a 30 y.o. ASA II pregnant woman at week 36+5 with a previous history of gastric bypass in 2016 and an acute caesarean section in 2017 due to foetal bradycardia. The patient arrived at the emergency department with severe abdominal pain and was diagnosed with ileus, the surgeons decided to perform an acute caesarean section first and then repair the ileus. The anaesthesia team opted for a general anaesthesia, however, when we informed the patient she asked if there was a possibility she could meet the new-born before the ileus repair. The anaesthetic plan was modified and instead the patient got a combined spinal-epidural at the L2-L3 level, with a spinal dose of hyperbaric bupivacaine 8mg + fentanyl 10mcg + morphine 100mcg. The caesarean section was performed without complications, the patient had skin to skin contact with the newborn and then a rapid sequence induction general anaesthesia was performed because of the high location and technical difficulties of the ileus repair surgery. After the surgery the patient was extubated without problems and transferred to the PACU where a PCEA pump with bupivacaine 1mg/ml + sufentanyl 1mcg/ml 6ml/h was connected to the epidural catheter for pain management. The patient had an uncomplicated recovery and was discharged from the hospital at day 7.
Discussion: Early skin-to-skin contact after birth is internationally recommended and many benefits have been described[2]. Obstetrics is a special working environment where not one but two lives are at stake, and it is our responsibility as anaesthesiologist to not only maintain safety in the operating room, but to do our best to give our patients a humane anaesthesia.
References:
1.Tan DJ, Chan MM. Ann Acad Med Singapore. 2017;46:248-251.
2.Guala A et al. Scientific World Journal 2017:1940756
Learning points: Obstetric anaesthesia is much more than getting the job done, it is also about life and bonding and we should do our best to encourage skin to skin contact between the mother and newborn. Thinking outside of the box and considering patient wishes can help provide a more humane anaesthesia

04AP07-7
Spinal anesthesia in herpes gestationis, a rare disease: case report

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Background: Herpes gestationis (HG), also known as pemphigus gestationis (PG), which is vesicular and disease of unknown etiology, is related to pregnancy (1). In this case, we aimed to present our clinical experience of spinal anesthesia method for caesarean section operation in the patient with history of systemic disease in addition to autoimmune bullous disease.
Case Report: In the physical examination of a 34-year old woman who was at 39 weeks of gestational week, it was observed that this woman had itchy erosive lesions all over the body including facial area, except the scalp. Eosinophilic infiltration was observed in the punch biopsy. The patient with obesity and asthma was assessed for spinal anesthesia. Smaller lesions were observed in the back and lumbar when compared to abdomen and extremities (Figure1,2). 10 mg bupivacaine heavy was injected by 25 G spinal syringe in the range of L4-L5.

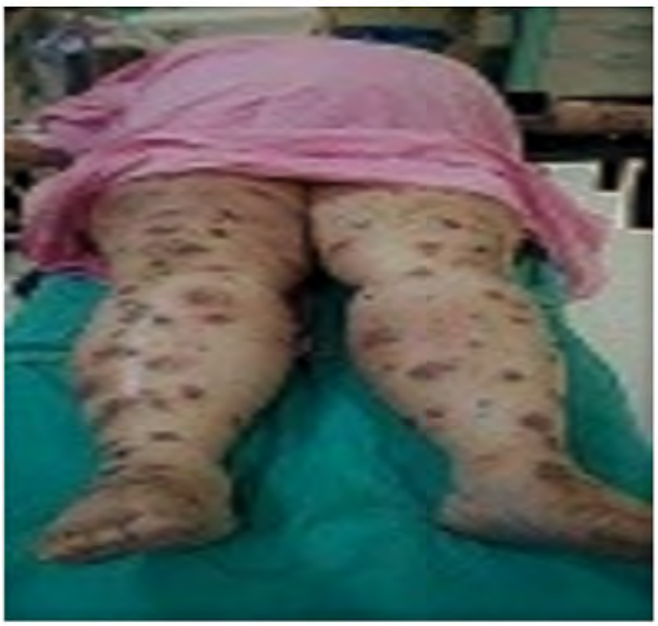

Figure1 Extensive hyper pigmented lesions on the extremities of herpes gestationis

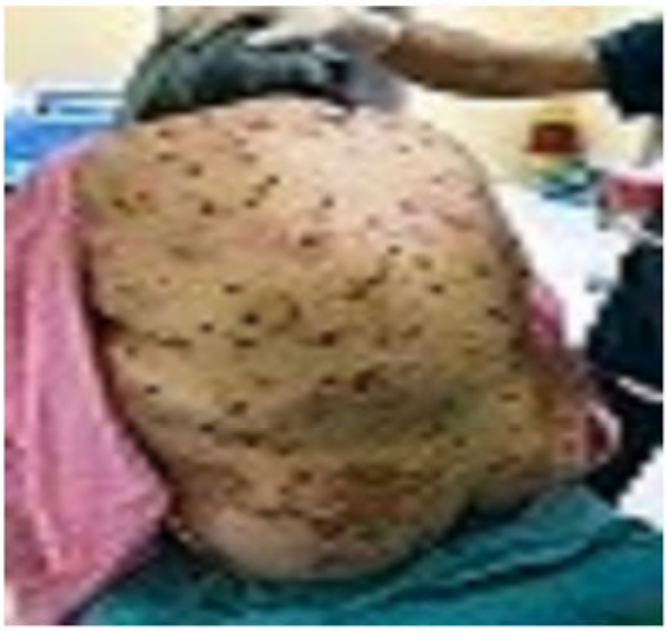

Figure2 Papule and plaques of herpes gestationis in the back and lumbar area

Discussion: Nejim T., et al. emphasized the importance of difficulty laryngoscopy or intubation possibility and mucosal related diseases. In the presence of localized sepsis in the epidural injection area, the epidural block is contraindicated (1). Eldor et al. performed epidural analgesia to HG patient with facial involvement (2). In our case, because of the presence of lesions in the facial area, we thought that the oral mucosa such as the facial area with rare involvement may be affected.
References:
1. Nejim T., et al. Emergency caesarean delivery of a parturient with undiagnosed pemphigoid gestationis. 2012 Elsevier.
2. Eldor J., et al. Epidural analgesia for aparturient with herpes gestationis. Can J Anaesth 1990/37:6/ 678-9.
Learning points: In our case with HG, spinal anesthesia was performed to ensure safety of mother and baby due to presence of coexisting asthma disease and obesity and the presence of facial involvement, after careful preoperative examination.

04AP07-8
Neuroaxial analgesia for elective caesarean section in a patient with Multiple Sclerosis (MS) and a pituitary prolactinoma

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Background: The rates of relapse of MS decrease during pregnancy and increase after delivery[1]. The interplay between neuro-axial analgesia in pregnant women with MS and the increased post-partum relapse rate remains unclear.
Case Report: A 39-year old female with MS and an 8mm secreting pituitary prolactinoma on Quinagolide was listed for a term elective lower segment caesarean section (LSCS). No MS exacerbations had occurred during pregnancy. Neurological examination elicited long-standing bilateral upper limb paraesthesia relating to a demyelinating spinal cord lesion at C3-C4 level. Visual fields and intracranial pressure were normal. A neuroaxial anaesthetic technique was chosen through shared decision making with the patient. 12mg of hyperbaric bupivacaine (0.5%) and 350mcg of diamorphine were administered intrathecally. Further pharmacological therapies included 1mg of Alfenanil, 1g of Paracetamol and 1g of tranexamic acid. Telephone follow-up 7 months post-delivery revealed a 7-day episode of MS relapse occurring 5 months post-partum and compromising the patient's mobility and childcare. No steroids were required and the patient recovered. Interval MRI scanning did not reveal any change in the pituitary mass and Quinagolide was restarted.
Discussion: The long term risks of neuroaxial blockade in pregnant patients with MS remain uncertain. A survey of UK practice highlighted how the majority of anaesthetists preferred spinal and epidural analgesia over general anaesthesia respectively for emergency and elective LSCS[2]. Older data suggest that the risk of relapse of MS is reduced when epidural levobupivocaine is used in concentrations below 0.25%[3]. Although the highest incidence of MS relapse in the obstetric population is within three months of delivery, in our patient this occurred at 5 months.
References:
1. Rate of Pregnancy-Related Relapse in Multiple Sclerosis. N Engl J Med 1998; 339:285-291
2. International Journal of Obstetric Anesthesia Vol 15, Issue 2, April 2006: 115-123
3. Anesthesia for the obstetric patient with multiple sclerosis. J Clin Anesth. 1988;1(1):21-4
Learning points: This case report highlights the unpredictable nature of MS and adds anecdotal evidence that pituitary adenomas that are not causing mass effect are not an absolute contraindication to neuro-axial techniques in obstetric anaesthesia.

04AP07-9
Anaesthesia for urgent caesarean delivery with severe pulmonary hypertension and spina bifida

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Background: Pulmonary hypertension (PH) in pregnancy is associated with a high maternal mortality and morbidity. The mortality rate is 30-56%.
Case Report: A 19 year old primipara at 37 weeks of gestation were transfered from regional to university hospital with regular uterus contractions. The patient had congenital ventricular septal defect (VSD) which cause the PH (risk for pregnancy IV class), right heart failure (NYHA III), paroxismal supraventricular tachicardia. Medication for PH treatment: Sildenafil, Carvedilol, Amiodarone. The partial correction of VSD was done when she was 4 year old. She also had congenital spina bifida meningocele at lumbosacralic part. It was corrected by surgery at childhood and lower limb function remained normal. Cardioechoscopy: Left ventricule CO 40%, max systolic pressure (SP) of pulmonary artery (PA) 141-146 mmHg, median PA SP 43 mmHg, III˚ tricuspid valve regurgitation. Laboratory tests: Hgb 90 g/l, Plt 155*10/9/l, SPA 69%, INR 1.17, NT-proBNP 780 ng/l. Multidisciplinary team (neurosurgeon, cardiologist, anaesthesiologist, obstetrician) decided to do urgent caesarian delivery. Anaesthesia: ASA class IVE. Epidural space was catheterizated at L2-L3 segment and sol. Bupivacaine 0,5% - 17 ml (85 mg) was infused. Fluid balance: crystalloids 1000 ml, blood loss 500 ml. Anaesthesia was adequate, hemodynamics was stable. Patient was transfered to ICU after operation and remained here for 7 hours. Heart function was compensated for all perioperative period. Patient was discharged after 4 days.
Discussion: Pregnant women with PH have high risk of mortality. Pregnancy is contraindication for these patients (1). Elective ceasarean delivery with epidural anaesthesia is the safest choice. Spina bifida is not an absolute contraindication for epidural or spinal anaesthesia but it could be less effective and more difficult to perform (2).
References:
1. Rex S, Devroe S. Anesthesia for pregnant women with pulmonary hypertension. Current opinion in Anesthesiology. 2016; 29(3):273-281. 2. O'Neal MA. A Pregnant Woman with Spina Bifida: Need for a Multidisciplinary Labor Plan. Front. Med. 2017; 4:172.
Learning points: Pregnant women with pulmonary hypertension had high risk maternal mortality. Pulmonary hypertension and pregnancy treated and followed in the tertiary referral center. The best delivery mode is elective caesarean section in week 34–36, preferentially under epidural or low-dose combined spinal-epidural anaesthesia.

04AP08-1
A Huge Giant Cervical Teratoma: antenatal diagnosis and emergent EXIT procedure.

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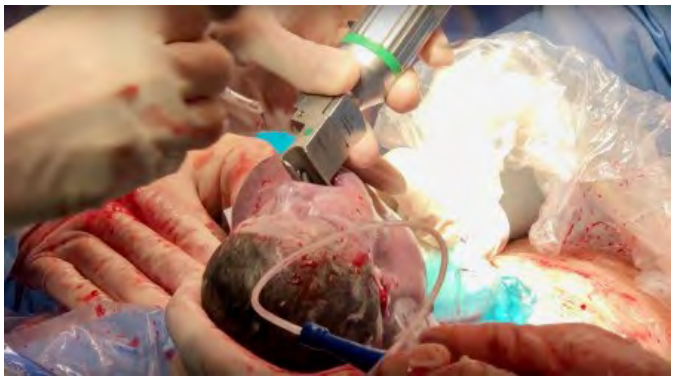
Background: Teratomas are tumours extremely rare in neck region. Obstruction of the airway is the major challenge in the neonatal period. The Ex-utero intrapartum treatment (EXIT) is a procedure performed during caesarean section (C/S) while on feto-placental circulation, it allows maintaining and securing adequate fetal oxygenation during the time needed for airway handling[1].
Case Report: A 37-year-old pregnant diagnosed with severe polyhydramnios and giant fetal cervical teratoma was scheduled for ultrasound-guided amnioreduction at 30 weeks of gestation. Under tocolysis amniotic fluid was evacuated. After procedure placental abruption with vaginal bleeding was suspected, despite maternal stability and cardiotocography registration suggested fetal well-being, the multidisciplinary team envolved (obstetrician, ENT, neonatologist and anaesthesiologist) decided to procede with emergent C/S and EXIT procedure.



Invasive BP monitoring and phenylephrine perfusion was started to keep MBP within its 10% basal value. Under general anaesthesia with rapid sequence intubation (fentanil+propofol+rocuronium) and high dose sevoflurane (MAC 2), fetal cephalic extraction was performed up to the nipple line and im fetal anaesthesia was administered (atropine+fentanil+rocuronium). The foetus' airway was exposed and tracheal intubation was successfully achieved after a single attempt by the neonatologist and fetal extraction was completed. At this point priority was focused on reversal of uterine hypotonicity with oxitocine, methylergometrine and up to 2 doses of carboprost; at the same time TIVA was started. 600mL PRBC were transfused during C/S. Patient was uneventfully extubated at the end of surgery and discharged home on postoperative day 4.
References :
1. Lin, Elaina E. et al. "Anesthetic Management of 65 Cases of Ex Utero Intrapartum Therapy: A 13-Year Single-Center Experience." Anesthesia and analgesia 123 2 (2016): 411-7
Learning points: The EXIT is an exceptional procedure bound for life-saving fetal airway interventions. Preparation for an EXIT surgery involves a multidisciplinary team: quick decision making and availability of experienced personnel is crucial for succeed.

04AP08-2
Oxygen therapy with high-flow nasal cannula for endoscopic retrograde cholangiopancreatography in pregnancy: could it improve mother and fetus safety? A case report.

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Background: Therapeutic endoscopic cholangiopancreatography (ERCP) secondary to choledocholithiasis is infrequent during pregnancy (1:1415 births) (1). Maternal hypoxia and hypercarbia can threat uteroplacental perfusion and produce, even, fetal death. Physiological airway changes during pregnancy can be even more important during ERCP. High-flow nasal cannula (HFNC) provides a constant Fio2, produces a positive airway pressure in nasopharinx and a positive end-expiratory pressure, reducing the anatomical dead space, what it could be especially beneficial in pregnant women(2).
Case Report: A 37 years old and 16 weeks gestation pregnant woman was scheduled to therapeutic ERCP due to choledocholithiasis under sedation, in 90º left lateral decubitus position. Standard monitoring and bispectral index were applied. A leaded apron was placed at the level of the iliac crests, and the radiation field was kept away from the uterus. Oxygen therapy with HFNC system (OptiflowTM; Fisher and Paykel Healthcare Ltd., Auckland, New Zealand) at 30 l.min-1 and 0.5 Fio2 was placed during the first 5 minutes and, after, Remifentanil 0.03 µg/kg/min for 5 minutes. Propofol 1 mg/kg was given, the flow through HFNC went up to 50 l.min-1 and the endoscope was inserted. Propofol and Remifentanil were maintained at 1-1.4 µg/ml (controlled infusion, Schnider model, effect-site target) and 0.03 µg/kg/min, respectively. Sphincterotomy and stones extraction were performed. ERCP took 32 minutes. Total radiation exposure was <1 mSv. Oxygen saturation remained above 98% all the time. Airway opening maneuvers were not needed. Once awake, the patient remained in PACU for 30 minutes, and was discharged home 2 days later without further complications.
Discussion: As far as we have found in literature, this is the first case that describes the use of oxygen therapy with HFNC in ERCP during pregnancy. Its benefit in obstetric population remains unclear, but some authors have rencently suggested its inclusion in obstetric airway algorithms(3). HFNC in ERCP in this woman could have prevent hazard complications, so it may be a good resource in this and other settings in pregnant women.
References:
1. Ersoz G, et al. Surg Endosc. 2016;30:222-8.
2. Helviz Y, Einav S. Crit Care. 2018;22:71.
3. Shallik N, Karmakar A. Br J Anaesth. 2018;121:511-512.
Learning points: Oxygen therapy with HFNC during ERCP under sedation in pregnant women could increase maternal and fetal safety.

04AP08-3
Acute myocardial infarction (AMI) and in vitro fertilization (IVF): a case report.

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Background: IVF techniques are increasingly used in developed countries. Many patients undergo hormonal therapies producing an ovarian hyperstimulation syndrome that can be complicated with cardiovascular events such as AMI. Close monitoring is necessary to detect and treat possible complications and to confirm the uneventful development of the underlying pregnancy.
Case Report: 32 year old woman,35 weeks pregnant with a history of chronic ischemic heart disease with LVEF 45-50% due to AMI in2016after IVF with dissection AD which was treated with primary angioplasty and drug-eluting stent. She also presents a proximal coronary fistula in the right coronary artery that communicates with the pulmonary artery. In follow-up for consultation of high-risk obstetrics, she maintains treatment with aspirin. During pregnancy she remains cardiologically asymptomatic. Cardiology reported no contraindication for a vaginal delivery, although recommended avoiding a prolonged 2ºstage time to prevent elevation of the blood pressure. The risks of new dissection and deterioration of ventricular function were explained
Discussion: Pregnancy after an AMI is associated with increased morbidity and mortality that will depend on patient's previous cardiac function and the size of the infarction. Patients must undergo a multidisciplinary evaluation, where the cardiologist will evaluate the presence of LV dysfunction. Vaginal delivery will be chosen unless expressly contraindicated. C-section increases the rate of hemorrhage, infection and thromboembolism, which increase myocardial ischemia. It is important to keep the patient stable, avoiding any stress or any situation which may imply a blood pressure elevation: it is a key factor to obtain an optimal analgesic control through epidural analgesia. Measures that reduce postpartum hemorrhage are recommended, avoiding ergometrine due to the possibility of producing coronary spasm. Among the maternal complications cardiac arrest, VT and heart failure stand out. Regarding fetal complications, prematurity and a4%mortality rate are the main concern. Normal ovarian stimulation is a rare cause of AMI,we should always bear it in mind in cases where patients with initial precordial pain after an ovarian stimulation protocol.
Learning points: Patients with previus AMI are patients at risk who need a multidisciplinary evaluation, still vaginal delivery will be the elective technique unless contraindicated. Strict monitoring and follow up during puerperium is mandatory.

04AP08-5
Outcomes of anesthetic techniques in fetal surgery at Sant Joan de Déu Children's Hospital.

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Background and Goal of Study: Advances in prenatal imaging and continued innovations in surgical and anesthetic techniques in fetal therapy have resulted in a wide range of fetal interventions including minimally invasive, open mid-gestation, and ex-utero intrapartum treatment procedures.The anesthetic management should focus on maintaining uteroplacental circulation, achieving profound uterine relaxation, optimizing surgical conditions, monitoring fetal hemodynamics, and minimizing maternal and fetal risk. Fetal anesthesia is necessary in some techniques. Evidence is increasing that from the second trimester onwards, the fetus reacts to painful stimuli and that these painful interventions may cause long-term effects. It is therefore recommended to provide adequate pain relief during potentially painful procedures during in utero life.
Materials and Methods: An observational study included 18 pregnants from february 2018 to november 2018 scheduled in our center to laser ablation of the placental vascular anastomoses (LAPVA), fetoscopic endotracheal occlusion (FETO), cystoscopy catheter, fetal blood transfusion after LAPVA and ex utero intrapartum treatment (EXIT) procedure. Anesthetic technique and any maternal or fetal complications were recorded.
Results and Discussion: The diagnosis were twin-to-twin transfusion syndrome (TTTS), congenital diaphragmatic hernia (CDH), Low Urinary Tract Obstruction (LUTO), cervical teratoma and congenital cystic adenomatoid malformation (CCAM). The anesthetic techniques are shown in table 1. Complication found were hypotension before epidural anesthesia. Fetal anesthesia was only administered in certain cases. No adverse events were evidenced in any fetus.
Table 1.

Anesthetic technique	Number of patients	Fetal anesthesia	Complications
Epidural anesthesia + sedation	7	3	Hypotension
General anesthesia	2	2	None
Local anesthesia + sedation	4	2	None
Deep sedation	4	0	None

Conclusion: These fetal procedures can range from minimal invasive punctions to full open fetal surgery. Providing anesthesia for these procedures is a challenge, where care has to be taken for both mother and fetus. Appropriate patient selection is critical, and a multidisciplinary team-based approach is strongly recommended.

04AP08-6
Use of the Flotrac in laparoscopic adrenalectomy for phaechromocytoma in pregnancy

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Background: The incidence of phaechromocytoma in pregnancy is < 0.2 in every 100000 pregnancies[1]. If left undiagnosed can lead to up to 30% maternal and fetal mortality. Patients presenting for surgery during pregnancy pose a significant challenge to the anaesthetist. We report our experience in managing such a case using the Flotrac as a cardiac output monitor to guide fluid management.
Case Report: A 29yr old lady who was asymptomatic was found to have an abdominal mass on routine health screening ultrasound. Her follow up CTAP showed a 2.8x3.2 cm lobulated mass in the left para-aortic region. Diagnosis was confirmed with elevated urine catecholamines at 14 weeks gestation. She presented for surgery at 17 weeks. A rapid sequence induction using propofol, fentanyl and rocuronium was carried out. She was maintained on an infusion of remifentanyl 1-3ng/ml, lignocaine 60mg/hr, MgSO4 and sevoflurane. Her BP uptrended to 145/77mmHg during tumour manipulation with episodes of ventricular bigeminy. Pre-ligation fluid loading was guided by Flotrac readings using stroke volume variation (SVV). No inotropic support was required post tumour removal,

and she was extubated uneventfully. Post-operative fetal Doppler revealed a good fetal HR and she was discharged home on POD 3.
Discussion: A combination of blood loss, anaesthetic related vasodilation and contracted plasma volume all contribute to exaggerated hypotension post tumour ligation[2]. Large volume intravascular expansion prior to ligation can mitigate this. Prior cases have reported using a pulmonary catheter (PAC)[1] or transesophageal echocardiography (TEE) to guide intraoperative fluid management. The use of a Flotrac in surgery for resection of secretory adrenal tumours has yet to be reported.
References:
1. Dugas G,Fuller J,Singh S,Watson J. Pheochromocytoma and pregnancy: a case report and review of anesthetic management.Can J Anaesth. 2004; 51: 134-138.
2. Ramakrishna H. Pheochromocytoma resection:Current concepts in anesthetic management. J Anaesthesiol Clin Pharmacol 2015;31:317-23.
Learning points: Early diagnosis, adequate preoperative medical optimization, multidisciplinary planning and meticulous intraoperative haemodynamic management are all essential in ensuring a good outcome in this rare but dreaded condition. We find the Flotrac to be a good alternative and less invasive form of haemodynamic monitoring for such cases.

04AP08-7
Anesthesia for elective caesarian in a pregnant woman with unruptured intracranial aneurysm

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Background: Choice of anesthetic technique for elective caesarian in pregnant woman with intracranial aneurysm remains a challenge. Given the pregnancy physiological changes, there is a risk of rupture.[1] There are still no recommendations available for the anesthetic management, due to the scarcity of literature.
Case Report: 38 weeks pregnant, 35 years old, 2G1P, proposed to elective caesarian. History of right posterior cerebral artery aneurysm, submitted to coil embolization 5 years before the pregnancy, asymptomatic. Epidural anesthesia was realized (L3-L4 median approach, with a 18G Tuohy needle and epidural space search with saline solution). A dose of 97,5mg of 7.5% ropivacaine and 0,01mg of sufentanyl was administered in fractioned doses. There were no intercurrences during peri-operatory period, patient remained hemodynamically stable, with no neurological deficits. Discharge was in the 3rd day post-operatively.
Discussion: In parturients with intracranial aneurysm it is crucial to stabilize cerebral vascular pressure to prevent rupture and preserve maternal-fetal well-being.[1]There is a lack of experimental or clinical data to confirm or disprove general or regional anesthesia in this context. Due to physiological changes of pregnancy, general anesthesia may be associated with more complications than regional anesthesia. Laryngoscopy and tracheal intubation are interventions which cause a significant rise in aneurysm transmural pressure, related to a risk of rupture of 0.5-2% and 75% mortality. Epidural anesthesia is a safe technique, if unintentional dural puncture does not occur (abrupt and intense intracranial pressure fall). In this case, the procedure was realized by an experienced anesthesiologist and underwent with no intercurrences. Given the poor literature on this subject, it is important to share case reports. Epidural anesthesia was safe and effective, allowing a stable hemodynamic profile, good post-operatory analgesia and the possibility of early diagnose of intracranial haemorrhage, in the event of its occurrence.
References:
1. Barbarite E., Hussain S., Dellarole A., Elhammady M., Peterson E., The Management of Intracranial Aneurysms During Pregnancy: A Systematic Review, Turk Neurosurg 2016
Learning points: Anesthesia for elective caesarian in pregnant woman with intracranial aneurysm requires a multidisciplinary approach. Anesthetic technique should be adapted to the patient clinical status and anesthesiologist's experience.

04AP08-8
Anesthesia management in a pregnant patient with oropharynx hemangioma: case report

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Background: Hemangiomas are benign vascular tumors that are composed of blood vessels with non-atypia endothelial cells. Oral cavity hemangiomas are observed less than 1% (1). In this case report, we aimed to present our clinical experience regarding spinal anesthesia applied to patient with oral cavity hemangioma which narrowed the oropharynx with uvula, soft palate, and intramuscular extension, for caesarean section operation.
Case Report: In the physical examination of the patient who was planned to undergo cesarean section operation at the 39th gestational weeks, hyperemic lesion which was present for three months and covered left oral mucosa, soft palate and uvula was observed (Figure 1). Lesion compatible with hemangioma which was observed in the maxillofacial MRI of the patient. For spinal anesthesia, 10 mg bupivacaine Heavy was injected by 25 G spinal syringe in the range of L_4-L_5 spinal, the operation was performed.

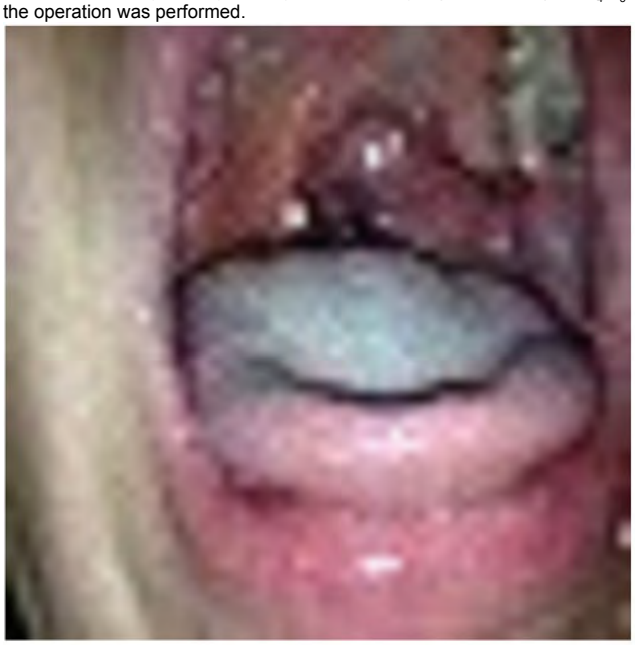

Figure1 Hemangioma, uvula in the soft palate

Discussion: Due to multinodular goiter, Yıldırım et al. provided safety airway management with gum elastic bougie in the patient with upper lip hemangioma with oral cavity extension to be operated. (2). In the case of Nirmal et al, cesarean section operation was safely performed by spinal anesthesia method in a pregnant patient with blue rubber bleb syndrome, after excluding possible venous malformation and hemangioma in the central nervous system (3).
References:
1. Wang M., et al. Cavernous hemangioma of the uvula: report a rare case with literature review. North American Jour. of Med. and Sci. Jan 2015 Vol 8 No 1.
2. Yıldırım S., et al. Anesthesia management in a patient with upper lip hemangioma of the oral cavity. Turk. Anesth and Rean Soc. J. 2011; 39(5): 276-280.
3. MRCOG D., et al. Pregnancy in blue rubber bleb syndrome: a case report. American Jour. of Obst. and Gyne. 2008, Vol 199, Issue 1, e14-e15.
Learning points: In our case with oropharynx hemangioma, because of the presence of rare soft palate and uvula, general anesthesia method was considered as high risk for the patient by considering all airway complications that may develop, especially bleeding, and the patient safety was provided by spinal anesthesia.

04AP09-3
National survey of the practice of obstetric anaesthesia in Austria

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Background and Goal of Study: The aim of this study was to describe the current practice of obstetric anaesthesia in Austrian labour and delivery units by performing a comprehensive questionnaire survey. The secondary aim was to compare the anaesthesia practices with the current guidelines published by the American Society of Anesthesiologists 2016 and by the Association of Anaesthetists of Great Britain and Ireland in 2013.
Materials and Methods: A questionnaire was sent via email to the key anaesthetists of obstetric anaesthesia departments of 81 hospitals registered at the Austrian Ministry of Health. Descriptive statistics and bivariate correlations were carried out on the data.
Results and Discussion: Of 81 obstetric departments contacted, 65 (80%), covering 84% of annual births in Austria, responded to 82 questions. Epidural analgesia was offered universally, with a rate < 30% in 56 (86%) responding hospitals. The caesarean section (CS) rate was < 30% in 44 (68%) of the responding obstetric units. All respondents provided spinal anaesthesia as the primary anaesthesia technique for elective CS. Three (5%) respondents administered long-acting intrathecal morphine and 18 (28%) respondents did not routinely administer any intrathecal opioid. Wound infiltration for acute postoperative pain control was practiced in 2 (3%) responding units. Spinal hypotension was treated using a prophylactic phenylephrine infusion in 2 (3%) responding hospitals. Thirty-one (48%) respondents administered prophylactic antibiotics prior to skin incision. An epidural rate < 20% correlated significantly with the use of nalbuphine ($p < 0.05$). This suggests that the analgesic therapy with nalbuphine appears efficient, making an epidural less necessary. An epidural rate > 20% correlated significantly with the determination of PT and PTT coagulation parameters despite negative history of coagulopathy ($p < 0.05$) and also correlated significantly with pre-labour anaesthetic evaluation and informed consent ($p < 0.05$). Undiscovered coagulopathies are a possible reason for this finding. An early consultation might give the parturients time for a more self-determined decision.
Conclusions: This survey reveals that obstetric anaesthesia practices in Austria differ from current European and American guidelines. A national workforce on obstetric anaesthesia was founded with the goal of international collaborations and the introduction of Austrian practice recommendations.

04AP09-5
Cardiac arrest following magnesium infusion in preeclampsia

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Background: Magnesium sulfate has many indications in obstetric patients: seizure prophylaxis in pre-eclampsia, fetal neuroprotection, tocolytic agent and labor analgesia [1]. We report the case of a parturient who developed cardiac arrest after continuous infusion of magnesium sulfate.
Case Report: A 37-year-old woman, at 27 weeks of pregnancy, developed severe preeclampsia associated with HELLP syndrome. kidney function was impaired with creatinine at 177 µmol/l. She underwent unventfully caesarean section under general anesthesia due to thrombocytopenia. Magnesium sulfate was given with a 4g loading dose over 30 minutes and continued at 1g/hour. 3 hours later, the patient presented a bradycardia arythmia with a heart rate of 35 bpm that responded well to 1 mg of atropine. Afterwards, the patient had an asystolic cardiopulmonary arrest. In light of the patient's renal failure and the magnesium supplementation, a hypermagnesemia was suspected and 1g of calcium gluconate was administered. The patient regained a sinus rhythm after 10 min of the resuscitation measures and remained intubated and sedated. Later on, the laboratory findings revealed a hypermagnesemia of 3.9 mmol/L which led to two hemodialysis session. She was discharged later from hospital with complete recovery.
Discussion: Hypermagnesemia is often diagnosed by associating the timing of adverse effects with the administration of magnesium. In patients with gastrointestinal diseases leading to increased absorption or renal failure leading to decreased excretion. Signs of hypermagnesemia include:vasodilatation, areflexia, muscle weakness, respiratory depression, sinus bradycardia, atrioventricular block, asystole. In this case, calcium administration should be considered to antagonize magnesium. Similar episodes in obstetric patients have been reported, all with good outcomes. The magnesium level was not correlated with clinical manifestation [2].
References:
1. C Dean, J Douglas. Magnesium and the obstetric anaesthetist. International Journal of Obstetric Anesthesia 2013; 22: 52–63.
2. H Morisaki et al. Hypermagnesemia-Induced Cardiopulmonary Arrest Before Induction of Anesthesia for Emergency Cesarean Section. J. Clin. Anesth 2000;12:224-226.
Learning points: Magnesium sulfate should be used with precaution in preeclamptic patients with renal failure. clinical and biological diagnosis of hypermagnesemia is essential to prevent severe adverse events including cardiac arrest.

04AP09-6
Clinical case of successful management of acute myocardial infarction during pregnancy

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Background: Acute myocardial infarction (AMI) occurs during pregnancy with a frequency of 3 to 10 cases per 100,000 childbirth. The development of this pathology accounts for 11% of maternal mortality and 9% of fetal loss.[1]
Case Report: A 42-year-old pregnant woman, pregnant for the third time, hospitalized with complains of severe compressive pain in the cardiac area with irradiation to the left arm and feeling of heaviness in the chest. AMI was registered on ECG. The patient had stage II hypertension, the woman is a smoker, and she`s overweight (BMI- 32). The physical examination shown: SpO2-90%, Ps-110', ABP-140/90mm.Hg, TrI-5.1ng/l.The condition of the fetus was satisfactory. At the hospitalization, fibrillation of the ventricles was recorded and resuscitation measures with cardioversion were performed. The results of the urgent coronary angiography have shown LAD occlusion in its middle portion, and 40% RCA stenosis in the proximal portion. The right side radial artery access was used for occluded LAD segment recanalization and implantation cobalt-chrome coronary stent system. She was prescribed clopidogrel, aspirin, b-blocker therapy. Clopidogrel had been cancelled 5 days before delivery. At 37 weeks of gestation, the patient gave birth to a healthy child by caesarean section under epidural anesthesia. On the 6th day, the patient and her child, were discharged home in satisfactory condition.
Discussion: The optimal management of AMI during pregnancy remains uncertain. [1] European Society of Cardiologists recommends coronary angioplasty as the preferred reperfusion therapy for STEMI during pregnancy with using bare metal stents. In this case, the appointment of dual antiplatelet therapy for 4 weeks is recommended. In our case, a bare-metal stent system has been implanted, which allowed to safely withdraw clopidogrel five days before the elective caesarean section, which had been performed under regional anesthesia and without significant blood loss.
References:
1.Smilowitz NR, Gupta N, Guo Y, Zhong J, Weinberg CR, Reynolds HR, Bangalore S. Acute Myocardial Infarction During Pregnancy and the Puerperium in the United States. Mayo Clin Proc. 2018 Oct;93(10):1404-1414
Learning points: Timely revascularization with using bare-metal stent system, along with a proper anticoagulation allows to safely prolong pregnancy and perform delivery, with the possibility of using regional anesthetic techniques.

04AP09-7
Euglycemic diabetic ketoacidocisis in a parturient with diet-controlled gestational diabetes: it's not a myth!

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Background: Euglycemic diabetic ketoacidosis (EDKA) is an under-recognized and under-diagnosed condition that usually occurs in patients with type I diabetes mellitus (DM). It is defined as a clinical triad comprising of increased anion gap metabolic acidosis, ketonaemia or ketonuria and normal blood glucose levels<200mg/dl. It is a diagnostic challenge since euglycaemia masquerades the underlying diabetic ketoacidosis (DKA).
Case Report: A 21-year-old primigravida (weight 135kg,height 1.65cm),at 36 weeks of gestation was admitted to our hospital for a urinary tract infection. Her medical history included diet-controlled gestational diabetes and methyldopa-treated hypertension. On admission, BP was 140/110mmHg with mild proteinuria. Two days later, she felt sick after a short period of vomiting, with tachypnoea and tachycardia. ABGs revealed a pH of 7.12,$PaCO_2$ 24mmHg, PO_2 107mmHg, and HCO_3 7.8mmol/L. Foetal monitoring and ABGs led us to proceed to emergent caesarean delivery. A rapid sequence induction with propofol and succinylcholine was conducted uneventfully. A radial artery catheter was placed and repeated ABG measurements confirmed a severe metabolic acidosis. Patient's blood glucose levels were repeatedly below 129mg/dl. Conditions causing high anion metabolic acidosis were considered. Serum lactate and renal profile were normal. There was a high suspicion of EDKA,so she was started on insulin and dextrose infusion. Also,4 amp of 40mEq sodium bicarbonate and 3L of crystalloid were administered. After the umbilical cord was clamped,5IU oxytocin and 0.5 mg fentanyl were administered

intravenously. Within 3 min of induction,a baby was delivered with Apgar scores 6 and 7 at 1 and 5 min, respectively. Morphine 10mg and acetaminophen 1000mg iv were administered. After the operation, she remained intubated and was transferred to the ICU for further management of her DKA. The baby was transferred to the neonatal ICU for further support.
Discussion: The exact mechanism is not known, EDKA has been associated with starvation, alcohol intake, inhibition of gluconeogenesis. Mostly occurs in type I DM, but can possibly occur in type II, as well.It has also been reported in patients with sodium-glucose co-transporter (SGLT-2) inhibitor treatment.
Learning points: Consider ketosis in patients with DKA, even if serum glucose levels are normal. High clinical suspicion is required to diagnose EDKA. Not necessarily in insulin-dependent patients. Vomiting is the most frequent symptom.

04AP09-8
Delayed recovery from general anaesthesia after a C-section: a case report

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Background: Differential Diagnosis(DD) of delayed recovery from general anaesthesia(GA) can be classified into: drug effects, metabolic disorders or neurologic disorders. We present the case of a delayed emergence after a C-section.
Case Report: A 34 yopregnant woman, with previous history of hypertension was admitted to the delivery room. Epidural catheter was placed, Ropivacaine and Sufentanyl were administered. Pain relief was satisfactory without neurologic signs. Fifty minutes later, a sustained foetal bradycardia led to an urgent c-section and an anaesthetic dose of Ropivacaine was administered through the epidural catheter. Loss of foetal focus turned c-section to emergent, leading to GA. Rapid sequence induction was accomplished(Propofol and Succinylcholine). Sevoflurane was used for maintenance. Baby was born with Apgar 2/8/9. Although the MAC of Sevoflurane was zero for 20 minutes, no muscular or respiratory movements were noticed. Besides bilateral mydriasis, no other aspect of physical assessment or standard monitoring was altered. Patient was sent to theemergency room. Residual curarization was assumed the most likely cause, serum pseudocholinesterase were measured(normal). Arterial blood gas and Cranioencephalic CT scan were normal. Aspiration of the Epidural catheter was positive for CSF, confirming migration into subarachnoid space and High Neural Blockade(HNB). Four hours later spontaneous ventilation was noticed.The patient was discharged completely recovered a few hours later.
Discussion: Suspicion of HNB is present when symptoms like dyspnea, numbness, nausea or hypotension occur after an epidural or spinal anaesthesia. These expected symptoms can be masked by GA.Epidural catheter migration is well documented, but most cases involve prior puncture of the arachnoid mater. Crucially, negative aspiration and dose tests after placement of the catheter do not exclude HNB.
Learning Points: Delayed recovery from GA can have many causes. DD can be hard in stressful situations. HNB is a possible cause of delayed recovery from GA, and must be suspected if spinal anaesthesia is performed. Apparently normal epidural catheters placement procedures, previous normal aspiration and test doses does not exclude HNB. Routinely testing Epidural catheters can reduce the incidence of HNB.
References:
Auroy Y, Benhamou D, Bargues L,et al. Major complications of regional anesthesia in France:The SOS Regional Anesthesia Hotline Service. Anesthesiology 2002;

04AP09-9
Fatal outcome of pregnant women in the 22nd week of gestation due to late detection of acute promyelocytic leukemia – case report

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Background: Acute promyelocytic leukemia (APL) is a subtype of acute myeloid leukemia due to abnormal growth and incomplete maturation of granulocytes called promyelocytes. The association of leukemia and pregnancy is extremely rare. The frequency is 1 in 75 000-100 000 pregnant women. The onset of APL is characterized by non-specific symptoms such as elevated temperature, feeling cold, weakness, pale skin, bone and joint pain, and later petechial bleeding and ecchymoses on the skin.
Case Report: The patient, 33 years of age, in fifth attempts in vitro fertilization remained pregnent. A couple of days before hospitalization, the patient contacted her gynecologist for an increased temperature, weakness, joint and bone pain, and pale skin. Blood tests were inside of the reference values. The patient was hospitalized in the 22nd week of gestation, because she no longer felt the fetal movement. Ultrasound has established fetal death and pregnancy termination was induced. Four hours after pregnancy termination, patients condition has drastically worsened with epileptic seizure, lost consciousness and haemodynamic instability. She was intubated, connected to mechanical ventilation and placed on continuous inotropic support of noradrenaline. Blood tests showed a drastic drop in platelets and leukocytes. Due to lack of diuresis, the patient was connected to CVVHDF the following day. A peripheral blood smear was made, the diagnosis of thrombotic thrombocytopenia purpura is proposed and indicated therapeutic plasmapheresis. Sternal puncture was suggested and after examination, diagnosis of APL occurs and therapy was introduced. Unfortunately, the patient died the next day.
Discussion: The association of APL with pregnancy is extremely rare. If APL occurs in the first trimester of pregnancy, this pregnancy is most commonly terminated by spontaneous abortion. Early diagnosis of APL in the second and third trimester of pregnancy gives a chance for completed pregnancy and childbirth without complications.
References:
Sanz, M.A., Montesinos, P., Casale M.F. et al. Maternal and fetal outcomes in pregnant with acute promyelocytic leukemia. Ann Hematol. 2015 Aug; 94(8):1357-61
Learning points: Taking into account the non-specific symptoms that this disease begins - it is necessary to pay attention to any rise in temperature and symptoms similar to colds or flu in pregnant women, for the purpose of early detection and diagnosis APL, what is crucial to saving lives.

04AP09-10
Complete atrioventricular block in pregnancy: a case report and review of management

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Background: Maternal complete hearth block (CHB), which manifests for the first time during pregnancy and puerperium, poses a challenge to treating physicians. Because it is a rare association (its incidence is 1/20000), there are no established guidelines for the management of these patients.
Case report: A 23-year-old primigravida presented to the obstetrics emergency at 36+6 weeks gestational age for spontaneous rupture of membranes. She had known history of asymptomatic bradycardia since the age of 3, never investigated. On examination, no abnormality was revealed. We thought it might be congenital CHB. A multidisciplinary approach was taken, temporary transvenous pacemaker was implanted. Plan was to proceed with cesarean section under general anesthesia. During the pacemaker impantation, the patient entered in spontaneous labor and an instrumental uneventful delivery was performed. A permanent pacing was done two weeks after delivery using dual-chamber pacemaker in DDDR mode.
Discussion: Most cases reported in the literature were managed by temporary pacing in labour with insertion of permanent pacemaker at a later date. Khardke et al. recommended temporary pacing in patients with atropine-resistant bradycardia, first- and second-degree AV block and atrial fibrillation with low ventricular rate. Similarly, there is no definite recommendation regarding permanent pacing[1].There are no specific recommendations as regards the mode of delivery in these patients. There is no specific reason not to allow labor and vaginal delivery in mother with CHB, excluding obstetric indications. Augmentation of labor to shorten the active labor phase and elective instrumental delivery has been recommended. Studies suggested that regional anaesthesia is safe in pregnant women with cardiac disease undergoing caesarean section. Haemodynamic stability can be obtained by using of incremental epidural top-ups with a concentrated solution[2]. If general anaesthesia is required there is no reason why it should not be administered, although perioperative cardiac rhythm disturbances due to arrhythmogenic and depressant effects of volatile anaesthetic agent and intravenous anesthetic drugs are documented[3].
References:
1. K. Baghel Pregnancy with complete hearth block;
2. Suri V. Maternal complete heart block in pregnancy: analysis of four cases and review of management;
3. O. Adekanye Bradyarrhythmias in pregnancy: a case report and review of management
Learning points: CHB management

04AP10-1
Can we predict who will complain postspinal headache after cesarean delivery? Role of matrix metalloproteinases

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Background and Goal of Study: Matrix metalloproteinase (MMP) family has a role in remodeling of extracellualr matrix as a physiologic process or may cause pathologic conditions like cancer and inflamatory or neurologic diseases. Particularly MMP-9, which is structurally a gelatinase and released from neutrophils by exocitosis, might have a critical role in wound healing via angionesis. Therefore, incidence of postspinal headache might be related to MMP-9 levels. Hereby, we aimed to investigate whether there is an association between postspinal headache incidence and MMP-9 levels in parturients scheduled for elective cesarean section under spinal anesthesia using different diameters of spinal needles.
Materials and Methods: After ethics committee approval, parturients were randomly assigned to 2 groups to perform spinal anesthesia with either 25 or 27 gauge (G) spinal needles. Each group's name were initially enclosed which type of spinal needle to be used before onset of study. After disinfection and local anesthetic infiltration into skin, spinal block was performed using either 25 G (n = 87) or 27 G (n = 82) spinal needle in the sitting position. When free flow of cerebrospinal fluid (CSF) was observed, 1 ml of CSF was collected to be stored in -80°C for further biochemical analysis of MMP-9 levels via ELISA. Then 12 mg of hyperbaric bupivacaine with fentanyl 10 µg+morphine 100 µg was administered intrathecally. After achieving a sensory block level at T4 dermatome, onset of surgery was allowed. Patients were questioned for postspinal headache at postpartum 48 hours at the hospiatl and called 5 days after discharge to check whether there was a postspinal headache or not at home. Kolmogorow simirnov and chi square tests were used. P value less than 0.05 was considered as statistically significant.
Results and Discussion: MMP-9 levels in CSF were significantly higher in subjects underwent spinal anesthesia with 27 G. Although healing of dural hole could have been expected to be faster, rate of postspinal headache was comparable.

	Group G n=87	25 Group G n=82	27	p
MMPs-9 in CSF (ng/L) median	74.7	365.3		0.0001
Postspinal headache rate %	25.3	14.6		0.124

Conclusions: Analyses of CSF biomarkers might imply a pathophysiological role in

04AP10-2
Predictive factors of dissatisfaction of spinal anesthesia for caesarean section

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Background and Goal of Study: Spinal anesthesia (SA) side effects can affect the parturient women's satisfaction with it and make them refuse it for a later surgery. The aim of our study was to determine the factors predicting the dissatisfaction of parturient women after a SA for cesarean section and to identify the possible causes of the refusal of a later SA.
Materials and Methods: It was a prospective analytical study, including 500 parturient women proposed for cesarean section with SA. The data collection was carried out by a questionnaire concerning three periods (pre, per and postoperative period) and which was filled by the anesthetist doctor who performed the SA.
Results and Discussion: The dissatisfaction rate was 7.1%. Predictive factors of dissatisfaction retained by the multivariate analysis were: the non-use of pencil-tip needle (p = 0.037, OR = 0.211, 95% CI: 0.049-0.913), paresthesia (p = 0.011, OR = 2.607, 95% CI: 1.243-5.470), hypotension (p = 0.002;OR = 22,766; 95% CI: 3.065-169.118) and post dural puncture headache (p = 0.066, OR = 2.181;95%: 0.951-4.999). About 8.6% of parturient women expressed their refusal of a possible later SA. The multivariate analysis showed that the possible causes of refusal of the SA were non-use of pencil-tip needle (p = 0.05, OR = 0.132, 95% CI: 0.017-1.002), paresthesia(p = 0.001, OR = 4.114, 95% CI: 1.846-9.171), postoperative nausea and vomiting PONV (p = 0.013, OR = 3.173, 95% CI: 1.281-7.862)and the dissatisfaction of the parturient women (p <0.001, OR = 24.637, 95% CI: 10.161-59.737).
Conclusions: The assessment of the satisfaction has become an increasingly important element in every patient's management. The study of this element among parturient women made possible to determine the most discriminating predictive factors of dissatisfaction with SA that were: the non-use of pencil-tip needle, paresthesia, hypotension and headache. Additional efforts must be made to overcome these factors, including pencil-tip needles' providing and the development of well-studied protocols to struggle against hypotension and its consequences.

04AP10-3
Risk factors for neonatal acidosis during elective caesarean section under spinal anaesthesia: a retrospective study of 559 patients.

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Background and Goal of Study: Neonatal acidosis is associated with neonatal morbidity and mortality. Only a few studies have assessed risk factors for neonatal acidosis during a caesarean section under spinal anesthesia (SA). Furthermore, no studies have analyzed anaesthetic, maternal, obstetrical and fetal parameters at the same time. Our work aims to identify risk factors for neonatal acidosis in this setting.
Materials and Methods: Retrospective, monocentric, descriptive study. Caesarean sections performed under SA between January 1st, 2011 and December 31st, 2016 were included. Co-infusion of ephedrine and phenylephrine was used for haemodynamic stability. Intraoperative anaesthetic data were extracted from a computerized data warehouse, and maternal, obstetrical, fetal and neonatal data were collected from the medical files. The primary endpoint was the occurrence of neonatal acidosis, defined as umbilical cord arterial pH (UApH) < 7.20. Urgent deliveries, use of intra-venous anaesthetic agents and missing data about maternal arterial blood pressure and UApH were excluded. After bivariate analysis, values with p < 0.2 were included in multivariate analysis, to identify independent risk factors of neonatal acidosis.
Results and Discussion: 559 patients were analyzed. The incidence of acidosis was 13.3%. Maternal arterial hypotension (systolic arterial pressure drop under 80% of baseline measured before SA) and maternal total amount of phenylephrine used between induction and birth, were associated with neonatal acidosis in multivariate analysis (respectively, OR = 2.30; 95%CI 1.30 - 4.25, and 4.87; 95%CI 1.22 - 19.07). Maternal hypotension duration was associated with neonatal UApH (Pearson coefficient r = -0.14, p=0.001). Mother's age, diabetes mellitus, obesity, previous caesarean, induction-to-delivery time and total amount of ephedrine were not associated with neonatal acidosis in our population. Low placental perfusion and impaired cardiac output by increased afterload may account for these results.
Conclusions: This study suggests that neonatal acidosis during Caesarean section under SA is highly influenced by anaesthetic parameters, especially maternal hypotension, total amount of phenylephrine and duration of hypotension. Reinforcing prevention, early detection and treatment of maternal hypotension, and reducing caesarean duration to limit phenylephrine consumption could reduce the incidence of neonatal acidosis.

04AP10-4
Incidence of general anesthesia (GA) in urgent caesarean sections (CS) between 2010-2018 in the Obstetric Anaesthesiology Service of the General University Hospital Gregorio Marañón

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Background: Epidural analgesia(EA) for labor is the key element for pain management in the obstetric patient. In our center 90% of the patients receive this procedure, albeit being the most oftenly used means for reinformcent prior to obstetric procedures or for pain management. However, we know that ocasionally this technique is unsuccessful and needs to be reconverted into GA. **The goal** of our study is to determine the incidence of reconversion from RA to GA for emergency CS.
Materials and Methods: Descriptive, observational and cross-sectional study where we collected the information regarding 323660 epidurals performed between June 2010 and November 2018.Informed consent was signed by the patients. Data related to the anesthetic technique was also recorded. After 24 hours we collected information of the type of delivery, type of anesthesia used as well as possible anaesthetic complications.
Results and Discussion: A total of 32366 women received epidural analgesia, out of which 3328 underwent emergency CS.This represents an incidence of 10.28%.The number of instrumental deliveries amounted to 12802 (39.57%) and the rest (16236 – 50.15%)resulted in eutocic deliveries.GA was necessary in 84 of the cesarean sections (2.52%),and in 5 of the instrumented deliveries (0.039%);in the rest (97.48%) RA was adequate for the surgical procedure. EA for labor has exponentially decreased the incidence of GA in CS. In the case of an urgent CS, if the epidural anesthesia was not optimal, it became necessary to change the technique to GA as it is a rapidly effective technique although it can be associate with an increased morbidity and mortality both for the mother and the fetus caused by airway manipulation and the risk of bronchoaspiration. Also, women want to be awake. In relation with the rates of emergency CS performed under RA, a multicentric study in the US resulted in a 93% while in our centre we managed to

reach up to 97.48%,which reflects an adequate management EA in the obstetric patient. It also reflects the excellent training received by our trainees who perform an important percentage of the RA with a RA failure rate for emergency CS below 3% compared with 15% published in the UK.
Conclusion: Success rate of obstetric RA in emergency CS is very high, which allows patients to avoid GA and its complications. The low rate of GA for emergency CS may result in an insufficient training for our residents. We believe that simulation could prove to be a very useful tool for training.

04AP10-5
Patient general satisfaction after continuous epidural perfusion of ropivacaine and sufentanil for analgesia after Caesarean Section – A prospective analysis

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Pain after Caesarean Section (PAC), is a common secondary effect inherent to this intervention, and it's control is indispensable for well-being of mother and newborn. Epidural perfusion of local anesthetic is effective in PAC control. Prospective randomized study comparing two epidural analgesic methods after Caesarean Section: epidural perfusion of ropivacaine (1mg/ml) and Sufentanil (0,2ug/ml) at 2ml/h (group RoSu) vs Epidural bolus of Morfine (2,5 mg) each 24 hours (group BME). The goal was to find significant differences between the groups in the first 48 hours of post-operative (PO).
After ethical approval, we gather a sample of 96 puerperal women that were randomized to RoSu or BME. Regarding multimodal analgesia, every woman had similar intravenous medication. Data collection was made every 12 hours until 48 hours of PO: rest and movement pain according to Verbal Numerical Scale (VNS); Nausea and vomiting; interference with newborn care; interference with deambulation; General satisfaction with the analgesic technique. Statistical analyses was made recurring to software SPSS 20.0. We calculated standard deviation (SD), mean of VNS (MVNS) and used T-Student test to compare means between groups.
MVNS at 12 hours in rest for BME was 1,50 (SD=2,41) and for RoSu was 3,22 (SD=3,09). In movement at 12 hours, BME had a MVNS of 4,84 (DP=2,91), and RoSu group of 6,42 (DP= 2,79). These results had statistical significance (p value<0,005). Pain scores in rest and movement at 24, 36 e 48 hours were higher for RoSu group. BME group had significantly more nausea and vomiting episodes. Interference with deambulation and newborn care was significantly worst in RoSu group. The final score of general satisfaction was worst in RoSu group.
RoSu Group had no analgesic advantages comparing with BME group. In some timings, the advantages of BME group was statistically significant. MVNS values were always superior in movement. There was a bigger interference with newborn care and with deambulation in RoSu group, which leads us to think the presence of a "fisical device" can have a negative effect on that field. As investigators, we don't want to discredit continuous epidural analgesia with local anesthetic and opioid. We believe that a higher speed of perfusion in RoSu group and reduction in ropivacaine concentration could bring more favorable results. The main limitation was the impossibility of varying the speed of epidural perfusion, because of the chosen devices.

4AP10-6
Hemodynamics during spinal anesthesia in preeclampsia

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Background and Goal of Study: To determine the influence of spinal anesthesia (SA) on arterial blood pressure (BP) in parturient with preeclampsia undergoing elective C-section (CS).
Materials and Methods: we evaluated 40 preeclamptic parturient (systolic pressure>160/110 mmHg) undergoing CS that had received general GA (n = 20) or low-dose spinal anesthesia SA (n = 20). SA consisted of 8-10 mg of isobaric bupivacaine plus 20 µg fentanyl. The most frequent indications for C-section among the groups did not differ.
Results and Discussion: The perioperative blood pressure (BP, systolic, diastolic, MAP) during SA in preeclamptic parturients were generally stable and comparable to parturients received GA. The largest fall in BP (MAP) occurred in the 5 th min (±0.8) of spinal puncture (87.3±8.5 mmHg vs. 100.0 mmHg±15.5 with GA, p <0.05), was short-lived (<1 min±0.8) and was easily corrected with low-dose boluses of IV ephedrine (5mg±2,8). During the further period (up to 60 min) there were no significant drops in BP with spinal group and they did not differ significantly compared to that of GA. Neonatal acid-base parameters (pH, BE) between the groups did not differ significantly (7.23±0.08, BE-5,49 ±2.4 vs. 7.24±0.03, BE-4.35 ±1.91in the GA group, p> 0.05), but the Apgar scores from newborns delivered with SA show better results than those from GA (p<0,05).
Conclusions: SA in preeclampsia is not associated with serious spinal-induced hypotension. The most likely reasons for this phenomenon include both the altered response of small vessels to the sympathetic block as well as a presence of high level of powerful pressure factors in a preeclampsia. However, we need more studies to elucidate the definitive confirmation of this statement.

04AP10-7
Ondansetron for prevention of hypotension following spinal anaesthesia in women undergoing cesarean section: a retrospective analysis

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Background and Goal of Study: Hypotension and bradycardia are common in patients undergoing cesarean section under spinal anesthesia (SpA). There is evidence that the Bezold-Jarisch reflex, mediated via type 3 serotonin (5-HT3) receptors, can also be held responsible for this[1]. Present results on the efficacy of 5-HT3 antagonists to prevent SpA-induced hypotension are ambiguous[2),3)]. Using retrospective data analysis, we therefore investigated whether blockade of 5-HT3 receptors by prophylactic i.v. administration of ondansetron (ODS) reduces hypotension or bradycardia under SpA.
Materials and Methods: The local ethics committee deemed the study exempt from review. 143 women (aged 33 +/-5 [mean +/- sd] years, ASA 1 and 2) undergoing elective cesarean section (05/2017–12/2018) were analysed retrospectively. 80 of them had received ODS prior to SpA, while 63 had not. Exclusion criteria were cardiovascular diseases, medication related to serotonin (ant)agonism, emergency procedure, and blood loss of more than 1000 ml. Blood pressure, dosage of vasopressors before and up to 15 min after SpA and heart rate (HR) were analysed.
Results and Discussion: Comparing the two groups (with/without ODS), there was no significant difference in mean arterial blood pressure before SpA (108 vs. 105 mmHg, p > 0.5), after 1-5 minutes (80 vs. 83 mmHg, p > 0.05), 6-10 minutes (78 vs. 73 mmHg, p > 0.05) and 11-15 minutes (81 vs. 80 mmHg, p > 0.05). Incidence of bradycardia (HR < 50) was decreased in the ODS group (n = 6 vs. n = 9), with significantly less severe HR reduction (mean HR 47 vs. 35, p < 0.05). However, vasopressor use was significantly higher in the ODS group (+57 %, p < 0.05).
Conclusions: In contrast to prior (smaller) studies, we could not see a significant effect of prophylactic administration of 8 mg ODS on the reduction of blood pressure drops during elective cesarean section under SpA. Additionally, more vasopressors were needed in the ODS group. There was a significant reduction of the severity of bradycardias in the ODS group, however, this might also be due to increased vasopressor use. We conclude that the prophylactic application of ODS prior to SpA has no positive influence on cardiovascular stability.
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Acknowledgements: This abstract contains part of the doctoral thesis of CHG

04AP10-8
Total spinal block after CSE for cesarean delivery: case report.

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Background: Neuraxial anaesthesia is the anaesthetic choice for caesarean delivery due to its advantages compared to general anaesthesia in pregnant woman. However, with the increase of obese parturients worldwide, combined spinal-epidural (CSE) can be the anaesthetic technic for them but, complications, such as total spinal block, can occur.
Case Report: M.V.A., 42yo female, BMI: 40kg/m 2 , 38w3d, G3 with 2 abortions, gestational diabetes insulin-dependent, requested C-section for delivery. The anesthetic choice was CSE to prevent high spinal block and provide postoperative analgesia. Epidural catheter placement was first performed with 16G Tuohy needle in L2 – L3 lumbar space, with no difficulties. Subarachnoid anesthesia was attempted with 25G Quincke needle in L3-L4 and L4-L5 by three anesthesiologists with no success. Therefore, lidocaine 2% with epinephrine in the epidural catheter was the anesthetic choice. The catheter was previously tested and 20ml (4mg/kg) was injected. As soon as the patient was positioned for C-section, she complained of difficult breathing, numbness and became irresponsive, with low mean arterial pressure, bradycardia and mydriatic pupils.

The patient was intubated, central venous line and invasive monitoring was assessed and ephedrine IV bolus was the choice for maintaining mean arterial pressure. The obstetric team performed emergency C-section, new born was Apgar 8/9, 5 minutes after the lidocaine injection. After C-section, patient was assisted until she presented adequate respiratory rate and tidal volume for safe extubation, around 240 minutes after injection. She was transferred for ICU for complete recovery.
Discussion: Total spinal block complication occur in 1 out of 4000 obstetric neuraxial anesthesia, and obesity is a risk factor for this complication. With increasing number of obese patients in our practice, we should be prepared to assist the patients, providing airway protection and hemodynamics support for better outcomes.
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Learning points: Total spinal block can be a threatening complication after an epidural catheter placement and advanced life support should be fastly provided for the patient.

04AP10-9
Management of a repeat Cesarean section for a patient with achondroplasia, atlantoaxial instability and an intravascular epidural catheter

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Background: Achondroplasia is the most common bone dysplasia in humans causing dwarfism and occurs in 1 in 15,000-40,000 live births worldwide.1 Limited neck extension, a large tongue, large mandible, and atlantoaxial instability can lead to difficult airway management. Furthermore, achondroplasia patients often present with severe kyphosis, scoliosis, spinal stenosis and an unpredictable spread of local anesthetics in the epidural and subarachnoid spaces making neuraxial anesthesia management more difficult. Physiological changes of pregnancy with achondroplasia lead to potential hypoxia from restrictive lung disease, severely decreased functional residual capacity, increased risk of gastric aspiration and an increased risk of supine hypotension. In this case report, we describe the anesthetic management of a parturient with achondroplasia undergoing repeat cesarean section (CS).
Case Report: 41 yo G6P1 54kg and 122 cm tall parturient with achondroplasia and atlantoaxial instability presents for repeat CS. Her first CS was done with a combined spinal epidural (CSE) with 3.75mg spinal bupivacaine and 14mg 2% epidural lidocaine to achieve surgical block. For this repeat CS, we placed a CSE with 7.5mg spinal bupivacaine, 15mcg fentanyl, and 150mcg spinal morphine and a T4 dermatomal level was achieved. The goal was to provide sufficient neuraxial anesthesia and to avoid airway manipulation and general anesthesia. The patient tolerated the surgery well. The epidural catheter was meant to be kept indwelling for post-operative pain management, however, when aspirated, the epidural catheter was found to be intravascular.
Discussion: Complications during neuraxial anesthesia are common in patients with achondroplasia. Failed or high spinals can occur due to dysfunctional anatomy or the duration of spinal anesthesia might be too short with reduced dosages.2This presents the danger of possible airway manipulation in patients with atlantoaxial instability, short necks and a potential difficult intubation. Hence, placement of a CSE provides patient safety by the ability to prolong neuraxial block and having the epidural catheter is almost crucial. Ultrasound guidance has been shown to improve success of epidural placement in these patients.3
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04AP10-10
Epidural anaesthesia for caesarian section in patient with Chiari malformation

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Background: Chiari malformation is a group of congenital diseases characterised by the prolapse of hindbrain structures below the level of the foramen magnum. It is often accompanied by the syringomyelia. Chiari malformation occurs in 0.1-0.5 percent of population. Anaesthesia for caesarian section in patients with Chiari malformation may be conducted in several ways: general anaesthesia, spinal or epidural.
Case Report: 29-year old, female patient who was scheduled for planned caesarian section was evaluated as ASA II. The reason for caesarian delivery was the patient's refusal to the vaginal delivery in the breech presentation. The patient had Chiari I malformation, confirmed by MRI, without the signs of brainstem compression and syringomyelia. The surgical correction had not been performed. Due to the benign course of the disease and low risk of the brainstem dislocation in the case of accidental dural puncture the epidural anaesthesia had been chosen. Epidural catheter at the level of L3-L4 was placed and 15 ml of ropivacaine 0.75% after test dose was injected. Patient remained haemodynamically stable and the operation was conducted without complications. Postoperative multimodal analgesia included paracetamol 1 g orally every 6 hours, dexketoprofen 50 mg iv every 8 hours and patient-controlled epidural analgesia with 0,125% ropivacaine. The patient was discharged 4th day after surgery in the satisfactory condition.
Discussion: We could not find any randomized controlled trial comparing different anaesthesia approaches for the cesarian section in patients with Chiari malformation. Data based upon the case reports and case series suggest that in patients with benign course of disease both epidural and spinal anaesthesia may be safely conducted. General anaesthesia is the method of choice when the signs of elevated intracranial pressure or brainstem compression are present and surgical correction has not been performed.
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Garvey GP, Wasade VS, Murphy KE, Balki M. Anesthetic and Obstetric Management of Syringomyelia During Labor and Delivery: A Case Series and Systematic Review. Anesth Analg 2017;125:913-24.
Learning points: Epidural is the simple and safe anaesthesia method for planned caesarian section in patients with Chiari malformation without syringomyelia and signs of the brainstem compression when the surgical correction has not been performed. Further investigations and randomized controlled trials for this issue are needed.

Paediatric Anaesthesiology

05AP01-1
Postoperative single blinded randomized controlled study comparing the efficiency of epsolon-aminocaproic and tranexamic acid in pediatric patients undergoing elective idiopathic scoliosis surgery

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Background and Goal of Study: Epsolon-aminocaproic acid (EACA) and tranexamic acid (TXA) are routinely used to prevent significant blood loss during multilevel pediatric scoliosis surgeries. Efficacy of these anti-fibrinolytic drugs was demonstrated in cardiac, total joint arthroplasty, and in adult spine surgeries. To date very few stydies have compared the efficacy of these drugs in multileval pediatric scoliosis surgeries. Purpose of this study was to compare the efficacy of EACA and TXA in reducing intraoperative blood loos, post-operative drain output and blood transfusion requiements.
Materials and Methods: This is a single center, prospective, single blinded, randomized controlled pilot study compairing the efficacy of TXA and EACA used intra-operatively in pediatric patients undergoing multileval idiopathic scoliosis corrective surgery. After obtaining IRB approval, idiopathic scoliosis patients undergoing corrective surgery were randomly assigned to one of the groups-TXA or EACA. the following parameters were analyzed: intraoperative estimated blood loss (EBL), perioperative blood transfusionrequirements, surgical drain output on postoperative day (POD)-1, POD-2, POD-3, and total 72h drain output
Results and Discussion: Forty six patients were randomly assigned to receive TXA (n=23) and EACA (23). Groups were similar at baseline with regards to weight, starting hematocrit level, and gender distribution. Age and number of the levels fused were different in the groups. The median (25th and 75th percentile) EBL in TXA and EACA groups were 600 (400-800) and 600 (450-800) milliliters respectively, p value 0.580.The median 72 hours drain output in the TXA and EACA groups were 300.5 (186.5-553) and 330 (165-513) respectively, p value 0.991. Additionally, there were no difference in the blood transfusion requirements between the two groups.
Conclusions: TXA and EACA showed no difference in EBL, 72 hours drain output, and blood transfusion requirements in patients undergoing idiopathic scoliosis repair. The end points analysis did not demonstrate superiority of one drug over the other. Limitations of the study are single center, small sample size, anesthesiologist was not blinded to the treatment and occurrence of baseline differences in the two proups.

05AP01-2
Single center 4-year review of Anaesthesia in Endoscopic craniosynostosis repair

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Background and Goal of Study: The aim of this study was to evaluate anaesthetic management in endoscopic strip craniectomy in order to analyze blood loose and blood components use.
Materials and Methods: A retrospective chart review was performed for patients diagnosed with craniosynostosis who underwent endoscopic repair at our institution through January 2015 to August 2018. Anaesthesiological parameters were analysed, blood loss and blood transfusion rate were measured.
Results and Discussion: 45 patients matched inclusion criteria, the mean age was 4,18 months (SD=1,19) at a mean weight of 6,93 kg (SD=1,46). Comorbidity was registered in 13 (20%), the most frequent comorbidity observed was prematurity (5 patients: 11,1%). Mean basal hematocrits was 33,46% (SD=2,77). The mean calculates blood loss[1] (CBL) was 12,9 mL/kg (SD=11,5) and blood transfusion rate was 93%. Mean duration of surgery was 107 minutes (SD=39,4). Controlled hypotension was maintained with remifentanil-sevoflurane in 44/45 patients (97,7%) and tranexamic acid was administered in 33/45 patients (73,3%). No detection of venous air embolism was found based on End-tidal CO2.

	SAGITAL (n=27)	METOPIC (n=10)	CORONAL (n=6)	LAMBOIDAL (n=1)	BI-CORORNAL (n=1)
CBL mL/kg (MEAN+/-SD)	14,3 (9,6)	5,3 (11,5)	18,7 (16,6)	13,8	29,6
PRBC mL/kg (MEAN+/-SD)	17,8 (8,9)	20,5 (8,7)	17,7 (7,7)	0	17,5
ICU TRANSFUSION %	33%	0%	16,7%	0%	0%

All patients were admitted to ICU after surgery (average time 1,1 days, SD=0,33). Average PRISM score was 1,6 (SD=1,5). Mean hematocrits on ICU admission was 35,42% (SD=4,9). 10 patients were transfused in the postoperative period (22,2%).
Conclusions: We report a blood transfusion rate of 93% much higher than published data[2]. There is lack of objective threshold for transfusion, standardisation of antifibrinolytic treatment regimen and preoperative haemoglobin optimisation. Future interventions are required.
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05AP01-3
Traumatic limb amputation in a patient with Total Cavo-Pulmonary Correction (TCPC)

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Background: It is not uncommon for people who have undergone cardiac surgery to present in the emergency department in need of urgent non-cardiac surgery. In such cases the modified cardio-pulmonary physiology and its repercussions on anesthesia are very important. Total cavo-pulmonary connection is usually performed on children with a single ventricle.
Case Report: We present a 7 year old boy who had undergone a staged Total Cavo-Pulmonary Connection at an early age who presented in the emergency department with an amputated foot from a lawn mower. The boy was pale, tachycardic and hypotonic. His history revealed a good functional capacity in his everyday activities. His therapy included Sildenafil and Acenocoumarol. People with TCPC have a passive circulation of the lungs which is very dependent on preload and pulmonary resistance hence the Sildenafil (1). Oxygenated blood from the lungs is pumped from a single ventricle to the systemic circulation (2). In his case preload was reduced because of blood loss, which was worsened by his Acenocoumarol therapy. Volume substitution was begun, but it was estimated that he would be a poor candidate for general anesthesia. Ventillation with positive pressures increases pulmonary resistance and combined with hypovolaemia could lead to severe hemodynamic compromise. It was decided that he should receive light sedation and a popliteal block. The block was done under ultrasound and in 20 min surgery was begun. The patient remained hemodynamically stable during the intervention and was later transferred to the PICU for monitoring and volume correction.
Discussion: Children who have undergone open heart surgery present unique physiological circumstances and their interaction with positive pressure ventilation and hypotonia from induction or maintenance can lead to severe hemodynamic compromise.

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05AP01-4
Anesthesia for Bilateral Lung Hydatid Cyst in a Child

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Background: Hydatid disease is a parasitic infection caused by paraeite, echinoccocus granulosus, characterized by cystic lesion in the liver, lungs and rarely in other parts of the body.
Case Report: A four years female child was hospitalized due to a verified bilateral hydatid cysts of lung. The child coughed and had chest pains. Preoperative preparation provides corticosteroids, antihistaminics and abendazole. The child premedicated with midazolam 0,5mg/kg. Induction was with 2µgr/kg fentanyl, 3,5mg/kg propofol and 0,5mg/kg atracurium. Atraumatic intubation was performed with a 4,5mm diametar cuffed endotracheal tube. Anesthesia was maintained with a combination of propofol (7-10mg/kg/h) and sevofluran. Ventilation was performed with intermitent positive pressure with tidal volume 6ml/kg and respiratory rate 20-25 breaths per minute using a combination of oxigen and air (50:50) and sevofluran. Prior to the incision patient received 3µgr/kg fentanyl; every half an hour atracurium was added. The patient was positioned in the right lateral position fist and left toracotomy was performed. Hydatid cyst were removed. Similarly the right toracotomy was done in left lateral position. There has been no drop in the contents of the cyst in the airways. Postoperative course was uneventful. The child was extubated in Intensive care 20 hours postoperatively.
Discussion: We were in a dilemma to ventilate the child as both lungs were affected by pathological process. In adult patients with double lumen edobronchial tubes it is possible to quickly and easily separation of lungs, aspiration of both lungs. In the case of unilateral ventilation in our patient, we would not be able to aspirate non-ventilated lung in case of cyst rupture. Hydatid cyst of lung in children should be provided with a fiber optic bronchoscope during the operative procedure in case of aspiration or placement of tubes for unilateral ventilation.
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Ismail M. Tantawy. Hydatid Cysts in Children. Annals of Pediatric Surgery 2010; 6(2): 98-104.
Learning points: In children, the lungs are the most common organ infected by larval from of echinococcuc granulosus. Surgery is the treatment of choice. To avoid complications, multidisciplinary approaches and careful planning of anesthesia are required.

05AP01-5
Neuromuscular blocking agents for tracheal intubation in children aged 1-12 y: A systematic review

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Background and Goal of Study: Airway management without using neuromuscular blocking agents (NMBAs) is well established in paediatric anaesthesia. However, the doses and combinations of drugs used in many of the relaxant free intubation trials may put patients at risk to haemodynamic depression, especially when given to ill and debilitated children. From the available evidence, the benefit of using NMBAs to facilitate tracheal intubation and their impact on complications related to intubation are unclear owing to variations in design, treatment and results between studies [1]. The purpose of current systematic review of randomized trials is to analyze the impact of using NMBAs on haemodynamic stability and on quality of tracheal intubation in children aged 1-12y.
Materials and Methods: A systematic search for RCTs related to the use of NMBA in ASA I-II children (1-12 years) was performed. We considered all trials in which intubation conditions and haemodynamics following induction of anaesthesia without NMBA (relaxant free control group) were compared to those scored or obtained when NMBAs were added to the induction sequence (intervention group) until June 2018. Meta-analysis was conducted using a random effects model and guided by the PRISMA statements for reporting of systematic reviews. Trial sequential analysis assessed the power and indicated the need for additional studies.
Results and Discussion: We included 18 eligible trials of 1454 participants. We assessed intubation conditions and haemodynamic effects of induction

and subsequent tracheal intubation. The use of NMBAs was more likely to provide both excellent (RR=1.22 [1.07,1.40], I²=64%) and acceptable intubating conditions,(RR=1.14 [1.07,1.21], I²=60%). Failed intubations at first attempt were reported in 9/391 (2%) of patients receiving NMBAs and in 38/359 (11%) of those in which NMBAs were avoided. Failure rates of up to 20% have been observed in some relaxant free groups. Significant lower systolic/mean arterial pressures (mean difference ΔP=15.0 [10.5,18.5] mmHg, I²=65%) and heart rates (mean difference ΔHr=14 [10,18] min-1, I²=64%) as well as higher incidence of arrhythmias could be observed in the relaxant free control groups. We can conclude that the use of NMBAs can provide haemodynamic stability during anaesthesia induction and improve quality/success rate of tracheal intubation.

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05AP01-6
Congenital tracheomalacia and emergency tracheostomy- a case report

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Background: Tracheomalacia is an abnormal collapse of the tracheal walls. It can be congenital or acquired, isolated or in combination with other lesions. Tracheomalacia is usually benign, with symptoms due to airway obstruction. We want to present a case report of a 2 month old infant with severe respiratory distress due to congenital tracheomalacia. Surgical tracheostomy was needed because of loss of compensatory mechanisms.
Case Report: 2 months old F infant, W 4 kg, presented to our department with severe respiratory distress for emergency tracheostomy. She was on 4-6 l HFNF oxygen support, with signs of respiratory failure. Surgical tracheotomy was planned. In the OR, standard anesthesiology monitoring was applied, and 8 l of HFNF humidified heated O_2 via nasal prongs, FiO_2 40%, 10 min before and during induction, until intubation. Induction was done with fentanyl, midazolam and sevorane (0.8 MAC), further oxygenation via facemask maintaining spontaneous breathing. Infant was intubated with ET 3,0 ID, ø cuff using VL MAC No 1. eFiO2 before intubation was 94%. Intubation lasted 40 s, no desaturation occurred. Anesthesia was maintained with sevorane (MAC 0.9) in O_2/air mixture facilitated with esmeron after securing the ET tube. Ventilation was controlled. After tracheostoma formation tracheal cannula No 3,5 ø cuff was placed and secured. Proper placement and depth was confirmed with fiber bronchoscope. After the procedure infant was transformed to pediatric ICU and weaned from ventilator 22 h after the procedure, respiratory sufficient without supplemental O_2. She was discharged home a month after the tracheotomy.
Discussion: HFNF is a method of providing CPAP to children requiring respiratory support. Although, widespread application of HFNF in many hospitals in pediatric wards and ICU, there is an ongoing applicability of HFNF in the ORs for preoxygenation especially in threatened airways, extending apnea time without desaturation.
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Learning points: Meticulous preoxygenation during airway management is mandatory. HFNF can be a useful adjunct in preoxygenation during airway management especially if children are already on that kind of O_2 support.

05AP01-7
Anaesthetic challenge of unpredictable situation in pediatric emergency

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Background: Myelomeningocele (MMC) is the most common neural tube defects. It is characterized by a cleft in the vertebral column, with a corresponding defect in the skin so that the meninges and spinal cord are exposed. It is frequently associated with the Chiari II malformation. The back lesion should be surgically closed within the first 72 hours after birth in order to decrease the risk of infection. We present a successful case of anaesthetic management of a new-born with MMC, where there was failure of the anaesthetic machine
Case Report: A new-born male, ASA III, was admitted for surgical repair of a large MMC in lumbar spine, 24 hours after birth. In this context, it was imperative to intubate the patient in lateral decubitus position and an arterial line and a venous catheter were placed in umbilical vessels. After, in view of the sudden breakdown of the anaesthetic machine, we were forced to use the transport ventilator of the Neonatal Intensive Care Unit (NICU). An intravenous anaesthesia was performed using intermittent bolus of fentanyl, thiopental and atracurium, according to the clinic. The patient remained hemodynamically stable throughout the intraoperative period and no complications were recorded. At the end of surgery, the patient was transferred to the NICU, no intercurrences were detected, being extubated at 72 hours.
Discussion: Meticulous anaesthetic management is crucial for early repair and to prevent sequel of MMC. There are many clinical cases described in the literature on the anaesthetic approach. In most cases a standard anaesthetic technique is followed and the most frequent perioperative complications are respiratory complications. A standard anaesthetic technique with sevoflurane was the first plan, but the sudden breakdown in anaesthetic machine forced us to change the plan. It was decided to maintain an intravenous anaesthesia with thiopental bolus in order to avoid continuous infusion due to its high context-sensitive half-life. Due to the new-born's brain immaturity, monitoring of anaesthetic depth with index bispectral wasn't possible. This implied an anaesthetic management guided only by vital signs.
Learning points: The routine check of the anaesthetic machine is of the utmost importance. But even though, there are uncontemplated events, which require the rapid and safe change of the anaesthetic plan. Despite the technological advances in monitoring the anaesthetic activity, the clinic can never be neglected.

05AP01-8
Ameliorating Paediatric Perioperative Care: A Survey

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Background and Goal of Study: Paediatric Anaesthesia is an emerging sub-speciality. The facilities to deliver safe anaesthesia care are not always available everywhere, causing variations in perioperative care of children. There has been no survey looking at the perioperative care provided by practicing paediatric anaesthesiologists. We conducted a questionnaire-based survey with the aim of determining the common practice in perioperative management of children. We compared the respondents' management against evidence-based practice.
Materials and Methods: The survey was done as an online questionnaire form. It was sent to all delegates registered for the ASPA (Asian Society of Paediatric Anaesthesia) 2017 congress in Mumbai. The questionnaire contained general questions regarding work place, experience in paediatric anaesthesia and opinion regarding specialized training and questions on perioperative care.
Results and Discussion: Responses were obtained from 185 anaesthesiologists from teaching hospitals, corporate and small hospitals across Asia. Majority were consultants 72.4% and 16.2% postgraduate trainees.55.7% had >10yrs of experience in paediatric anaesthesia. 91.9% felt specialized training is required for paediatric anaesthesia and 47.6% felt the training should be for a year.62.2% respondents carried at preoperative evaluation a day prior to surgery, 93.5% took an informed consent and 89.7% explained the regional blocks. NPO guidelines were well followed with 88% providing clear water till 2 hrs prior to surgery. 42.2% respondents routinely premedicated children at variable ages with variable drugs, commonest being Midazolam. 55.7% preferred inhalational induction, with 68.9% did it using open circuit. 98.4% used pulseoximeter for monitoring and 65.9% also used EtCO2.53.5% used pressure mode of ventilation in neonates whereas 38.4% used only hand ventilation throughout surgery. Landmark technique being the most commonly used method for regional (52.4%) and central neuraxial blocks (84.9%) by the anaesthetists.
Conclusions: Whilst there is individual variability, majority of the paediatric anaesthetists follow recommendations which exist for consent, fasting and fluid management. There is marked variability in practice in areas of premedication, maintenance of anaesthesia, monitoring and perioperative pain management; which require further evidence-based recommendations.

05AP01-9
Activation of Massive Blood Transfusion Protocol in a One-Year-Old Patient for Cranial Vault Reduction Surgery

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Background: Craniomegaly (Figure 1) impedes neurodevelopmental milestones[1] and responds to Cranial Vault Expansion-Remodeling. Cranial Vault Reduction Surgery results in symptom relief and morphologic stability.[2] We present a TIVA case-inclusive of Massive Blood Transfusion activation for CVRS requiring the administration of ~10 IVV and discuss the professional interaction.
Case Report: A 13kg, 12-month-old patient with macrocephaly (Figure 1) presented for CVRS. PMHx was significant for cranial size and VPSs. After induction of anesthesia, a radial arterial line and two peripheral IVs were secured. While prone,

removal of skull sections resulted in marked hypotension and tachycardia (Figure 2). The MTP was activated (uncross-matched blood with specific PRBC:FFP:PLT ratios) and TXA started. Serial I-stats were obtained (Table 1). Estimated blood loss was at 5L. No vasopressors were administered (Table 2). With 3D computer CVRS volumetric reconstruction calculated at 4L of CSF, the adjusted body weight was 11.5 kg (Figure 3). Total IVV was 863 ml (11.5 kg X 75ml/kg). In surgery, the patient received 8145 ml (Crystalloids 550ml, Albumin 500ml, PRBCs 4740ml, FFP 1750ml, Platelets 430ml, and Cryoprecipitate 175ml). In the PICU, the patient received one Factor VII dose and 100ml of PRBCs over the ensuing 48 hours with CXRs negative for edema.

Discussion: CVRS historically requires blood product transfusion[3]. We present a significant blood loss case (~5L) in a one-year-old. MTP was activated with multidisciplinary coordination between anesthesiologists, technicians, nurses, orderlies, and the Blood Bank and TXA was started. After having exchanged the intravascular volume about 10 times, the patient arrived stable in the PICU requiring minimal support. We share the importance of communication among operating room staff and the Blood Bank for the safe care of these patients.

Figure 1: Preoperative Photo

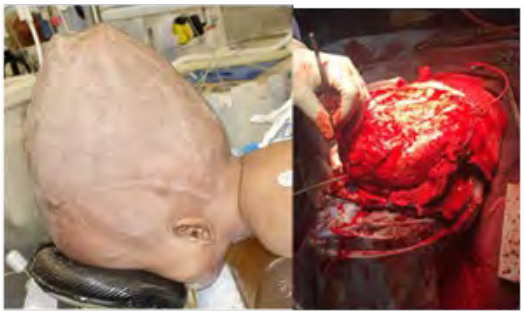

Figure 2: Intraoperative Prone Position Surgery

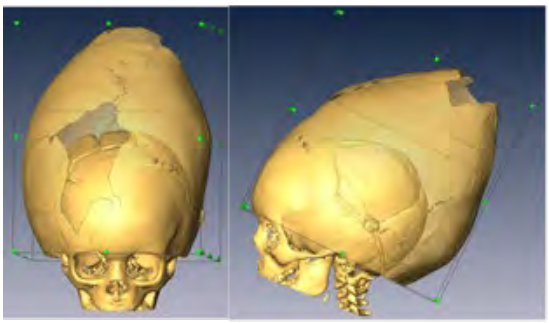

Figure 3: 3D Computer Reconstruction

Time	1030	1305	1415	1700	1730	POD2*
pH	7:32	7.22	7.33	7.49	7.37	7.4
$PaCO_2$ (mmHg)	34	43	42	32	45	45.9
PaO_2 (mmHg)	155	412	138	199	214	27
Base Excess (mEq/L)	-8	-10	-3	1	0	4
Bicarbonate (mEq/L)	18	18	23	24	26	
Oxygen Saturation (%)	99		99	100	100	28
Sodium (mEq/L)	149	149	150	153	153	
Potassium (mEq/L)	2.6	4.1	4.8	3.7	3.7	
Ionized Calcium (mg/dL)	1.2	1.1	0.7	0.8	0.9	
Glucose (mg/dL)	100	243	206	153	168	
Hemoglobin (g/dL)	9.9	5.8	10.9	6.5	7.8	7.5 -> 9.9
Hematocrit (%)	29	17	32	19	23	

*POD2= Post-Operative Day #2

MEDICATIONS	Total
Calcium Chloride (mg)	800
Calcium Gluconate (mg)	600
Tranexamic Acid (mg/kg/hr)	605
KCl (mEq)	13
$NaHCO_3$ (mEq)	30
Packed Red Blood Cells (ml)	4440
Albumin 5% (ml)	500
Fresh Frozen Plasma (ml)	1750
Cryoprecipitate (ml)	175
Platelets (ml)	428
Ringer's Lactate (ml)	50
NaCl 0.9% (ml)	500

05AP02-1
Arthrogryposis: anaesthetic implications

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Background and Goal of Study: Arthrogryposis multiplex congenita (AMC) is a rare condition characterized by multiple joint stiffness found all over the body at birth. These patients often require anaesthesia to perform diagnostic muscle biopsies at an early age and also to correct orthopedic deformities. AMC may be associated with multiple congenital anomalies in external genital organs, decreased temporomandibular joint mobility and muscular atrophy. These facts are important in the perioperative setting.

Materials and Methods: Our case is a 9-month lactant with bilateral equinovarus foot due to AMC scheduled for bilateral Achilles Tenotomy. Patient was premedicated with oral midazolam. Intravenous catheter insertion failed in upper limb veins after several attempts although eco-guidance was used. The pacient was finally cannulated successfully in the left external jugular vein. After induction (with propofol, fentanile and rocuroni) patient was intubated with a 3.5mm-cuffed endotracheal tube (Cormack I). Anaesthetic management was successful with balanced halogenated anesthesia and local infiltration by surgeons. There were no adverse events during surgery. We were able to extubate the patient in the operating room after reversal of neuromuscular blockade with neostigmine. We had to perform manual ventilation with positive pressure for a few seconds to the patient and administer naloxone because of desaturation and stridor 15 minutes after finishing surgery. In the end, patient was discharged after feeding, being calm and without apparent pain six hours after surgery.

Results and Discussion: Anaesthesiologists should consider all the related diseases (respiratory, cardiac and nervous systems). The most important concerns are the possibility of difficult airway management, extremely difficult venous access and malignant hyperthermia. We shoud have done an intravenous anesthesia instead of an halogenated one and also we should have monitored the patient temperature.

Conclusion: Careful airway evaluation and monitoring of perioperative respiratory complications such as stridor, are essential. It is also important to consider their increased sensitivity to drugs. We must monitor body temperature, heart rate and pCO2 to avoid critical events in patients with AMC. It is necessary to have difficult airway material available and it may be useful to have “hockey stick” ultrasound probe to help us in venous access.

05AP02-2
Neonatal sepsis caused by Corynebacterium and Serratia marcescens

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Background: Neonatal flora and causes for infection differ significantly from those of older patients as well as the level of immune competence. Neonates undergoing surgery are at increased risk from perioperative infectious complications. Although abdominal wall membranes in omphalocele have some protective role the infectious risk is still very high.
Case Report: We report a neonate at term that was transferred from another hospital at 4 h age with omphalocele covered in protective gauze. She had received Ampicillin and Amikacin after birth. The child's exam and laboratory were satisfactory and she had surgery the same day. She made good recovery in the following days while treated with Piperacillin /Tazobactam and Amikacin but worsened dramatically on day 8 with fever 39.2 C a severe drop in Plt and rise in CRP (fig1.). She was transferred to the NICU where Catecholamines and Mechanical ventilation were started. In the following days her condition worsened with severe difficult to control seizures. Isolates from day 8 and 10 showed Corynebacterium spp (resistant to glycopeptides). and Serratia Marcescens (Resistant to Amoxicillin, Ampicillin , Cefuroxim, Colistin). She was ventilated for 13 days. Her seizures subsided and head CT showed no structural damage to the brain. At day 32 she was dehospitalized in good condition.
Discussion: Corynebacterium is a rarisime causative agent for sepsis in neonates but there have been reports. Serratia marcescens is known to cause outbreaks in NICU which are dificult to control as the germ is ubiquitous and resistant to many antibiotics. Strict hand hygiene and isolation of sick babies is key to controlling such outbreaks. Depending on local flora up to 15 % of neonatal sepsis can be due to Serratia marcescens. We managed to control this case and no other Serratia cases were observed.
References:
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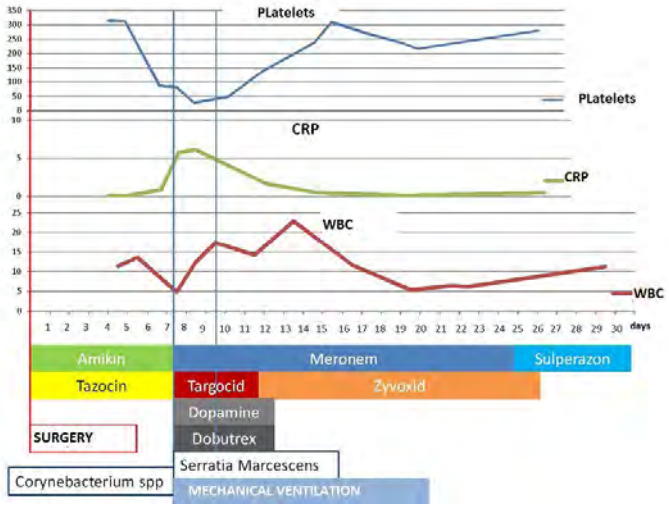

05AP02-3
Anesthetic management of a patient with Angelman syndrome

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Background: Angelman syndrome (AS) which is a rare neuro-genetic disorder caused by the microdeletion of 15q11–q13 may present for a variety of conditions affecting anesthetic management such as microcephaly, spasticity in extremities, periferic muscular atrophy, atropine-resistant increased vagal tone, epilepsy and GABA-A receptor dysfunction (1). In this report, we presented anesthetic management of child with AS.
Case Report: Sixteen month old and 8.2 kg boy with vesicoureteral reflux was preoperatively evaluated for endoscopic surgery. Microcephaly, severe periferic spasticity and muscular atrophy was observed in his preoperative evaluation. No history of epileptic seizures were present. Although endotracheal intubation was not considered video laryngoscope set up was kept available due to possibility of difficult intubation. No premedication with benzodiazepine was used. Anesthesia was induced with 2mg/kg propofol, 0.5mg/kg atracurium and 1mcg/kg remifentanil which was followed by insertion of size 1.5 laryngeal mask. Anesthesia was maintained with 2% sevoflurane in 50:50 mixture of oxygen and air. No additional doses of neuromuscular blocker was used during the procedure which lasted 35 minutes. Patient was awakened without the need of using cholinesterase inhibitors.
Discussion: AS's also known as 'Happy Puppet Syndrome' because of the frequent laughter or smiling of these children. Some specific anesthetic considerations should be kept in mind while the management of a patient with AS. First, difficult intubation may be experienced due to microcephaly. Changes with the GABA-A receptor susceptibility may pawe way for unpredictable respones to agonists of this receptors such as barbiturate, propofol, etomidate and benzodiazepines. Additionally, neuromuscular blocker susceptibility was increased owing to muscle atrophy and spasticity. Finally, bradycardic effect of neostigmine may lead to cardiac arrest due to increased vagal tone.
References:
1. Ishii H et al. Anaesthesia and orphan disease: marked attenuation of motor evoked potentials by high-dose dexmedetomidine in a child with Angelman syndrome undergoing scoliosis surgery. Eur J Anaesthesiol. 2015 Aug;32(8):587-9.
Learning points: Although the uneventful anesthetic management of presented case it should be emphasized that Angelman syndrome warrants special interest and anesthetic considerations due to its unique clinical features

05AP02-4
Peritonitis shortly after radical correction of Tetralogy of Fallot

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Background: Tetralogy of Fallot is one of the most common complex cyanotic cardiac anomalies that includes pulmonary stenosis, ventricular septal defect, overriding aorta and hypertrophy of the right ventricle. Surgery is generally radical correction in the first 12 months of the patient's life. Paliative correction still has its indications too.
Case Report: We report a 7 month old child diagnosed with Tetralogy of Fallot at 2 months of age. She started having hypoxic crisis equivalents at 6 months and was scheduled for radical correction. Surgery went well with 154 min. cardio-pulmonary bypass, the pulmonary valve was conserved and a small VSD was left. Postoperatively the child was hemodynamically stable on Milrinone/Adrenaline infusion. She was extubated on the day of surgery and had low oxygen needs. SVO2 -57%. At 24 h. after surgery her bowel sounds were missing and the abdomen was distended. There were no electrolyte disturbances. Abdominal ultrasound and X-ray were non-significant. The following day the abdomen remained distended with no bowel movements. Palpation was painful to the child. The child became febrile and CRP started rising. She was sent to the operation theater for urgent laparotomy. Considering her recent radical surgery anesthesia was induced with midazolam 0.2mg/kg and Fentanyl 7mcg/kg and Succinilcholine 2mg/kg. The child was hemodynamiclly stable. CVP was maintained between 10 and 14 cm H2O in view of her right ventricular hypertrophy. Anesthesia was maintained with Sevoflurane 3% in 40% Oxygen, Fentanyl and Atracurium 0.4 mg/kg. The child remained stable throughout surgery. The abdominal finding was feculent peritonitis caused by gut malrotation with volvulus of the large intestine and two perforations in the ileocecal region. The child was transfered to PICU and started on broad spectrum antibiotics. Milrinone was gradually tapered off and she made a good recovery.
Discussion: Congenital heart disease are often part of more complex anomalies which can include gut malrotation. Open heart surgery can produce transient reduction in gut motility related to ischemia and hypoperfusion but a direct causative mechanism for peritonitis is unlikely. In our case the second condition coincided with

the first surgical intervention. There were fears that the freshly operated heart would poorly tolerate anesthesia and the concomitant septic condition but she remained stable during surgery and later in the ICU.

05AP02-5
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: 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 analgesia 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. .
Conclusions: Clonidine can be used in dorsal penile nerve block to improve and to prolong its analgesic effects after male circumcision.

05AP02-6
Anesthetic management of comorbid pediatric patient undergoing dental procedures: a case report

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Background: This case report presents a patient with neurologic, cardiologic and endocrinologic disorders to emphasize the requirement of special healthcare during dental work and raise awareness about their specific anesthetic needs. The patient's medical history weree thoroughly assessed and the necessary examinations from assigned medical specialists we performed. Planned approach for induction in anesthesia, what to expect as complications and outcome were explained in detail to parents.
Case Report: Adolescent male patient, 14-years old, 50 kg, ASA III was presented in our dental clinic EODENT, Sofia, Bulgaria. The patient had the following conditions: Dysmorphic facial features (microretrognatia, microcephaly), hydrocephaly, West syndrome, epilepsy, cerebral palsy, dilatative cardiomyopathy, aortic valve stenosis diabetes type I, Hashimoto's thyroiditis. Patient was proposed for cavity treatment and tooth extractions. Therapy with Insulin, L-thyroxyn and valproic acid cont to anesthesia day. Conscious sedation with N_2O/O_2 mixture was chosen as induction technique, venous access was secured. The patient was monitored with noninvasive blood pressure, ECG, pulse oximetry, capnography. Induction with Fentanyl 2 mcg/kg, Propofol 3 mg/kg. Orotracheal intubation was performed next and patient was connected to mechanical ventilation. Oropharyngeal tamponade was placed. Maintenance was made with TIVA. Blood glucose levels were controlled promptly and continuously. The procedure was uneventful and the patient was transferred to a recovery room following extubation.
Discussion: Comorbid pediatric patients require special consideration when undergoing general anesthesia for dental procedures. Preoperative evaluation, smooth induction, painless maintenance of anesthesia together with control of vital signs, infusion therapy and blood glucose levels monitoring are crucial for reducing incidence of severe complications in such patients. The perioperative care and preanesthetic considerations of a child undergoing dental procedures are occasionally reviewed in medical literature.
References:
Wang YC et Al. *Dental anesthesia for patients with special needs*. Acta Anaesthesiol Taiwan. 2012 Sep; olume 50, Issue 3, September 2012, Pages 122-125
Learning points: Pediatric comorbidity is not an obstacle but a new way to stretch the way of thinking of the anesthesiologist for the well-being of our patients.

05AP02-7
Case report: features of xenon anesthesia in ophthalmic surgery in a patient with Marfan syndrome

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Background: The ophthalmological manifestation of Marfan syndrome is the subluxation of the lens. Marfan syndrome is also associated with pathology of the cardiovascular system. Therefore, when conducting anesthesia in these patients, hemodynamic instability should not be allowed: an increase in blood pressure can lead to aortic aneurysm stratification, a decrease in blood pressure - to insufficient coronary perfusion (especially in the presence of aortic valve insufficiency) [1].
Case Report: Two operations were performed (in both eyes with a difference of 2 months) in a 7-year-old patient with Marfan syndrome for lens subluxation during laryngeal mask combined anesthesia using xenon with subtenon anesthesia (lidocaine, ropivacaine). Anesthetic risk was determined by the presence of congenital cardiac pathology: aortic valve insufficiency 1 degree; Valsalva wall aneurysm, dilatation of the left ventricle and right atrium, heart failure FC II. Premedication: atropine 0.3mg, midazolam 2.5mg. Induction: sevoflurane 8-6vol%; fentanyl 0.25mg. Maintenance of anesthesia: xenon 50%(spontaneous breathing); fentanyl 0.25 mg. Monitoring indicators (baseline, intraoperative min-max): Heart rate 87, 103-115; MAP 100, 85-93; SatO2 99, etCO2 6,5. Rated indicators: CO 122, 82-96; CI 10,6, 8,5-11; TPR 722, 602-838. Hemodynamics was stable, ventilation and oxygenation were adequate, awakening was quick and quiet (removal of LM after 2 min, recovery - 4 min). Duration of anesthesia 50 min and 70 min. The duration of operations was due not only to the need of lens replacement, but also to suture centration of the lens.
Discussion: Operations for lens disruption in patients with Marfan syndrome are technically difficult for ophthalmic surgeons (due to the weakness of the ligamentous apparatus, especially the Zinn ligament, and anatomically small lens and its displacement). The safety of xenon anesthesia is determined not only by the absence of a pronounced vasoplegic action of xenon, but also by the positive inotropic and cardioprotective effect of xenon[2].
References:
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Myasnikova V, Sakhnov S. Trends in Anaesthesia and Critical Care. 2017;16:21.
Learning points: Xenon is the anesthetic of choice for general anesthesia in ophthalmic surgery in children with Marfan syndrome and concomitant aortic valve insufficiency. The course of anesthesia is characterized by stable hemodynamics and the absence of complications.

05AP02-9
Comparison of Pre- and Post-operative Single-shot Caudal Analgesia for Hypospadias Repair

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Background and Goal of Study: Caudal anesthesia is one of the most useful and popular adjuncts during general anesthesia and effective postoperative analgesia for hypospadias repair in children. One of the major limitations of the single-shot technique, however, is its relatively short duration compared with rather long surgical procedure of hypospadias repair. In our facility, the timing of caudal anesthesia placement is not standardized, and is left to each anesthetist's decision. Some give only preoperative single shot, and the others add another dose after the operation. The goal of this study is to determine if the perioperative timing of caudal anesthesia affects the postoperative analgesia outcomes.
Materials and Methods: We conducted a retrospective audit of 128 patients (ASA1-2, 1-7years old) who underwent hypospadias repair with caudal analgesia from Nov. 2015 to Oct. 2018. 81 patients received caudal analgesia prior to the operation (Group1; preoperative), 18 received both before and after the operation (Group2; pre- and postoperative), and 29 after the operation (Group3; postoperative). The postoperative analgesia requests and the time of the first analgesia request after the operation were investigated.
Results and Discussion: Between Group1 and Group2, there were no significant differences in age , weight , ASA , the first analgesia request within 6h after operation, 12h , 24h. The significant difference were acknowledged in operation time, anesthesia time, and 0.2%ropivacaine. Between Group1 and Group3, there were no significant differences in age, weight, ASA, operation time, anesthesia time, and 0.2%ropivacaine, the first analgesia request within 6h after operation, 12h, 24h. The significant difference was seen in the amount of remifentanil.
Conclusions: We concluded that the timing of caudal analgesia does not make any differences in postoperative analgesia of hypospadias repair. Therefore, considering the risk of caudal analgesia, and toxicity of local anesthetics, we should perform single-shot caudal analgesia for hypospadias repair.

05AP03-1
Long-time postnatal exposure to sevoflurane induces memory deficits but not attention deficit hyperactivity disorder relevant abnormality in rats

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Background: Volatile anesthetics are commonly used in clinic. Neonatal exposure to volatile anesthetics has been found to induce long-term developmental impairments including cognitive and memory deficits. However, it is unclear whether early exposure to volatile anesthetics can induce attention deficit hyperactivity disorder (ADHD) relevant deficits in adolescent and adult ages.
Methods: Neonatal rats at postnatal 5-day were exposed to 3% sevoflurane for 2, 4 and 6 hours, respectively. Behavioral tests including open-field test, five-choice serial reaction time task, fear-conditioning and Morris water maze were applied to evaluate cognition and memory, anxiety and ADHD relevant attention on the rats, at the age of adolescent (~25-day postnatal) and adult (~65-day postnatal).
Results: After neonatal exposure to sevoflurane for over 4 hours, the rats developed memory deficits at adolescent age by fear-conditioning test. These exposed rats also developed deficits of spatial learning and memory in the adult age by Morris water maze. However, even 6-hour exposure to sevoflurane did not induce ADHD relevant abnormal behaviors including premature activity and attentional deficits in five-choice serial reaction time task, at the ages of both adolescent and adult. The behaviors were also normal in open-field test.
Conclusions: The present study demonstrates that ADHD relevant behaviors are invulnerable compared to cognitive and memory functions with single long-time exposure to sevoflurane. Cognitive and memory impairments can be induced when neonatal exposure to sevoflurane over 4 hours but not ADHD relevant behaviors. Thus, the cognitive and memory impairments do not result from attention deficits.
Discussion: Except for cognitive and memory functions, whether neonatal exposure to volatile anesthetics can induce other psychological abnormalities is another concern, among which ADHD is the one of the most prevalence disorders. We found that postnatal exposure to sevoflurane could lead to some deficits in cognition and/or memory while did not affect any primary outcomes in 5-CSRTT, even after 6-hour exposure. There results suggest that ADHD relevant behaviors are relatively invulnerable compared to cognitive and memory functions after exposure to sevoflurane for the same duration. Other important factors such as surgical stress and original diseases may also contribute to the incidence of ADHD.

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05AP03-2
How often can you enter the MRI scanner?

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Background and Goal of Study: To review current knowledge concerning long-term effects from repetitive exposure to strong magnetic fields inside the MRI scanner.
Materials and Methods: Studies of in vitro and in vivo exposure to strong magnetic fields inside the MRI scanner room were sought through Pubmed
Results and Discussion: Anesthesiologists often need to accompany patients into the MRI and stay with the patient during scanning. This is especially true for pediatric patients. Most studies deal with short term transient effects from the MRI like vertigo or vision problems, but we wanted to see if any long-term effects were registered that could affect someone who enters the MRI on a frequent basis. European regulation from 2014 is only focused on short term ill effects. MRI scanners emmit three types of nonionising radiation: static magnetic field, pulsed magnetic field and radio-frequency field. There are more than 400 studies dealing with health risks from static magnetic fields and they do not allow to draw any clear conclusions as to long-term ill effects. In vitro studies of pulsed magnetic fields have shown DNA breaks in rat cells. In humans no long-term ill effects have been proven. Radiofrequency can lead to some local heating but studies do not show any long-term ill effects so far. There have been in vivo and in vitro studies that explore the exposure to all three components together. Most focus on DNA double strand breaks and there are conflicting results. There are 7 such studies. There is also a study clearly showing that a single MRI scan induces the appearance of micronuclei in lymphocites both in vitro and in vivo. Micronuclei have recently been associated with preliminary events in carcinogenesis. The WHO expert agency for research on cancer has classified both low frequency magnetic field and radiofrequency field as possibly carcinogenic to humans class IIB.The need for more studies is evident and extremely important for anesthesiologists who very often get exposed to all three components of MRI scanning.
Conclusions: Arrangements need to be made to meet safety standards for patient monitoring in MRI and limit the physical presence of the anesthetist in the scan area as much as reasonably possible.
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Biological effects and safety in magnetic resonance imaging: a review Int.J. Environ. Res. Public Health 2009,6, 1778-1798

05AP03-3
Successful anaesthetic management of separation surgery for pygopagus conjoined twins.

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Background: The incidence of conjoined twins is extremely rare, ranging from 1 / 50,000 to 1 / 200,000. We report anaesthetic management of separation surgery for pygopagus conjoined twins.
Case Report: A pair of twin boys with suspicion of pygopagus conjoin (prenatal diagnosis) were born by elective caesarian section at 35 weeks gestation. The total birth weight was 4690g and the twins did not need resuscitation on Apgar 8/9. They were conjoined from the sacrum to the perineum, sharing the spine, anus and the urethra. Their growth after birth was good, and it was decided to perform a separation surgery at 5 months. The multidisciplinary team consisted of specialists from pediatric surgery, urology, neurosurgery, plastic surgery, anaesthesiology, and operating room nursing. The team conducted the surgical planning and rehearsals. The total weight of twins at the time of surgery was 13.8 kg. In the operating room, two anaesthesia machines and patient monitors were prepared and two anaesthesia teams managed them. Because of the rotation of the spine the upper bodies of both twins were in a supine position and lay down side by side. The prone position during separation surgery was required for anatomical reasons. Propofol and rocuronium were injected and tracheal intubation was performed one by one in the supine position. Maintenance of anaesthesia was performed with sevoflurane and remifentanil. The twins were separated approximately 10 hours after beginning surgery. Total surgery time was approximately 15 hours. They were transferred to ICU and extubated 2 days later.
Discussion: Anaesthetic management for conjoined twins is a challenging task (1). In this case, the relationship between the left and right babies is reversed by position change from supine to prone. Therefore we used the opposite side anaesthesia machine and monitor for anaesthesia induction of both twins. That is, at the time of anaesthesia induction, the right side anaesthesia machine and monitor were used for the left side baby, and the left side equipment was used for the right side baby as well. The positional relationship between the babies and the anaesthesia machines/ monitors became normal after changing to the prone position.
References:
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Learning points: Careful preoperative assessment and planning is essential for successful anaesthetic management of conjoined twins.

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05AP03-4
Emergency front of neck access in children: assessing the success probability in a rabbit model

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Background and Goal of Study: A pediatric "cannot intubate, cannot oxygenate (CICO)" situation is uncommon, but associated with poor outcome. Seldinger techniques are inappropriate in this situation, and a rapid sequence tracheostomy (RST) has been proposed instead. We investigated the success and the injury rate of RST in a rabbit model
Materials and Methods: Ten pediatric intensivists, 10 pediatric in-hospital emergency physicians, 10 pediatric surgeons, 10 pediatric anesthesiologists and 10 out-of-hospital emergency physicianswithout prior RST-experience performed 10 RST on rabbit cadavers each, after watching an instructional video. The goal was to perform RST in less than 60 sec. The rate of successful attempts, and injuries (minor: cutting 3-5 cartilage rings; severe: trauma to cricoid or thyroid, cutting >5 cartilage rings; failure: paratracheal insertion) were recorded. A multinomial logistic regression was used to model the relative risk of minor injuries, severe injuries and failure, RST (2)consists of four steps: 1st: Orientational palpation and vertical midline skin incision (scalpel curved blade#10); 2nd: Strap muscles separation using 2 Backhaus clamps and exposure of the trachea and cricoid by anterior luxation of the trachea with a 3rdclamp. 3rd: Vertical puncture with tip scissors and incision of no more than 2 tracheal rings. 4th: Tracheal insertion of a properly sized tube.
Results and Discussion: The overall success rate was 94%. The probability for severe injury dramatically decreased from 58% (95% CI: 44-72%) during the first attempt to 14% (95% CI: 8 - 20%) after the second attempt (phase I, Figure 1). Simultaneously, the probability for no injury increased from 22% (95% CI: 10-34%) to 70% (62-78%), while the probability for minor injury and of failure remained stable. Following the 2ndattempt, only few changes were observed relative to injury rates. Upon completing the 10thRST attempt, probabilities for no injury were 64% (95%CI: 55-73%), 20% (95%CI: 13-27%) for minor injury, 10% (95%CI: 5-15%) for severe injury and 7% (95% CI: 3 -11%) for failure.
Conclusions: Steady skill improvement was observed, up to 94% tracheal tube placement success. Despite the high rate of success and the reduction of trauma over the 10 attempts, about 20% severe injuries and paratracheal tube placement happened independent until the 10th attempt.

5AP03-5
Establishing the learning curve for pediatric emergency front of neck access in a rabbit model.

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Background and Goal of Study: Unanticipated difficult airways leading to a "cannot intubate, cannot oxygenate" situations are very uncommon but associated with poor outcome in children. A predetermined plan of action is paramount. In adults, mannequins training reduces cricothyroidotomy time and improves success rates. Learning curves flatten after 4 attempts in percutaneous needle-puncture cricothyroidotomy in a pig cadaver model, without differences in performance time. This study investigated learning curves when acquiring rapid sequence tracheotomy (RST) in a rabbit model as surrogate for children anatomy.
Materials and Methods: After watching an instructional video10 pediatric intensivists, 10 pediatric in-hospital emergency physicians, 10 pediatric surgeons, 10 pediatric anesthesiologists and 10 out-of-hospital emergency physicians without prior RST-experience performed 10 RST on rabbit cadavers each. The goal was to perform a RST in less than 60 seconds. The main outcome was performance time. RST consisted of four steps: 1st: Orientational palpation, vertical midline skin incision (scalpel curved blade#10); 2nd: Strap muscles separation (2 Backhaus clamps) and exposure of the trachea and cricoid by anterior luxation of the trachea with a 3rdclamp. 3rd: Vertical puncture with tip scissors and incision of no more than 2 tracheal rings. 4th: Tracheal tube insertion and lung ventilation. To predict the performance time we used a linear spline model with a single knot at attempt four. Results: The time to perform RST (Figure 1) decreased from 107±45 sec to 55 ± 17 sec at attempt 10. The learning curve was steep between attempt 1 and 4, decreasing performance time per attempt by 11% (95% CI: 9-13%, $p < 0.001$) compared to attempt 4to 10) with 4% (95% CI: 3-5%, $p < 0.001$) decrease (Figure 1).
Results and Discussion: The time to perform RST (Figure 1) decreased from 107±45 sec to 55 ± 17 sec at attempt 10. The learning curve was steep between attempt 1 and 4, decreasing performance time per attempt by 11% (95% CI: 9-13%, $p < 0.001$) compared to attempt 4to 10) with 4% (95% CI: 3-5%, $p < 0.001$) decrease (Figure 1).
Conclusions:The learning curve to perform RST in a rabbit model showed a biphasic skill improvement, with a flattening after the fourth attempt. At the 10th attempt, the procedural times was less than 60 seconds. Video-instruction followed by 10 attempts enabled to learn even this advanced invasive technique.

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05AP03-6
Submissive behavior in rats after maternal separation in early life

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Background and Goal of Study: Maternal separation of rodent pups (MS) is a relevant and widely used rat model of early-life stress. The effect of MS has been studied in the context of depression, anxiety and learning, however a few studies have focused on the consequences of early life stress on social behavior. In social groups a mood disorder of a member can affect a change in hierarchical relations. Dominance and submissiveness are important functional elements in maintaining the social hierarchy which has the advantage of limiting the amount of violence in a group. In the current study, dominant-submissive behavior was examined, in conjunction with a battery of tests of cognitive and emotional behavior in adult rats following maternal deprivation.
Materials and Methods: 30 Sprague-Dawley pups were separated from the dams for 6 hours each day during the first 3 weeks of life. The pups of the control group were housed permanently with their mothers. Two groups underwent a battery of behavioral tests at 3 months of age (one MS and one control rats in each test).
Results and Discussion: Our results showed that rodents exposed to MS displayed significant submissive behavior in resident-intruder and dominant-submissive tests compared to control rats. Significant changes in learning and memory were not detected.
Conclusions: The main finding of this study was that the early stress caused by maternal separation of pups leads to submissive behavior in the population of rats in adulthood without any effect on learning and memory. The impact of stress during early postnatal development on antisocial and submissive behavior suggests that exposure to stress during infancy and childhood could interfere with the ability of an individual to benefit from social support in a stressful situation.

05AP03-7
Sevoflurane affects proliferation and differentiation of neurons via Cdc42 in developing mouse cortex

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Background and Goal of Study: The proliferation and differentiation of neurons by Radial Glial Cells (RGCs) during development of cerebral cortex follows a precise temporal sequence. Our previous research showed that sevoflurane exposure to pregnant mice inhibited proliferation of RGCs , induced cell cycle arrest at G0/G1 phase and caused an earlier switch from proliferation to differentiation in Vitro. Cdc42, a protein regulating the structure and function of RGCs in polarity, was reported to be involved in the G1.The loss of function of Cdc42 can lead to premature neuronal differentiation. Thus, this study was try to prove Sevoflurane affects the proliferation and differentiation of neurons via Cdc42 protein.
Materials and Methods: C57BL/6J female and male mice were mated , and the pregnant mice were randomly assigned to a control group□Con□ or a sevoflurane group□Sevo□ at gestational day 14.5. Pregnant mice in the Sevo received 2.5% sevoflurane in 100% oxygen for 6 h, while the pregnant mice in the Con received 100% oxygen for 6 h. For the determination of proliferation, pregnant mice were injected i.p. with a single BrdU dose (50 mg/kg of body weight) at the start of experiment and the pregnant mice were sacrificed 6 h later (at the end of the sevoflurane/oxygen exposure). The percentage of proliferating cells was calculated as BrdU+/DAPI. A cesarean section was performed to extract the embryos, and the fetal brains were cryosectioned for immunofluorescence. Cell nucleus was counterstained with DAPI. The following primary antibodies were used: Pax6,Cdc42, NeuN, Tuj1, BrdU, caspase-3,. Immunofluorescence analysis was performed on data collected from cortexes of at least 3 ($n \geq 3$) embryos of each group. Cells were counted in four 100 μm-wide strips through cortex, in a minimum of three nonadjacent sections from each embryo, with the image J pro plus software. Values are presented as means ± SEM. Two-tailed Student's t-test was performed for statistical evaluation .
Results and Discussion: The number of RGCs was reduced and the morphology of Cdc4+ cells changed with protein expression decreased . The proliferative cells of Con mainly located in Ventricular Zone (VZ) while Sevo in the Subventricular Zone (SVZ). Increased immature neurons also were found in Sevo group in(VZ/SVZ) .
Conclusions: This study demonstrates the potential role of Cdc42 in Sevoflurane inducing earlier switch from proliferation to differentiation in Vivo.

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05AP03-8
Psychological characteristics of children undergoing cardiac surgery at early ages

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Background and Goal of Study: The different cardiac anomalies and the long-term effects of cardiac surgical interventions result in psychological and behavioural problems and increased morbidity during adolescence. We aimed to identify the differences in psychological development of pre-school or school aged patients who underwent cardiac surgery at a very young age compared to healthy children.
Materials and Methods: After Institutional Review Board Approval, data of 142 children (80 patients undergoing cardiac surgery and 62 control) were examined. The psychosocial characteristics were assessed during the study period, while perioperative data were collected retrospectively from medical records. Patients were asked to complete the Beck Depression Inventory, the Spielberger State-Trait Anxiety Inventory, the Hungarian adaptation of the Ways of Coping Questionnaire, the Child Behaviour Checklist and the ADHD Rating Scale-IV.
Results and Discussion: The mean age was 11.5±3.4 years for the surgery group and 11.3±3.5 for the control group. For both coping styles (problem-focused and emotion-focused) measured by the Ways of Coping (WOC) questionnaire, the surgery group had significantly lower values than the control group (M=11.6±8.5 vs. M=15.2±6.6; p=0.008; and M=9.3±6.3; M= 11.8±4.8; p=0.009, respectively). The ADHD Rating Scale-IV showed higher scores for the surgery group (M=10.1±10.7; M=6.7±6.4; p=0.044 respectively). We have not found significant deviations between the depression and anxiety levels of operated children and the control group, neither when examining the influence of parents' depression or trait-anxiety results.
Conclusions: Children undergoing congenital heart defect corrections are at higher risk of employing ineffective coping strategies, manifesting mostly as decreased abilities to mobilize emotion-focused and problem-focused ways of coping.

05AP03-9
Comparison of i-gel, LMA-supreme, LMA-classic and LMA-proseal as conduits of endotracheal intubation in newborns and infants: A manikin study

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Background and Goal of Study: Many types of supraglottic airway devices (SAD) including the traditional LMA are commonly used as conduits for intubation in pediatric patients with difficult airway. The aim of this study was to evaluate the feasibility of four types of commonly used neonatal and infant sized SADs as conduits of intubation.
Materials and Methods: Fiberoptic-guided tracheal intubation with uncuffed, cuffed and armored uncuffed endotracheal tubes (ETT) sized between 2.5 and 4.5 through four commonly used types of size 1 and 1.5 SADs (i-gel, LMA-classic, LMA-supreme, LMA-proseal) were performed by two investigators on an infant manikin. The investigators scored two main outcomes with a 5-point scale: 1) passage of ETT during intubation through the SAD, and 2) passage of SAD over the ETT during SAD removal. The differences between the study groups were evaluated using the Bonferroni-adjusted Mann-Whitney U test and $p<0.0083$ was considered as statistically significant according to Bonferroni correction.
Results and Discussion: i-gel sizes 1 and 1.5 both performed better as conduits for fiberoptic-guided intubation compared with LMA-proseal, LMA-classic and LMA-supreme with most of the uncuffed ETTs investigated ($p<0.0083$). We found i-gel sizes 1 and 1.5 easily feasible to use even with uncuffed ETTs with an ID of 3.5 mm and 4.5 mm, respectively. i-gel was the only SAD that was feasible for use as a conduit for armored ETTs. The passage of cuffed ETTs was problematic with all types of studied SADs.
Conclusions:The choice of i-gel as a conduit for intubation could be safer than LMA-classic, LMA-supreme and LMA-proseal.

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05AP04-1
Primary spread of caudal blockade in children - anatomical perspective

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Background and Goal of Study: Caudal block is the most frequent used regional anaesthesia in children and a plethora of studies have been published in the literature. Despite this certain fundamental issues remain unclear. One of these issues is the finding that the initial injection and spread of local anaesthetics does not reach higher that the thoraco-lumbar junction as verified by either ultrasonography or conventional x-ray (local anaesthteic mixed with radio-opaque dye). It also remains to be explained why there is very little difference in initial cranial spread despite using a low or a high volume caudal injection (0.5 ml/kg or 1.5ml/kg). The goal of the study is to explore if there exists an anatomical explanation that can explain why the initial injection of local anaesthetic only reaches the thoraco-lumbar junction level and not more rostral levels. Our hypothesis was that the lumbar spinal cord enlargement (tumenescence) may constitute the anatomical barrier that limits the initial cranial spread.
Materials and Methods: Thirty patients, 0-6 months of age, with spinal MRI scans performed for various reasons and judged by a radiologist to be normal, were reviewed. The maximum thickest of the lumbar tumenescenes was identified on a T2-weighted sagital MRI scan sequence. The corresponding axial slice completely surrounded by bone and cartilage was assessed for three areas: 1. The cross section of the spinal cord, 2. The area representing the cerebrospinal fluid (dural sac area minus spinal cord area) and 3. The epidural space.
Results and Discussion: The maximum of the lumbar tumenescence was found at the L1 spinal level. The results with regards to the cross sectional areas and their potential influence on flow resistance will be presented at the congress. The position of the lumbar tumenescence was found to coincide with the thoracolumbar level where initial spread of a cadual injection usually is halted.
Conclusions: The increased resistance due to the presence of the lumbar tumenescence might well be the explanation why initial caudal spread stops at this level.

05AP04-2
The efficacy of the complex application of ERAS pathways in children undergoing orthopaedic surgery

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Background and Goal of Study: Enhanced recovery after surgery (ERAS) is well studied in adults but remained unexplored and not widely adapted in children [1]. The aim of the study was to evaluate the efficacy of the complex application of ERAS pathways in children undergoing orthopaedic surgery.
Materials and Methods: After receiving the ethics committee approval and parent's consent we conducted a prospective study which included 57 patients aged 1-17 y.o. Patients had ASA status I-II and underwent 1-3 hours' orthopaedic surgery. In Group 1 (n=22) we used ERAS pathways: informing of patients and their parents, avoiding of bowel preparation, eating the night before surgery, carbohydrate drink 2 hours prior surgery, regional anaesthesia, avoiding opioids, euvolemic infusion strategy, normothermia, early postoperative feeding, verticalization and mobilization in the 1st postoperative day, no drains and catheters if acceptable, determination of criteria for safe discharge. Group 2 (n=25) managed without ERAS complex approach. The primary outcome was the length of stay (LOS). Secondary outcomes were nausea and other complication, orthostatic tolerance in the 1st postoperative day, patient wellbeing (10-point scale) next morning after surgery. Statistical analysis using Mann-Whitney U-test for continues variables, Fisher's exact test for nominative data.
Results and Discussion: LOS was significantly low in Group 1 (5,6 (3,4) vs. 8,9 (3,5) days, P=0,002). Nausea registered in 2(9%) patients in Group 1 and in 9(36%) patients in Group 2 (P=0,04). There were no differences in other complications. All patients (n=22,100%) in Group 1 and 19 (76%) in Group 2 successfully took a vertical position in the 1st day after surgery (P=0,02), patient wellbeing in the morning day after surgery was rated at 7,86 (1,61) points in Group 1 vs. 6,52 (1,81) p. in Group 2 (P=0,01).
Conclusions: Results of the study reveal that the complex application of ERAS pathways suggests reducing LOS, improving postoperative wellbeing and activity in paediatric patients undergoing orthopaedic surgery, but not influencing on complication except nausea. It remains unclear which exactly items from ERAS protocol have the greatest effect on shortening the hospital LOS, and further research is necessary to study a surgical stress response in children.
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05AP04-3
Pain in hospitalized children in a Greek Paediatric Hospital. Time for change?

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Background and Goal of Study: Austerity in Greece has slowed down improvements in quality of care for adults and children. The goal of this audit was to benchmark pain management in "Paidon Agia Sofia", the largest Greek paediatric hospital and inform the need of introducing an acute pain service.
Materials and Methods: The audit included more than 1/3 of the overall hospitalized children and incorporated data from a single day. Medical and surgical units were included (2 paediatric, 2 surgical, 2 orthopaedic, 1oncologic, 1 PICU, 1CICU). Charts and pain scores by parents and patients were reviewed.
Results and Discussion: 84 children (mean 6.5y, min1.5m, max16 y) out of the 236 hospitalized were reviewed. 51% (n=43) had experienced some pain during their current hospital stay and were further explored: 57,79% of them belonged to surgical wards, they were 60.47% males. Age groups were: 27.9% 1.5m-3y, 32.56% 3-12y and 39.53% 12-16y. Worse pain during the last 24 hours was 7.14% "none", 42.86% "little", 33.33% "medium", 16.67% "lot". 79.1% were receiving analgesia, 58.82% of the cases by the clock. 23.26% were receiving more than one analgesic. Out of the cases that were receiving analgesics 73.53% found analgesia adequate, 8.82% inadequate and 17.65% were not sure. Among the cases with unsure/ inadequate analgesia despite taking analgesics (26.47%) only one child was postsurgical.
Conclusions: Ward- based pain management is efficient for most of the cases. Anaesthetist-based post-surgery analgesia seems to offer the most adequate pain relief. More than a quarter of the patients who require analgesics would probably benefit from a more intense pain management plan.
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05AP04-4
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.xcv.

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05AP04-5
Perioperative characteristics for acute kidney injury after paediatric liver transplantation: A single institutional retrospective observational study

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Background and Goal of Study: Postoperative acute kidney injury (AKI) is associated with extended duration of hospital stay and increased morbidity and mortality in adult patients undergoing liver transplantation. Currently, AKI is shown to be common and be associated with poor outcomes in critically ill children. However, data regarding the characteristics of postoperative AKI in paediatric patients undergoing liver transplantation are limited. Thus, we investigated the incidence of AKI after paediatric liver transplantation and assessed the risk factors and outcome of postoperative AKI.
Materials and Methods: This single-centre, retrospective, observational study included 137 paediatric patients undergoing liver transplantation between April 2005 and March 2017. Exclusion criteria were age >18 years; coexisting end-stage kidney disease; and use of preoperative renal replacement therapy. AKI was defined according to the Kidney Disease: Improving Global Outcomes guidelines based on serum creatinine and urine output, and was assessed for the first 7 days after liver transplantation. Statistical analyses were performed by using Fisher's exact test, Mann-Whitney Utest and multivariate logistic regression analysis.
Results and Discussion: Postoperative AKI developed in 32 patients (23.4%); 16 (11.7%) had stage 1, 14 (10.2%) had stage 2 and 2 (1.5%) had stage 3. Multivariate analysis revealed that Child-Pugh score B or C (odds ratio, 2.64; 95% CI, 1.01–6.92; P = 0.048), intraoperative blood loss >70 mL/kg body weight (odds ratio, 3.49; 95%CI, 1.40–8.74; P = 0.0075) and postoperative cumulative fluid balance >100 mL/kg body weight for the first 96 hr after liver transplantation (odds ratio, 3.57; 95% CI, 1.40–9.13; P = 0.0079) were independent risk factors of AKI after paediatric liver transplantation. Postoperative AKI was associated with prolonged intensive care unit (ICU) and hospital stay after liver transplantation (median [range], 12 [4-87] vs 8 [3–36] days; P = 0.009 and 51.5 [26–243] vs 40 [16-213] days; P = 0.015, respectively), whereas was not associated with increased in-hospital mortality (3.1 vs. 1.0 %; P = 0.414).
Conclusions: The incidence of AKI after paediatric liver transplantation was 23.4%. High Child-Pugh score, a large amount of intraoperative blood loss and a large postoperative positive fluid balance were independently associated with the development of postoperative AKI. Furthermore, postoperative AKI increased ICU and hospital stay.

05AP04-7
The Effect of Adequate Pain Relief on Cost and Patient Attitudes in Pediatric Orthopedic Surgery

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Background and Goal of Study: Pediatric pain control has long been a neglected area of care. Recently, the satisfactory control of post-operative pediatric pain has seen resurgence of interest as medicine seeks alternatives to narcotics. However the secondary benefits of this care (reduction in anxiety and patient costs) also bear interest. It is the object of this study to examine these parameters.
Materials and Methods: Originally 154 pediatric patients were enrolled in an IRB approved study examining whether steroids prolonged regional blocks. Additionally, questionnaires were given to parents and/or children regarding their opinions on pain relief, anxiety and their surgical experience. Data was collected on cost savings due to same day rather than overnight admissions.
Results and Discussion: The improvement and duration in quality pain control were reflected in the surveys, which showed high satisfaction for both patients and parents. Parents rated pain relief as 3.6/4.0, (Figure1) overall surgical experience as 3.7/4.0 and anxiety over future surgeries 0.8/5.0 (0=no anxiety). Children rated pain relief at 3.4/4.0, (Figure 2) overall experience at 3.6/4.0 and anxiety over future procedures at 1.0/5.0. Elimination of an overnight hospitalization at our institution generated a cost savings estimated at $2800.
Conclusions: We found discharging patients home with good pain control on the day of surgery, minimizes family disruption, decreases situational anxiety, and reduces overnight hospitalization costs to both families and the institution where the procedure was performed. In summary, this study showed that adequate pain control generated increased psychosocial satisfaction as well as a significant potential for reduction in hospital costs.

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05AP04-8
Anesthetic management for the removal of an accidentally swallowed toothbrush

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Background: Foreign body ingestion is a common problem.[1] Chemically or mechanically harmful foreign bodies and big foreign bodies that cannot be removed spontaneously should be removed endoscopically or surgically.[2]
Case Report: A 15-year-old, 63kg weighing girl was transferred to the operating room for endoscopic removal of a swallowed toothbrush. She told she accidentally swallowed it while brushing her teeth and tongue after the dinner she had 2 hours ago. The brush was seen in the proximal stomach on the abdominal X-ray. 50mg ranitidine was given intravenously to decrease acidity in the stomach. We started rapid sequence induction with 0.2mg/kg intravenous rocuronium and continued with 2,5 mg/kg propofol. After the application of cricoid pressure we gave additional 1mg/kg rocuronium and 1mcg/kg fentanyl. Endotracheal intubation was quickly done with 7.5mm cuffed endotracheal tube. 2% sevoflurane and 0.05mcg/kg/min remifentanil were used for maintenance. Endoscopy lasted 2 and a half hours but the toothbrush couldn't be removed endoscopically. We added 10mg rocuronium and then the toothbrush was removed surgically. At the end of the procedure rocuronium was reversed with 4mg/kg sugammadex but the patient didn't start breathing. We added 2mg/kg sugammadex. Then she started breathing spontaneously and was extubated successfully.
Discussion: Swallowed toothbrush is a rarely seen condition and spontaneous removal has never been reported. As Rasheed M.A. et al. mentioned, bulimics may use a toothbrush to induce vomiting and this may result in accidental swallowing. In this situation it is highly possible to see the brush part located upward proximally in the stomach.[3] The toothbrush should be quickly removed to minimize the risk of bleeding, perforation and ulceration.
References:
1. Ofosu A, Ramai D, Reddy M. Overtube-Assisted Foreign Body Removal: A Review of Endoscopic Management and Case Illustration. Cureus, 2017. 9(9).
2. Geng C, et al. Endoscopic management of foreign bodies in the upper gastrointestinal tract: a retrospective study of 1294 cases. Scandinavian journal of gastroenterology, 2017. 52(11): p.1286-1291.
3. Rasheed M.A., et al. Accidental ingestion of toothbrush: An unusual foreign body. Journal of Ayub Medical College Abbottabad, 2018. 30(1): p.130-132.
Learning points: It is important to prevent aspiration in the foreign body ingestion procedures. It should be kept in mind that those patients may have psychiatric comorbidities.

05AP04-9
Caudal Catheters for major abdominal and thoracic surgery in Neonates – A 6 year retrospective study

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Background and Goal of Study: Caudal anaesthesia is an established anaesthetic technique for surgery in neonates.1 The placement of a catheter and the addition of epidural morphine can give excellent intra- and extended postoperative analgesia for thoraco-abdominal surgery even when the exact position of the catheter tip is not located. We therefore describe our single-centre experience with this simple technique for major neonatal surgery and the perioperative period.
Materials and Methods: We included all neonates up to 28 days of life who had a caudal catheter placed for laparotomy or thoracotomy between October 2012 and April 2018. Data were extracted from the electronic anaesthesia and intensive care unit records. Descriptive statistics were used.
Results and Discussion: 33 neonates with a median age of 2 days (IQR 1-8), gestational age of 260 days (IQR 247-277), weight 2700g (IQR 2124-2875) at time of surgery of which 84,8% had laparotomy and 15,2% thoracotomy were included. Intravenous opiods were administered for a median of 29h (IQR 15-72) postoperatively, however 6 neonates did not receive any intravenous opiods after surgery. Patients received epidural Ropivacaine 0,2% for a median of 90h (IQR 27-135) and epidural morphine was administered intermittently for a median of 43h (IQR 27-133). 21 neonates (63,6%) required postoperative ventilation for a median of 60h (IQR 42-90). Enteral nutrition was initiated 29h after surgery (IQR 23-70) and first stool was passed after 40h (IQR 16-60). Median length of ICU stay was 628h (IQR 413-741). Microbiological testing of the removed catheter tip revealed 3 cases of colonisation with Staphyloccus epidermidis, one Bacillus species and one Micrococcus luteus, however none was considered a clinically relevant infection. This data shows that intravenous opiods were either not needed at all or could be stopped earlier than epidural morphine.
Conclusion: Continuous caudal anaesthesia with intermittend peridural morphine is a feasible anaesthetic technique for major neonatal surgery with the potential to limit intravenous opiods and long term use was not associated with infections complications.
References:
1Menzies R, Congreve K, Herodes V, Berg S, Mason DG. A survey of pediatric caudal extradural anesthesia practice. Paediatr. Anaesth. 2009;19(9):829–36.
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05AP05-1
Real-time ultrasound guided epidural placement in infants: our experience

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Background: Epidural analgesia is the standard and reliable technique of perioperative pain relief in patients undergoing abdominal and thoracic surgeries. It's use in paediatric age group is not being widely practiced because of concerns for higher chances of dura puncture and neurological complications as they have thinner & softer ligamentum flavum and narrower space. Real time, ultrasound (US) guided/assisted epidural catheter insertion can improve success rate and safety margin.
Method: We did retrospective analysis of 9 ASA I & II infants undergoing abdominal surgeries, in which real time, ultrasound guided epidural catheter was placed. Duly informed parental consent were taken. Children with history of spine deformity or surgery, neurological disorder, coagulopathy, local infection or sepsis and allergy to local anaesthetic were excluded. Under general anaesthesia, in left lateral position, congruent epidurals were inserted using linear/hockey probe (8 to13 MHz) (GE LOGIQe 9L, GE Healthcare, Wauwatosa, Wisconsin) after getting optimum ligamentum flavum and anterior dura complex views by para median sagittal oblique approach. Twenty gauge Tuohy needle was inserted in-plane from the caudal end of the probe and advanced under real-time, US guidance. Further confirmation of epidural space was done by loss of resistance to saline and simultaneous visualization of downward displacement of posterior dura complex on US. Procedure time, number of bone contacts or needle redirections, number of attempts and procedure related complications like dura puncture, bloody tap were recorded.
Results: Real time ultrasound guided epidural placement was performed in 9 infants in lower thoracic and upper lumber interspaces. We had 100 % success rate with no complications observed. The mean procedure time taken was 212 seconds (range- 60- 480 seconds). Seven out of 9 required single needle insertion attempts, while 2 and 3 attempts were needed in one patient each. Two patients had no bone contact, while 4 had single bone contact and 3 had it twice. No needle redirections were required in 2 patients, single redirections in 2 patients and 2 redirections in 4 patients.
Discussion and Conclusion: Ultrasound helps in identification of interlaminar space, ligamentum flavum, dural complexes and needle tip. Placement of epidural catheter under US guidance will decrease complications and increase success rate.

05AP05-2
Retrospective analysis of centrally inserted central venous catheters in low birth weight neonates: our experience with 50 cases

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Background and Goal of Study: The use of centrally inserted central venous catheters (CICCs) allows maintenance of prolonged intravenous access in children. Our aim was to outline the characteristics of the low birth weight new-born population that received CICC and to present our therapeutic outcomes.
Materials and Methods: This retrospective study was performed using data derived from the medical files of 50 infants (37 females, 13 males) aged 81.3±55.3 days. Patients were treated in the neonatology department of our tertiary care centre. Relationship between demographic, clinical and hematologic variables was investigated.
Results and Discussion: The vast majority of our patients had comorbidities (n=46, 92%). Complications were noted in 14 patients (28%) and revision was necessary in 9 (18%) cases. Catheter infection was evident in 18 patients (36%), while the tip of the catheter was most commonly detected at the levels of 5th (n=12, 24%) and 6th (n=9, 18%) costa. The reason for removal of the catheter was infection in only 15 (30%) of cases. The durability of CICC was significantly longer (p=0.027) and platelet count was notably higher (p=0.032) in patients that underwent revision intervention. In patients with infectious aetiology for removal of CICC, activated partial thromboplastin time was remarkably longer (p=0.045).
Conclusions: We suggest that CICCs constitute a reliable, safe and practical route of access for prolonged intravenous treatment in infants with low birthweight. Identification of patients who may require revision intervention and increased awareness on catheter infection may improve success rate and decrease the likelihood of complications and hazards.

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05AP05-3
Retrospective analysis of 166 central line placements in children

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Background and Goal of Study: To analyse the techniques and approaches that proved successful in pediatric central line placement.
Materials and Methods: The entries from 2016, 2017 interventions Pediatric Anesthesia Unit digital database were analysed for site of cannulation, age, weight of patient, ultrasound guidance or not, number of attempts, complications, straight or J-wire, Seldinger through needle or cathlon. All anesthetists are experienced in pediatric anesthesia. The sets used are Braun.
Results and Discussion: 166 patients were entered 88 of which below 12 months. 68% of time the right internal jugular vein was used followed by the subclavian and femoral. Ultrasound guidance was used 71 % of the time. In 63% the vein was cannulated from the first attempt. 19% from the second. In one patient 10 attempts were made at different sites. The patient was 2 days old with oesophageal atresia. 7 complications were registered ranging from haematoma, to arterial puncture and arterial bleeding from the subclavian artery. No life threatening complications were observed The most common complication was non-advancement of the J - wire. In 23% of cannulations a modified Seldinger technique was used with a cathlon catheter instead of a metal needle. In 22% a straight wire was used instead of a J wire. Analysis showed that cannulation attempts and difficulties were more frequent with decreasing weight, especially below 5 kg. The most common problems in these patients were non-advancement of the J wire and malposition of the needle after disconnection from the syringe. In cases where straight wires were used no such problems were observed. Also when a cathlon was used instead of a needle no syringe was necessary. The operator relied on blood flashback and there was no disconnection malposition. The third factor that improved success rate in all ages was the use of ultrasound.
Conclusions: As expected the most challenging patients proved to be the youngest. Use of ultrasound especially in this age group is irreplaceable. For children below 5 kg it is better to use a straight wire. A cathlon catheter instead of a needle can reduce malpositioning due to syringe disconnection.

05AP05-4
Retrospective study of perioperative complications in noncardiac surgeries for children with congenital heart diseases

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Background and Goal of Study: Noncardiac surgeries for pediatrics with congenital heart diseases require prudent anesthetic management because of the high risk of perioperative complications. The occurrence frequency of perioperative complications has not yet been extensively reported. In this study, we analyzed our experience with the frequency of perioperative complications in noncardiac surgeries for pediatrics with congenital heart diseases.
Materials and Methods: The study was conducted with approval from the Hospital's ethic committee. We reviewed patients with congenital heart diseases who had undergone general anesthesia at Kitasato University Hospital between January 2016 and August 2018 and ranged in age from 0 to 12 years. The operative procedures, anesthesia methods, airways management, intraoperative elapsed time, perioperative complications such as cardiovascular events, and outcomes are examined. Data were analyzed with Chi square test. $p<0.05$ is considered significantly.
Results and Discussion: We examined 81 cases, 50% of whom were in the untreated heart disease group. Perioperative complications were observed in 16 cases (17.5%), of which 10 were in the untreated heart diseases group, and 6 were in the treated group ($p<0.05$ treated vs untreated). In regards to perioperative complications, there was 1 cardiac arrest (1.2%), 1 case of bradycardia (1.2%), 8 cases using circulation agonist (9.8%), 5 cases of difficult intubation (6.1%), and 1 case of re-intubation (1.2%). Focusing of department, pediatric surgery and otolaryngology have a larger number of noncardiac surgery cases, and the frequency of perioperative complications in pediatric surgery was the highest (68.0%).Our study of perioperative complications in noncardiac surgeries for pediatrics with congenital heart diseases indicated that the frequency of perioperative complications are same or slightly higher when compared with previous reports. Also, the untreated heart diseases group had a higher frequency of perioperative complications, such as cardiovascular events and airway problems, compared to the treated group.
Conclusions: Our results indicate that perioperative management for noncardiac surgeries for pediatrics with congenital heart diseases requires a risk assessment in consideration of treated or untreated cardiovascular disease. In addition, clinicians should consider both circulation and airway management as important factors.

05AP05-6
Real-time ultrasound-guided left supraclavicular vein access as an alternative approach in cases of difficult peripheral venous access

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Background: In daily clinical practice, we sometimes come across difficult peripheral veins in severely low birth weight babies or in pediatric patients under long-term management in the intensive care unit. In addition, for example, in patients with pulmonary artery stenosis (such as in Tetralogy of Fallot) with no venous blood access or in whom a venous catheter is not available due to an extravascular leak suffering an anoxic spell, swift intravenous catheterization for fluid and medication administration is needed. However, it is often not only difficult to perform peripheral intravenous catheterization, but also to find a peripheral vein using ultrasound in patients in shock. In such cases, central venous access should be considered to avoid wasting time with further unsuccessful attempts to access peripheral veins.
Report: A real-time ultrasound-guided left supraclavicular approach to the left brachiocephalic vein is to be an alternative approach in cases of difficult peripheral veins.
Discussion: Access to the internal jugular vein, the most popular approach among anesthesiologists, is sometimes difficult, especially in babies or small pediatric patients because their large head, short neck, and the ultrasound probe interfere with each other. Access is even more difficult in patients under bag-valve-mask ventilation by another anesthesiologist. In the real-time ultrasound-guided left supraclavicular approach, the target vein (left brachiocephalic vein) is shown in a long-axis view and the puncture needle is inserted from the left side of the patient via a long-axis approach(1, 2). It has been reported that the real-time ultrasound-guided left supraclavicular approach is easier and its success rate higher than that of the right approach(3). Therefore, this technique is helpful as one of solution strategies in cases of difficult peripheral veins.
References:
1 Yamamoto T, Schindler E. Paediatr Anaesth 2015; 25: 1176-1178.
2 Yamamoto T, Schindler E. Anesth Analg 2017; 125: 359.
3 Breschan C, et al. Paediatr Anaesth 2015; 25: 943-949.
Learning points: We discuss the reason the left approach is easier than the right approach from an anatomical point of view and introduce a step-by-step procedure of the real-time ultrasound-guided left supraclavicular approach to the left brachiocephalic veins, showing a video of real venous puncture during anesthesia induction for heart surgery in a case of small pediatric patient with difficult peripheral veins.

05AP05-7
Emergency reversal of rocuronium-induced neuromuscular block with sugammadex for rescue of spontaneous ventilation in a very low birth weight neonate with esophageal atresia and tracheoesophageal fistula

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Background: Sugammadex can be used for immediate reversal of neuromuscular block (NMB) after administration of rocuronium. Although its use is extensively described in adults for elective and emergency purposes, sugammadex is still an off-label alternative in the neonatal and pediatric populations. In this abstract, we report the successful reversal of rocuronium-induced NMB with sugammadex for rescuing spontaneous ventilation in a neonate with esophageal atresia and tracheoesophageal fistula (EA/TEF).
Case Report: A 30 weeks 2/7 premature female neonate with 1060g was scheduled to undergo an EA/TEF repair two days after cesarean delivery. She was being mechanically ventilated in the Neonatal ICU, but in asynchrony, presenting herself agitated and tearful. In the OR, she was monitored with EKG, intra-arterial BP, temperature, pulse oximeters (pre and postductal) and urinary catheter. General anesthesia was induced and maintained with dexmedetomidine, S-ketamine and fentanyl. Despite appropriated anesthetic doses for providing hypnosis and analgesia, she was still reactive and maladapted to the ventilator. Then, it was decided to administer rocuronium. However, after apnea, she became impossible to be ventilated or oxygenated, presenting with increased abdominal volume, desaturation and bradycardia. While the surgeon was preparing for an emergency gastric decompression, it was given a high dose of sugammadex with atropine. Right after that, spontaneous ventilation was recovered, being only manually assisted, which enabled the immediate return to the previous respiratory and hemodynamic status. In spite of all the expected and inherent challenges of the procedure, the fistula was ligated and the esophagus was successfully reconstructed. Enteral nutrition was initiated one day latter and the trachea was extubated in the 27th postoperative day.
Discussion: There are just a few case reports and one open-label trial about the use of sugammadex in neonates and none of them describe the use of the 16mg. kg-1 dosing for emergency reversal of the NMB, which can be a lifesaving measure.
References:
TOBIAS JD. Current evidence for the use of sugammadex in children. Paediatr Anaesth. 2017;27:118-125.
Learning points: Sugammadex is likely to be an effective alternative for NMB reversal and for rescue of spontaneous ventilation after administration of rocuronium in neonates. However, there are no data available about the efficacy and safety of the drug in this age group.

05AP05-8
Anesthetic management in pediatric patients with congenital long qt syndrome undergoing left cardiac sympathetic denervation

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Background and Goal of Study: Congenital long QT syndrome (LQTS) is a cardiac disorder resulting from malfunction of cardiac ion channels. It predisposes to malignant ventricular arrhythmias, such as "torsade de pointes", which may lead to syncope, cardiac arrest and sudden death. Left cardiac sympathetic denervation (LCSD) is a therapeutic option for patients who cannot tolerate pharmacotherapy, patients who continue to have cardiac events despite pharmacotherapy or those who received frequent shocks from the implantable cardiac defibrillators. Anesthetic management in these patients must be cautious as many medications may exacerbate QT prolongation. The aim of this study is to describe our experience in the anesthetic management of pediatric patients who have undergone LCSD for congenital LQTS.
Materials and Methods: We have performed a retrospective observational study of all patients with congenital LQTS who have undergone LSCD in our center between January 2016 and December 2018.
Results and Discussion: We have analyzed 20 patients, median age 13y(17m-20y), median weight 38(10-71)Kg. 90% patients received premedication with intravenous midazolam. External defibrillator pads were placed in all patients and emergency drugs were prepared. All patients underwent general intravenous anesthesia with fentanyl 3mcg/Kg, thiopental 5mg/Kg/h, rocuronium 0,4mg/Kg/h, remifentanil 0,25

mcg/Kg/min, and morphine 0,1mg/Kg. Dexamethasone was administered in 80% of patients after the induction as a prophylaxis of nausea and vomiting. One patient received topical lidocaine prior to endotracheal intubation. One-lung ventilation was achieved with a double lumen tube in 60% of patients, and with a standard tube in 40%. At the end of surgery 30% of patients received local anesthesia in the trocar insertions (levobupivacaine). 70% of patients received sugammadex for reversal of neuromuscular blockade. All patients were successfully extubated in the OR and they were sent to the recovery room. No significant cardiac or other events occurred in any of these patients in the perioperative period.
Conclusion: In our experience, continuous monitoring of the ECG perioperatively, avoidance of sympathetic stimulation and "unsafe" drugs, and correction of any abnormal electrolytes allowed a safe anesthetic management without triggering any cardiac events. We considered of outmost importance the immediate availability of a defibrillator and antiarrhythmic agents.

05AP05-9
Age based formula for nasotracheal tube size in developmental disability patients.

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Background and Goal of study: Uncuffed nasotracheal tube is still preferred in oral maxillofacial surgery. In the case of uncuffed tube, tube size is important. Inadequate tube size might lead to insufficient ventilation or give damage to the vocal code. We previously reported height is the most important factor to select tube size in healthy children. In children with developmental disability, however, there was much variation in body growth. Therefore, tube size should be selected carefully. We investigated the factors for selection of nasotracheal tube size for children with developmental disability, retrospectively.
Materials and Methods: The study period was from April 2012 until May 2017. Patients were children with developmental disability aged 2-10 yrs, who underwent oral maxillofacial surgery using uncuffed nasotracheal tube under general anesthesia. Patients' background was reviewed. Data were analyzed using spearman's regression analysis to calculate the correlation between background (age, height, weight), the diameter of the trachea at the sixth cervical vertebra (C6), 7th cervical vertebra (C7) and 2nd thoracic vertebrae (T2) in X–ray and tube size. In addition, we compared relationships between predicted tube size by greatest correlation-based for orotracheal tube and actually intubated tube size.
Results and Discussion: The study included 75 patients; 104.6 ± 12.2cm in height, 17.1 ± 4.6kg in weight. The clinical features in children with developmental disability include shorter statue and lighter body weight. All patients were intubated nasotracheally with 5.0-6.0mm ID. The spearman's correlation coefficients was significantly related to all factors. Especially age is the most related factor to the tube size; vs age; r2= 0.9027, vs height; r2=0.5434, vs weight; r2=0.3779, vs C6; r2=0.0785, vs C7; r2=0.2279 and vs Th2; r2=0.3065. As a result, the formula by age (ID=4+age [yrs]/4), could be most suitable for the selection. The correlations between the actual tube sizes and the predicted tube sizes from each factor were analyzed. The correspondence rate to the size predicted by age was 28%, 28% and 35% in 5.0, 5.5 and 6.0mm ID. 0.5 mm smaller size tubes were more frequently intubated; 48%, 52% and 39%, respectively.
Conclusion: Age is important factor to select adequate tube size for children with developmental disability. In the case of larger size was predicted, we suggest that one smaller tube should be prepared.

05AP06-1
The effectiveness of intravenous droperidol for the prevention of postoperative vomiting in children: a systematic review and meta-analysis

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Background and Goal of Study: Since postoperative vomiting (POV) is a frequent complication in paediatric anaesthesia, a risk-adapted antiemetic prophylaxis is recommended. While droperidol is one of the most commonly selected antiemetics, two recent large trials [1,2] demonstrated absence of effectiveness when droperidol was added to other antiemetic prophylaxes in children. In face of severe side effects including extrapyramidal symptoms and QT-prolongation, solid data balancing these risks are required to justify future administration. Therefore, we assessed the effectiveness of droperidol for POV prophylaxis in children by a systematic review and meta-analysis.
Materials and Methods: After registration at PROSPERO (CRD42018089207) we searched EMBASE, MEDLINE and CENTRAL for randomized, controlled trials in children <16 years of age evaluating intravenous droperidol when given alone or in addition to another antiemetic prophylaxis. Primary outcome was the overall (0 to 24±6 hours) incidence of POV. Secondary outcomes included early and late POV, the need for postoperative antiemetic treatment, as well as any side effects reported. Statistics: Relative Risks with corresponding 95% confidence intervals (Mantel-Haenszel, Random Effects Modeling), p<0.05.
Results and Discussion: Out of 1,455 search results, 22 studies comprising 2,200 children were included. When given as a single antiemetic prophylaxis, droperidol (up to 75µg/kg) reduced the risk for overall POV (0.71 [0.58; 0.86], p<0.001), early POV (0.61 [0.50; 0.75], p<0.001), late POV (0.77 [0.61; 0.95], as well as the need for antiemetic rescue treatment (0.46 [0.28; 0.76] p=0.002). In contrast, when droperidol was administered additionally to other medical prophylaxes (3 studies, 543 patients), there was no difference between droperidol and control (1.10 [0.79; 1.51], p=0.57). Finally, droperidol markedly increased the risk for drowsiness (3.64 [1.69; 7.82], p=0.001) and restlessness (2.16 [1.27; 3.65], p=0.004). Other extrapyramidal symptoms were rare and without difference between the droperidol and control (8 studies, 4/471 vs. 1/468 patients, respectively, p=0.26).
Conclusion: In children undergoing general anaesthesia, droperidol reduces the risk for POV when given as single antiemetic prophylaxis. However, there was insufficient evidence for droperidol in combination with other antiemetic drugs.
References:
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05AP06-2
The effect of ramelteon on preventing emergence agitation after general anaesthesia in paediatric patients: a randomised placebo-controlled clinical trial

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Background and Goal of Study: Melatonin is a pineal gland hormone that regulates the sleep-wake rhythm. Melatonin premedication is reported to have a preventive effect on emergence agitation (EA) in children, without causing respiratory depression1. The effect of ramelteon, a melatonin receptor agonist, on preventing EA in children has not been studied. The purpose of this study was to confirm our hypothesis that ramelteon has a preventive effect on EA in children.
Materials and Methods: This prospective, double-blinded, parallel-group, placebo-controlled randomised clinical trial included patients aged 18 to 119 months, with American Society of Anesthesiologists physical status 1 or 2, and scheduled to undergo tonsillectomy under general anaesthesia. The enrolled patients were randomly allocated to the ramelteon or placebo group and administered the study drug or placebo 45-60 min before induction. The patients in the ramelteon group received 0.1 mg/kg of ramelteon dissolved in 5 mL syrup. The patients in the placebo group received the same amount of syrup alone. When the patients were transferred to the postanaesthesia care unit (PACU), the Paediatric Anaesthesia Emergence Delirium (PAED) score was assessed every 5 min after waking, and the worst score was recorded. The primary outcome was the incidence of EA (PAED score > 10). The secondary outcomes were the PAED scores, incidence of POV, pain score, and adverse events. We hypothesized that the incidence of EA in the placebo group and ramelteon group were 67% and 21%, respectively, according to the meta-analysis of melatonin1. The required number of patients was 22 per group (alpha error of 0.05 and statistical power of 0.80). Considering dropout, we set the number of patients at 25 per group.
Results and Discussion: Forty-eight patients were eligible. There was no significant difference in the incidence of EA between the two groups (67% in both groups; RR 1.0; 95% CI 0.67–1.49; P > 0.99). There were no differences in the secondary outcomes.
Conclusions: Our results showed that 0.1 mg/kg ramelteon did not have a preventive effect on EA after general anesthesia in children.
References:
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05AP06-3
Immunogenicity and safety of live attenuated viral vaccines in children after minor surgery

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Background and Goal of Study: It is commonly believed that surgical stress and anaesthesia suppress immune responses. Therefore, it has been said that we should wait to administer live attenuated viral vaccinations for at least 2–4 weeks after surgery in Japan. To date, however, no study has reported changes in antibody titres or associated immunity induced by vaccines administered after surgery with general anaesthesia1. Hence, we examined the immunogenicity and safety of live attenuated viral vaccines in children who underwent minor surgery after general anaesthesia.
Materials and Methods: Subjects were preschool children aged ≥1 year who underwent minor surgery with general anaesthesia and received live attenuated viral vaccine for mumps and/or varicella 1–3 days after the surgery (Group An). Anesthesia was induced with sevoflurane and maintained with sevoflurane and remifentanil. Age-matched healthy children who received the vaccines in the same season served as controls (Group C). Total lymphocyte count and CD4/CD8 ratio were measured before and 1 month after vaccination in Group An. The effects of vaccines on antibody titre were evaluated based on IgG (EIA) in both groups. Adverse events were also recorded. Results were statistically analyzed using the Mann–Whitney U test, the chi-square test, Student's t-test, and analysis of variance.
Results and Discussion: Twenty-five subjects in Group An and 127 subjected in Group C were enrolled in the study. In Group An, 20 received varicella vaccine and 18 received mumps vaccine after 1.6 ± 1.4 days of operation. In Group C, 114 received varicella vaccine and 33 received mumps vaccine. No significant changes in lymphocyte count or CD4/CD8 ratio were observed during the 1–3 day or 1-month period in Group An. Antibody titre of mumps and varicella were significantly elevated after vaccination in both groups, and did not differ significantly between Group An and Group C. No significant adverse events were observed.
Conclusions: Minor paediatric surgery had no major impact on the immune status of young children. Live attenuated viral vaccines for mumps and varicella are safe and immunogenic for children after minor surgery and anaesthesia without a long waiting period.
References:
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05AP06-4
Accuracy of dynamic fluid variables for predicting fluid responsiveness in paediatric patients with liver cirrhosis: A prospective study of diagnostic accuracy

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Background and Goal of Study: Predicting whether a fluid challenge will elicit fluid responsiveness is crucial during liver transplantation. We reported that pulse pressure variation (PPV), stroke volume variation (SVV), and plethysmographic variability index (PVI) predict fluid responsiveness in adults with liver cirrhosis.[1] However, paediatric patients with cirrhosis have unique haemodynamic characteristics, and the accuracy of PPV, SVV, and PVI has not yet been clarified for these patients.
Materials and Methods: Twenty seven consecutive paediatric patients with cirrhosis (age 8 months to 13 years) who were undergoing orthotopic liver transplantation were enrolled. PPV, SVV, stroke volume index (SVI), and systemic vascular resistance index (SVRI) were measured using the PiCCO system. PVI was measured using a Masimo Radical-7 CO-Oximeter. During the hepatic dissection phase of surgery, an intraoperative fluid challenge with 10 mL kg−1 of crystalloid was infused at the attending anaesthesiologist's discretion. Fluid responsiveness was defined as an increase in SVI 15%. A sample size of 9 fluid responders and 27 nonresponders was calculated for an area under the receiver operating characteristic (AUROC) curve of 0.8 to reject the null hypothesis that AUROC=0.5.
Results and Discussion: A total of 61 fluid challenges were made, with 15 fluid responders and 46 fluid nonresponders. Fluid challenge induced significant decreases in PPV, SVV, and PVI among the fluid responders [PPV decreased from 13 (6)% to 8 (4)% and SVV decreased from 15 (7)% to 10 (7)%, both $p < 0.001$; PVI decreased from 16 (8)% to 13 (7)%, $p = 0.0494$] but not among the fluid nonresponders. Fluid challenge induced significant increases in CVP in both the fluid responders and nonresponders. The SVRI, lower than those reported in adult patients, was observed [1180 (455) vs. 1166 (460) dynes·s/cm^5/m^2 before and after fluid challenge, respectively; $p = 0.7361$]. The AUROC curves for PPV, SVV, PVI, and CVP—predictors of fluid responsiveness were 0.67 (p=0.0255), 0.68 (p=0.0140), 0.57 (p=0.4192), and 0.56 (p=0.4724), respectively. These low accuracy values may be due to lower SVR among paediatric patients with liver cirrhosis compared with adult patients.
Conclusion: PPV, SVV and PVI did not predict fluid responsiveness in paediatric liver cirrhosis patients.
References:
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05AP06-5
Does oral clonidine premedication decrease the risk of nausea/vomiting after pediatric tonsillectomy?

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Background and Goal of Study: Postoperative nausea/vomiting episodes remain the main cause of morbidity and discomfort following tonsillectomy in pediatric patients. Even there are many reasons for the high rate of postoperative nausea/vomiting after pediatric tonsillectomy, premedication with a suitable agent could improve the management of such undesired events. Our prospective randomized, double-blind trial tested the hypothesis that oral clonidine premedication could be effective in nausea/vomiting prophylaxis after pediatric tonsillectomy.
Materials and Methods: After obtaining Local Ethics Committee approval and parental written informed consent, 70 children (ASA I-III, aged 3-7 years) scheduled to elective tonsillectomy under general anesthesia, were enrolled. They were randomly allocated into two groups. Thus, patients from group C (n=36) were treated with 20 ml of a clear sweet liquid containing 4 µg/kg of clonidine, orally administered one hour before induction, whereas those from group P (n=34) received the same volume of placebo. Standardized general anesthesia and postoperative analgesia regimen based on paracetamol were used in both groups. The incidence of nausea/vomiting episodes was measured and registered during first 24 h postoperatively. The dose of rescue antiemetic medication such as intravenous metoclopramide was documented, too. Drug side effects were also recorded. Statistics used Student t-test and Mann-Whitney test with significance above 0.05.
Results and Discussion: The two groups were similar concerning demographics. Patients from group C experienced significantly less episodes of nausea/vomiting compared to those from group P during study period ($p<0.001$). Similarly, the consumption of antiemetics during the first 24h postoperatively appeared significantly lower in clonidine patients compared to placebo($p< 0.05$). No clinical significant adverse effects such as bradycardia or hypotension were registred during study period.
Conclusions: According to our data, we conclude that oral clonidine preoperatively administered as a dose of 4µg/kg, could be associated to a significantly reduced number of nausea/vomiting episodes compared to placebo, respectively to a lower antiemetics consumption during first 24 h after tonsillectomy in pediatric population.

05AP06-6
Pharmacoeconomic analysis of Sevoflurane use over one month in a Pediatric Anesthesia Unit

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Background and Goal of Study: Sevoflurane plays a major role in pediatric anesthesia and is the main expenditure in our drugs budget. Our aim was to analyse the use of Sevoflurane in a Pediatric Anesthesia Unit over a month and see if any optimisation can be done. We hypothesised that the most Sevoflurane is used in induction.
Materials and Methods: All anesthesia cases for a past month were analysed for the use of Sevoflurane, inhalational Induction, % of Sevoflurane for maintainance, flow of fresh gas, age of patient, duration of anesthesia.
Results and discussion: Out of 305 anesthesia cases, in 103 Sevoflurane was used. There were 71 inhalational inductions with Sevoflurane. 21 cans of anesthetic were used for that month. 6030 min. (100,5 h) of maintainance of anesthesia were done. Mean time of anesthesia was 58 min. 81% of children were below 6 years of age. Mean induction was calculated as 5 min at 8% Sevoflurane and 6 L/min of fresh gas. Mean maintainance setting was 3.5%. What was most striking was that mean maintainance fresh gas flow was 4,047 L/min which is not a small number for maintainance. We expected that induction wtih Sevo was the main expenditure and it turned out that only 16,24% of Sevoflurane was used during inductions. 83,76% was used for maintainnance. There were two main reasons for the use of such high flows for maintainance. The first reason was cases with uncuffed endotracheal tubes which present leaks and hence the system needs a higher flow of fresh gas. The second reason was subjective and it was simply habitude. Even when working in airtight systems with no leaks, some people prefer higher flows for safety reasons. Our calculations showed that if flow was reduced from 4 to 2 L/min in this latter group of cases where no objective reason exists for high fresh gas flow we could reduce our monthly use of Sevoflurane by 32 %.
Conclusions: Sevoflurane induction has a small contribution to overall expenditure. Sevoflurane consumption at our institution can be significantly reduced by simple measures like staff education about the safe use of lower flow anesthesia.

05AP06-7
Influence of oxygen desaturation on pulse oximetry readings and cerebral Near Infrared Spectroscopy (NIRS) in a child with hyperbilirunemia

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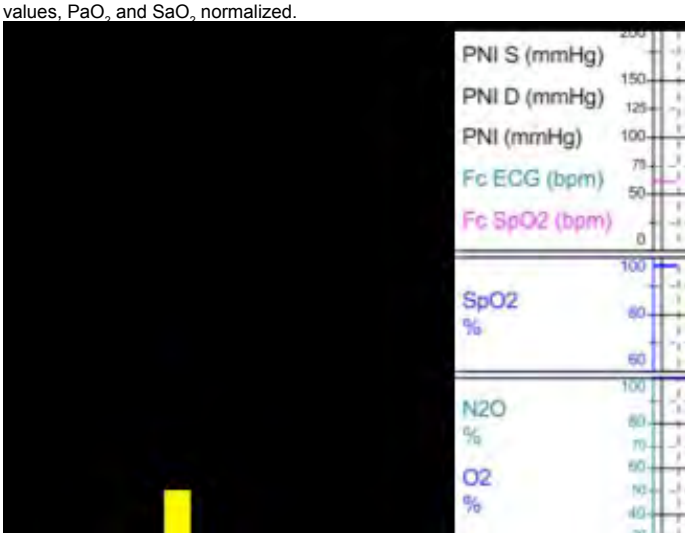
Background: Regional cerebral O_2 saturation can be monitored using NIRS.There is limited information about its correlation with O_2 Hb saturation measured by pulse oximetry (SpO_2) in pediatric patients with hyperbilirunemia.
Case Report: We report the case of a two-year-old child scheduled for liver transplantation with a preoperative bilirubin of 26 mg/dL. Intraoperatively, the cerebral NIRS (Fore-sight Elite) dropped to 35% while SpO_2 (Masimo SET) remained constantly >95% (Fig1). Hemodynamic and respiratory parameters were stable. Several recruitment manoeuvres were performed. Arterial blood gas analyses were realized before, during and after the event (Fig 1). The one analyzed during the NIRS desaturation under a FiO_2=0,5 showed a PaO_2=61 mmHg and a SaO_2=83% explaining the NIRS alteration (Fig1). Endotracheal tube had accidentally become selective following mobilisation of the patient. After repositioning the tube, NIRS values, PaO_2 and SaO_2 normalized.



Discussion: Several factors such as light scatter and reflexion, HbCO and metHb, Ph, temperature, and vasoconstriction are known to interfere with SpO_2 measurements. Studies reporting the influence of hyperbilirunemia on SpO_2 readings are conflicting(1,2). In this patient SpO_2 was overestimated. As Fore-sight Elite uses 5 wavelengths of light and takes into account the 690nm wavelength, it accurately allows a differentiation between oxyHb, deoxyHb and other chromophores such as bilirubin. It may thus be the only reliable parameter to detect an O_2 delivery problem in these conditions.
References
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Learning points: Hyperbilirubinemia may influence SpO_2 values resulting in false readings and masking an O_2 desaturation. NIRS technology taking into account different wavelengths of light may detect the latter and should be standard of care in icteric patients. The threshold value of blood bilirubin disrupting the plethysmograph needs however to be defined.

05AP06-8
Effect of Passive Smoking on Postoperative Nausea and Vomiting in Children

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Background and Goal of Study: Tobacco use is a public health problem with a high priority worldwide. This study hypothesises that assessment of postoperative nausea and vomiting (PONV) risk between passive smokers and non-passive-smokers in children.
Materials and Methods: The patients' age range was 0-16 years; they were scheduled for elective surgery. A total of 50 patients [26 passive smokers (Group S) and 24 non-passive-smokers (Group NS)] were included in the study. Group S included patients whose parents smoked at least 0.5packs/day and were currently smoking, whereas Group NS included whose parents had never smoked. We compared PORC risk between groups.
Results and Discussion: The childrens' mean age were 4.8 years. Twenty-five of them were girl, 25 of them were boy. Parents who smoked at home nearby their children were smoked 0.86 packs / day on average. PONV was more common in children whose parents were smoking more than 1 p / day at home and was statistically significant($p<0.05$).
Conclusions: Smoking is known to alter the effects of neuromuscular agents and recovery times of the patients. It is believed that studies with larger populations and different perspectives are needed to evaluate passive smoking, which has negative effects on all body systems in children.

05AP06-9
Effect-site concentrations of propofol and opioids at extubation in total intravenous anaesthesia in children

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Background: Total intravenous anaesthesia is gaining popularity in paediatric anaesthesia. Although no technology is available for monitoring blood concentrations of intravenous agents, pharmacokinetic approach is a promising alternative for predicting the time of the emergence from anaesthesia and extubation. In this study, we retrospectively investigated effect-site concentrations (Ce's) of anaesthetics at extubation in paediatric patients.
Materials and Methods: After IRB approval, 80 patients, aged 3 to 8 years, for elective adenotonsillectomies were enrolled. Anaesthesia was induced with sevoflurane in N_2O-O_2 and maintained with propofol and remifentanil. Propofol was continuously infused at 14 to 10 mg/kg/h in step-down manner after 2 mg/kg of a bolus. Remifentanil infusion was maintained at 0.3 to 0.7 μg/kg/min. Fentanyl was also administered for post-operative analgesia. At the end of surgery, infusions of propofol and remifentanil were discontinued. Extubation was performed when adequate spontaneous respiration was achieved with $EtCO_2$ ≤ 50 mmHg and patient movement was observed against light stimulus. Ce's of propofol (CeP), remifentanil (CeR), and fentanyl (CeF) at the end of surgery and at extubation were calculated by pharmacokinetic simulation with the Kataria, Eleveld, and Shafer models, respectively. Mean, standard deviation, and 95% confidence interval (95% CI) were calculated for each Ce.
Results: All patients were successfully extubated 20.0 ± 4.8 minutes after the end of surgery. CeP, CeR, and CeF at extubation were 1.33 ± 0.26 μg/mL, 1.30 ± 0.29 ng/mL, and 1.61 ± 0.44 ng/mL, respectively. CeR ranged below 2.0 ng/mL and showed smaller distribution (95% CI 1.24 – 1.37). Synergic relationship between CeP and CeR or CeF was not observed at extubation (Figure).
Conclusion: For extubation in paediatric patients, the reduction of remifentanil Ce below 2.0 ng/mL may be required rather than the reduction of propofol Ce or combined opioid Ce of remifentanil and fentanyl. Propofol and opioids might interact little for extubation in paediatric patients.

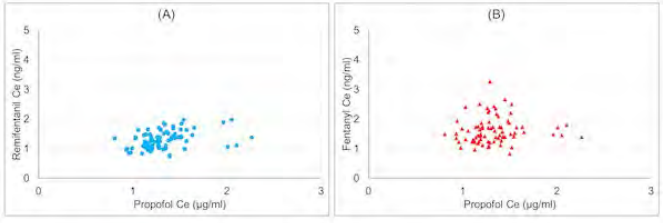

Figure: The relationship between propofol Ce and (A) remifentanil or (B) fentanyl Ce at extubation.

05AP07-1
Anesthetic management in a child with rapid-onset dystonia-parkinsonism (DYT12).

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Background: Rapid-onset dystonia-parkinsonism also known as DYT12 is an extremely rare neurological disease. The mutated gene is ATP1A3 (19q13.2). Patients develop dystonia, bradykinesia, postural instability, dysarthria and dysphagia. Injection of Botulinum toxin is the first choice treatment for focal dystonia. (1)
Case Report: A 14 years-old patient diagnosed with DYT12 was planned for injection of botulinum toxin in his upper limbs under general anesthesia. The disease was diagnosed at 12 with the onset of severe generalized dystonia. Rapidly, the patient became wheelchair-bound and lost the use of his hands. Because of the large number of injections needed, the pain associated with them and in order to optimize the chances of successful treatment, it was decided to realize them under general anesthesia. The patient was placed supine with careful positioning of the head, because of the severe cervical dystonia. Sevoflurane and nitrous oxide by facemask was used for induction and maintenance of anesthesia. Dexamethasone was used for anti-emetic prophylaxis and paracetamol for analgesia. He presented nausea and was vomiting in the post-anesthesia care unit: this was successfully treated with ondansetron.
Discussion: To our knowledge, there is no previous report about the anesthetic management of patients with DYT12. We choose not to use propofol because of the risk of worsening dystonia, which may lead to laryngeal dystonia. Propofol-induced dystonia is a well-documented side effect that may involve any muscle group with wide range of clinical manifestations, specifically in children. (2) As the neurologist performing the injections needs to use neurostimulation (ENMG) to identify the dystonic muscles, neuromuscular blocking agents could not be used. Last, antidopaminergic antiemetics, such as dehydrobenzoperidol, are contraindicated because of the high risks of severe laryngeal dystonia and status dystonicus.
References:
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Learning points: Anesthetic management for botulinum toxin injections in patients with DYT12 is challenging because of potential aggravation of dystonic features and the risks related to medications frequently used in anaesthesia. Proper preparation and collaboration with the neurologist are important.

05AP07-10
ANAESTHETIC MANAGEMENT OF FUSION SPINAL. REPORT CASE OF CAREY FINEMAN ZITER SYNDROME.

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Background: The Carey Fineman Ziter syndrome (CFZ) is a rare condition characterized by skeletal muscle hypotonia, Pierre-Robin sequence (PR) and Moebius sequence (MS) which includes facial paralysis and congenital paresis of the facial and abducens cranial nerves, laryngostenosis, unexplained intermittent arterial hypertension with facial flushing and sweating, hydronephrosis, and talipes equinovarus.
Case Report: A 13-year-old female with a diagnosis of severe kyphoscoliosis needing a surgical correction. Medical history of CFZ with retard psychomotor development, facial paralysis, hypotonia, strabismus, micrognathia, obstructive sleep apnea with no treatment, reflux esophagitis. Intraoperative: Total intravenous anaesthesia with neurophysiological monitoring. The intubation was a two-hand technique and no problems with manual ventilation. The surgery proceeded without incidences. The patient was extubated and remained at the ICU for 24 hours
Discussion: Given the multisystem involvement of MS, there are several potential perioperative concerns like airway management, aspiration risk, corneal abrasions and peripheral neuropathies needing a special intraoperative care. A difficult airway management was planned. Cotrel traction was used during the surgery. Prone position increases the risk of ocular damage in this case. The risk of aspiration and hypotonia were considered before the extubation.
References:
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Learning points: CFZ is a complex syndrome. Potential for problems with the aspiration of oral secretions should be remembered, the use of antisialogogue premedication is recommended. General anaesthesia is potentially a high-risk, due to the airway management difficulties. Hypotonia can also impact on postoperative respiratory function. It is very important to consider residual anaesthetic agents effects which may exacerbate poor baseline function leading to respiratory failure.

05AP07-2
Changes in cerebral and renal oxygenation during laparoscopic pyloromyotomy.

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Background and Goal of Study: Insufflation of the abdomen with CO_2 during laparoscopy increases intra-abdominal pressure (IAP), which may adversely impact cardiac output and organ perfusion. Near-infrared spectroscopy (NIRS) is a non-invasive monitoring for regional oxygen saturation (rSO_2). Although one study has demonstrated stable cerebral rSO_2 on NIRS during laparoscopic pyloromyotomy with low IAP, the potential impact of pneumoperitoneum on cerebral and renal rSO_2 have not been thoroughly assessed. We evaluated changes in cerebral and renal rSO_2 during laparoscopic pyloromyotomy, hypothesizing that insufflation of the abdomen would reduce rSO_2.
Materials and Methods: Infants ≤ 2 months of age undergoing laparoscopic pyloromyotomy for correction of congenital pyloric stenosis were recruited for the study. Cerebral and renal rSO_2 were measured using NIRS monitors placed on the forehead and lower back, respectively. The rSO_2 was recorded prior to induction, after induction, at incision, at the beginning of laparoscopy, at the end of laparoscopy, and at the end of surgery. Repeated-measures ANOVA was used to test for change in rSO2 during the procedure. For the primary aim of comparing rSO_2 changes associated with insufflation of the abdomen, rSO_2 change from incision to the end of laparoscopy was compared using a paired t-test.
Results and Discussion: The study cohort included 25 infants with a mean age of 40 days and weight of 4.0 kg. IAP at the beginning of laparoscopy was 10 ± 2 mmHg. Repeated measures ANOVA identified statistically significant changes in both brain and renal rSO_2 during the study period ($p<0.001$, both). Both cerebral and renal rSO_2 decreased from incision compared to the end of laparoscopy, the decrease reached statistical significance only for cerebral rSO_2 (81 ± 12 to 76 ± 16, $p=0.033$) (renal rSO_2: 83 ± 11 to 77 ± 20, $p=0.072$). No change in hemodynamic or respiratory parameters was found. The previous study reported no change in rSO_2 associated with insufflation of the abdomen with IAP maintained at 8 mmHg, our study of a larger cohort identified a significant decrease in cerebral rSO_2 associated with insufflation of the abdomen. There were no corresponding changes in renal rSO_2. Of note, procedures in our study were performed with higher and more variable IAPs than in the previous report.
Conclusion: Limiting and maintaining the IAP during laparoscopic procedures may help avoid deleterious effects on cerebral oxygenation.

05AP07-3
Successful anaesthetic management in children with Steinert’s disease for maxillofacial surgery

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Background: Myotonic dystrophy (DM) is a rare autosomal dominant inherited neuromuscular, with two defined forms: type 1 (DM1), also known as ‘Steinert’s disease’; and type 2 (DM2), also known as proximal myotonic myopathy. DM1 is the most common form of adult onset muscular dystrophy. The disease affects multiple systems (skeletal muscle, heart, eye, endocrine and central nervous system). The clinical picture includes myotonia (impaired muscle relaxation), arrhythmias, cataracts, diabetes and cognitive dysfunction. There is greater perioperative risk of bronchoaspiration, respiratory failure and malignant hyperthermia[1].
Case Report: A 13-year-old boy with DM1, scheduled for resection of ankylosed central teeth in the maxilla. Pre-anaesthetic evaluation identifies important facial deformity. Mallampati test class I. Routine preoperative evaluation was normal. Surgery was performed under total intravenous anaesthesia: propofol in target controlled infusion, remifentanil and single dose of 0.5 mg kg-1 of rocuronium. Intraoperative monitoring: cardioscope, pulse oximeter, capnograph, noninvasive pressure, anaesthesia depth monitor and neuromuscular function monitor. At the end of the surgery (60 minutes), with no response to TOF stimulation and 6 post-tetanic count, 4 mg kg-1 of sugammadex reversed the motor block in less than 2 min. Postoperative analgesia and nausea and vomiting prevention were promoted with dipyrone, tramadol, ondansetron and dexamethasone. Awake extubation was performed and the patient was referred to the recovery room, where remained without complaints or complications for 2 hours. He was discharged on the same day.
Discussion: The anaesthesiologist is the only physician who can actually check the risks associated with anaesthesia. We defined the perioperative conducts with the patient and their parents, based on following a rigorous plan of using techniques and drugs that prevented the development of myotonya, malignant hyperthermia, bronchoaspiration, respiratory failure and cardiac complications.
References:
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Learning points: Child with Steinert’s disease is a big challenge. The preanaesthetic preparation, the choice of short-acting intravenous agents and sugammadex to reverse neuromuscular blockade, in addition to a close perioperative monitoring, helped us to ensure a safer anaesthetic experience for this patient.

05AP07-4
A retrospective review of cardiorespiratory events during ophthalmic arterial chemosurgery for retinoblastoma in children.

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Background and Goal of Study: Retinoblastoma (rb) is the most frequent malignant intraocular tumor in childhood. Intra-arterial chemotherapy (IAC) has emerged over the past decade as a first-line treatment option for rb. Sant Joan de Déu Barcelona Children's Hospital is one of the reference centers for this cancer disease. Serious adverse cardiorespiratory events complicate selective ophthalmic IAC for rb in children under general anesthesia. Their mechanism remains unclear but may be attributed to an autonomic nervous reflex induced by the catheter close to the ophthalmic artery.
Materials and Methods: 19 children were included in this study between 1/2015 and 5/2018 scheduled to ophthalmic IAC under general anesthesia after diagnosis of rb. Standardized deep general anesthesia with sevoflurane, rocuronium or atracurium, fentanil and remifentanil were administered. Moreover to treat haemodynamics stability intavenous pump of adrenaline or dopamine were used. Dexametasone, vitamine C and heparine were administred in every patient. Serious cardiorespiratory event criteria were predefined and included arterial hypotension, bradycardia, asystole, hypertension and decrease in end-tidal of capnography.
Results: 59 procedures were performed on 18 children (no data of one children). The average was 3.1 sessions per patient. Serious cardiorespiratory events occurred in 25 procedures (most during first and second procedures) (Table 1). The most frequent complication was hypocapnia (17%). One patient suffered an asystole with recovery after active treatment. No morbidity was associated with intraoperative severe cardiorespiratory events.
Table 1.

	Number of patients	Percentage
Bradycardia	9	15.2%
Asystole	1	0.6%
Hypotension	5	8.5%
Hypertension	1	0.6%
Hypocapnia	10	17%

Conclusion: Serious cardiorespiratory events occur commonly during super selective ophthalmic IAC. Standardized deep anesthesia with analgesia did not appear to be protective. Anesthetists and neuroradiologists should be prepared to manage these serious complications and parents should be informed of the risks. *JH Scharoun et al. Anesthesia for Ophthalmic Artery Chemosurgery. Anesthesiology. 2017Jan;126(1):165-172.*

05AP07-5
Intrauterine injury to the fetus by a projectile

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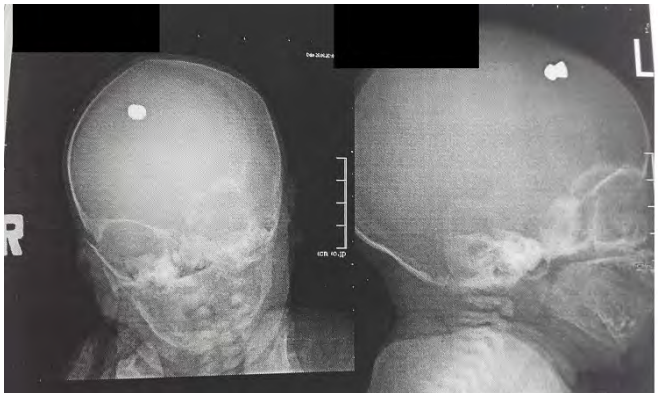
Background: Projectile injury to infants before birth is uncommon and generally fatal. The speed and weight of the projectile are the major factors that produce damage. Even if the fetus is not wounded hypotonia and blood loss of the mother can endanger the child.
Case Report: We report a case of a 34-35 week old baby who was injured with an air rifle in the woumb. The mother was shot at close range with an air rifle in the abdominal area. She was transported to the Emergency department and a Cesarean section was performed immediately. Haemoperitoneum was found. Amniotic fluid was bloody and the baby was in a critical condition. It weighed 2250 g. and started breathing spontaneously within 1 min. Respiration was irregular and she was intubated and ventilated. Volume resuscitation was begun. Initial Hb was 70 g/l. Blood concentrate and FFP brought Hb to 109 g/l. She received surfactant, Vit K, and antibiotics. General inspection revealed entry and exit wounds to the left knee, wounds to the left antebrachium and elbow, entry wound at the base of the nose. The neurologic exam revealed she moved all four limbs, pupils were equal and reactive with no lateralisation. A CT scan showed the pellet intracranially, located in the right frontal lobe with a subdural hematoma frontally and temporally. The rest of the intracranial structures were intact. Surgery was performed and the projectile was successfully removed. The child was transferred to PICU intubated and received more blood products. She was extubated two days later. Her other wounds were treated conventionally. In the following days she started feeding from a bottle and at day 12 she was sent home. Her neurologic exam showed no motor or other neurologic disturbances. Her followup showed very good recovery.
Discussion: Pellet guns have low velocity projectiles which rarely cause serious injury. In our case though the gun was fired at point-blanc range. A contributing factor is that fetal tissues have a very high water content and that allowed the projectile to traverse so many structures including bones.



05AP07-6
Myhre Syndrome and Anaesthesia Management

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Background: Myhre Syndromeis characterized by mental retardation, fetal dysmorphism, short stature, brachydactyly, muscular hypertrophy, limitation of motion, hearing loss and cleft lip or palate.Thickened calvarium, hypoplastic iliac wings, large ribs, large, flattened ribs are seen in X-ray. The mutation in the SMAD4 gene causes Myhre syndrome.
Case Report: A 5 years old, 15 kg weighted ASA II, Mallampati III, Myhre Syndrome patient was admitted to OR for circumcision and bilateral inguinal hernia repair. Following routine monitoring, propofol 2-3 mg / kg and fentanyl 1 mcg / kg were applied. The patient with faecal dysmorphism had difficulty in mask ventilation. LMA number 2 was applied. The patient had to have 0.5 mg / kg rocuronium because of surgical procedure prolonging. At the end of the operation 1 mg/kg sugammadex was applied. There were no peroperative or postoperative complications.
Discussion: The heredity pattern of Myhre Syndrome is not fully known.All reported cases are sporadic and new dominant mutations are detected. In addition, all reported cases are male and the X-linked transition cannot be excluded. We would like to emphasize that in this rare case, dysmorphic diseases may be difficult for ventilation and intubation, we need to be prepared for difficult intubation and sugammadex should be ready.

05AP07-7
Sedation and intrathecal administration of Nusinersen in SMA children in Greece: first 16months experience.

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Background and Goal of Study: In SMA patients the loss of full-length functioning SMN protein leads to a degeneration of anterior spinal motor neurons and muscle weakness. Nusinersen is a 2'-O-methoxyethyl phosphorothioate-modified antisense drug. It acts to SMN2 pre-mRNA to increase the amount of functional SMN protein. Its intrathecal delivery schedule requires these high risk children to be frequently sedated. We assessed the role of anaesthetist in the team as well as the efficacy and safety of sedation during the first months of the programme.
Materials and Methods: Charts of the patients that were included in the programme during July 2017-October 2018 were reviewed. Student t test was used to compare means.
Results and Discussion: 20 children (3 months-16 years, 5,7-53kg, 7 SMA I, 11 SMA II, 3 SMAIII) were included in the programme and 87 intrathecal injections were recorded (max per child n=7). 2 children were on constant CPAP ventilation and 1 used cough assist. Intrathecal injections were done by the neurologist exept 36% of the times (severe scoliosis) by the anaesthetist and all injections in one child by a neurosurgeon with C-arm, due to spinal fusion. In 40.2% of injections ketamine /dexmedetomidine were used, in 43,6% Sevoflurane/ N2O and in 16,0% no sedation were used. Movement was more frequently recorded with Ketodex ($p<0.05\%$). All and only the cases of Sevo/ N2O required assisted mask ventilation. Recorded adverse events were: back pain (n=6), extrasystoles during Ketodex (n= 4), atelectasy requiring mechanical ventilation after Sevo/N20 (n=1). Ketodex cases tended to have higher SPO2 values than Sevo/ N2O in the PACU but also prolonged PACU stay ($p<0.05\%$). Parent satisfaction did not differ among types of sedation.
Conclusions: Despite the impaired physical status of SMA children, multiple sedations for Nusinersen intrathecal therapy is related with low risk of adverse events. Difficulties in delivery requires different disciplines cooperation

05AP07-8
Cardiac event after surgical positioning in a patient with Neurofibromatosis type I

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Background: Neurofibromatosis type 1 (NF1) is a disease with a great variability of clinical manifestations and complications, with an estimated prevalence of 1/1900 to 1/3500. In this case we report a cardiac event related to surgical positioning of a patient with NF1 and thoracic dysmorphia.
Case Report: A 12-year-old female with NF1 and multisystemic compromise (severe scoliosis conditioning paraparesis and restrictive ventilatory syndrome, pectus carinatum and thoracic neurofibroma) was proposed for surgical correction of kyphoscoliosis in 2018. In the preoperative study, there weren't any relevant electrocardiographic or analytical anomalies. Chest x-ray showed severe deformity of the spine, with distortion of the thoracic anatomy. Induction of anaesthesia occurred after adequate monitoring, which proceeded without any complications. During the positioning in prone position, the arterial pulse line disappeared, and the end-tidal expired CO2 decreased severely. The patient was immediately replaced in the supine position, with spontaneous recovery of circulation. The procedure was cancelled. Afterwards, a detailed chest CT showed sternal dysmorphism with marked intrathoracic deformity, in close proximity with the heart chambers, probably responsible for the cardiac event due to direct compression. Transthoracic echocardiography denied structural heart disease and reported preserved heart function. The electrocardiogram remained unchanged. After the discussion with Pediatric Surgery, the patient underwent surgical correction of the sternal deformity and placement of a retrosternal metallic band, which occurred without intercurrences. The patient was again proposed for surgical correction of scoliosis, which was followed by additional monitoring of continuous transoesophageal echocardiography, namely during positioning. The procedure had no major complications. The patient was extubated during the same day in the Pediatric Intensive Care Unit.
Discussion and Learning points: NF1 is can have serious implications in the peri-operative approach of patients. Careful preoperative evaluation of cardiac, respiratory and thoracic structure, in particular, may anticipate intraoperative adverse events. This case also highlights the impact of the positioning in the prone position, mainly in patients with thoracic dysmorphia and the value of intraoperative echocardiography as a tool for the evaluation and prevention of cardiac adverse events in risk patients.

05AP07-9
Intermittent hyperammonemic encephalopathy detected by electroencephalography spectrogram analysis during delayed recovery from general anesthesia in a child with ornithine transcarbamylase deficiency.

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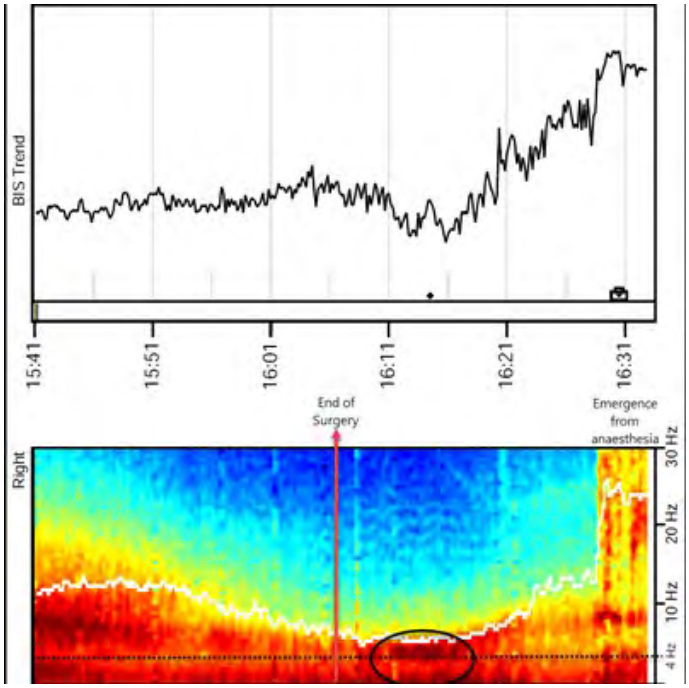
Background: Ornithine transcarbamylase deficiency is the most common inherited cause of hyperammonemia. Fluctuating concentration of ammonia results in chronic or episodically recurring encephalopathy. There is still insufficient information about optimal anaesthetic management and perioperative complications in these patients.
Case Report: A 5-year-old male patient, ASA 3, 17kg, with a medical history of OTCD diagnosed at birth, was admitted to the paediatric emergency with mental confusion, vomiting, lethargy and abdominal pain. Serum ammonia was 270 µg/dL. Because of inadequate venous access, a central venous catheter insertion was required to start treatment with benzoic acid, arginine and phenylbutyrate. Following routine monitoring, including BIS Bilateral Sensor, the patient was induced with propofol, fentanyl and rocuronium through a 22G peripheral intravenous catheter. After endotracheal intubation, general anaesthesia was maintained with 1% end tidal sevoflurane. Central venous catheterization was performed by paediatric surgeons at the right subclavian vein. Total procedure time was 15 minutes. All anesthetic drugs were suspended and neuromuscular blockade antagonized with sugammadex. A delayed recovery from anaesthesia was noticed while spectrogram showed a transient slowing in the EEG with the presence of theta and delta bands. After 8 minutes, spectrogram started to change to an open-zipper pattern and patient was extubated and discharged to the ward.
Discussion: Delayed awakening from anaesthesia remains one of the biggest challenges that involve an anaesthesiologist. Corresponding spectrogram analysis in this patient showed a generalized slowing activity with a greater predominance of theta and delta band power during the course of recovery from anaesthesia (Fig. 1) which might be correlated with the high levels of ammonia and an intermittent brain dysfunction during emergence from anaesthesia. While BIS values were almost constant, spectrogram analysis was more sensible to detect changes in brain function.
Learning points: Spectrogram analysis is a valuable tool to assess brain function under general anaesthesia in these complex patients.



05AP08-1
Difficult Airway Prediction in Paediatric Anaesthesia: prospective observational trial

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Background and Goal of Study: The reported incidence of difficult airway in paediatric patients is considered lower in comparison to adult population and the majority should be predictable. In prospective observational study the airway anatomy has been evaluated (preoperatively, preoperatively in the operating theatre and after securing the airway) and patients were divided in low-risk, intermediate-risk and high-risk group. The primary aim was the incidence of difficult airway and the secondary aim was the performance of the difficult airway prediction.
Materials and Methods: After Ethics committee approval and trial registration on clinicaltrials.gov (NCT03404453), 389 paediatric patients were included in the study (1.1.2018-30.6.2018). Patients airways were evaluated during the preanaesthesia visit, before anaesthesia induction and after securing the airway. Age, weight, height, Mallampati score, interincisor gap, thyreomental distance, mobility of the cervical spine and upper lip bite test were all evaluated during the preanaesthesia visit. The distances were measured in cm and in the ratio compared to fingers of the patient. The Mann-Whitney test and Fischer-exact test was used for statistical analysis.
Results and Discussion: The overall incidence of difficult airway (multiple attempts, difficult mask and/or tracheal intubation and Cormack-Lehane 3-4) was 3.6% (95% CI:2.1-5.8%), incidence of events associated with difficult airway was was 10% (95% CI:7.3-13.3). Identified risk factors for difficult airway were the limited movement of the cervical spine (OR 2.45, 95% CI:1.10-5.46 p=0.028), patient evaluation in the operating theatre as intermediate or high risk patient (OR 6.95, 95% CI:2.09-23.10, p=0.002) and the position of the head before anaesthesia induction (OR 0.33, 95% CI: 0.12-0.87, p=0.024). The sensitivity of difficult airway prediction during the preanaesthesia examination was 5.3% with the specificity of 93.3%. In the operating theatre the sensitivity of prediction was 15% with 97.8% specificity.
Conclusions: The overall incidence of difficult airway in selected cohort of patients was 3.6% (95% CI:2.1-5.8%). We found limited effectiveness for preoperative difficult airway prediction.
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05AP08-2
The application of laryngeal mask airway in preterm neonates receiving inguinal hernia surgery: is it a safer method compared to endotracheal tube intubation?

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Background and Goal of Study: Laryngeal mask airway (LMA) is related to decreasing perioperative respiratory adverse events (PRAE) compared to endotracheal tubes (ETT) in infants receiving minor surgery[1]. However, previous study population not included preterm neonates. Thus we conducted a retrospective survey to compare the PRAE between LMA and ETT in preterm neonates receiving hernia surgery.
Materials and Methods: During July 2014 to December 2017, we enrolled 72 neonates into final analysis. The inclusion criteria were: gestational age at birth (GA Birth) < 37 weeks, body weight at operation (BW Op) < 5000g, and receiving scheduled inguinal hernia repair under general anaesthesia with LMA or ETT. Infants who were dependent on mechanical ventilation preoperatively were excluded. The PRAE included delayed extubation, re-intubation, and apnea within postoperative 24hr (post-op apnea) were compared between LMA and ETT group.
Results and Discussion: The GA Birth and postmenstrual age at operation (PMA Op) was no significant deference between groups. But in ETT group, the BW Birth and BW Op were both lower, and there were more infants had severe RDS at birth. None of infant developed delayed extubation, re-intubation, or postoperative apnea in LMA group.

	LMA (n=57)	ETT (n=15)	p value
GA Birth (week)	31.88 ± 3.62	30.60 ± 3.52	0.23
PMA Op (week)	39.44 ± 4.00	37.80 ± 1.70	0.13
BW Birth (gm)	1720 ± 584	1290 ± 529	0.01
BW Op (gm)	3039 ± 907	2368 ± 310	<0.01
Severe RDS	11 (19.3%)	7 (46.7%)	0.04

	LMA (N=57)	ETT (N=15)	p value
Delayed extubation	0 (0%)	6 (46.2%)	<0.001
Re-intubation	0 (0%)	2 (13.3%)	0.005
Post-op apnea	0 (0%)	2 (13.3%)	0.005

Conclusions: LMA is safe in majority of preterm neonates undergoing inguinal hernia surgery despite low gestational age. However, in neonates with lower body weight at birth and at surgery, and history of severe RDS, further prospective study is needed.
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05AP08-3
Anesthetic management of an obstructed neonatal airway when an EXIT procedure was not an option

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Introduction: Agnathia-otocephaly is a rare syndrome characterized by severe mandibular hypoplasia or agenesis, microstomia, ear and tongue anomalies. Endotracheal intubation is very difficult or impossible. When prenatal diagnosis is established, an EXIT procedure is recommended to secure the airway under utero-placental support. We present a case of emergency tracheostomy under mask anesthesia following the unplanned premature delivery of a newborn with Agnathia –otocephaly.
Case description: 28-year-old female G1P0 admitted with premature rupture of membrane at 33 weeks gestation. The vaginally delivered, 2.5Kg infant had severe mandibular hypoplasia, bilateral choanal atresia and 4mm mouth opening . He was ventilated by mask and transported to the ORs for emergency tracheostomy. Sevoflurane was administered with mask ventilation achieving oxygen saturations of 80-85%. Tension pneumothorax was suspected when ET-CO2 and blood pressure decreased significantly along with evidence of poor perfusion. Bilateral needle decompression followed by chest tube placement, immediately relieved the tension pneumothoraces. A 2.5 tracheostomy tube was then successfully placed.
Discussion: Agnathia-otocephaly is a rare genetic syndrome with life threatening airway malformations. Prenatal diagnosis may be established by three dimensional ultrasound and MRI. Unsuspected diagnosis at the time of delivery leads to respiratory failure and death due to the very difficult airway and limited intubation options. Ideally, the parturient should be referred to a medical center experienced in an EXIT-to -airway procedure. A Cesarean section is performed under general anesthesia and the airway secured by fiberoptic intubation or tracheostomy while the fetus is still supported by the utero-placental circulation.
Our patient had received prenatal care elsewhere and an EXIT procedure could not be pre-planned prior to the onset of premature labor. Because it was impossible to intubate the trachea orally or nasally, emergent tracheostomy under mask anesthesia was the only option. High positive pressure mask ventilation sustained adequate oxygenation. The early recognition and treatment of tension pneumothorax was life-saving.
Conclusion: Best possible outcomes for obstructed neonatal airways, can only be achieved with early prenatal diagnosis and referral to a medical center where an EXIT procedure may be non-emergently performed.

05AP08-4
Difficult tracheal intubation in a child with Cornelia de Lange syndrome

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Background: Cornelia de Lange is a syndrome which may be accompanied by motor and mental retardation, short neck, microcephaly, hypertrichosis, craniofacial deformities (high palate, midline fused eye brows, micrognathia), epilepsy, muscle hypotonia, gastrointestinal (hiatus hernia, pyloric stenosis, gastroesophageal reflux), renal, urinary, anorectal, endocrine, hematological and cardiac anomalies.1Due to craniofacial deformities of the patients, the risk of difficult intubation, increased aspiration and malignant hyperthermia poses a problem for the anesthetists.2
Case Report: 2.5 years old, 8 kg, male patient with Cornelia de Lange Syndrome (CdLS) had microcephaly, hirsutism, micrognathia, microcephaly, mental-motor retardation. Previously Nissen fundoplication, gastrostomy were performed. The patient scheduled for gastrostomy revision surgery was taken to the operating room. Preparations were made because of the risk of difficult intubation and a laryngeal mask was placed because the gastrostomy revision only would be made. Intravenous midazolam, fentanyl, propofol was applied in the induction of anesthesia and muscle relaxant not used. Air-O2 mixture and sevoflurane were used in the maintenance of anesthesia. Hemodynamics were stable, and after the patient was woken up in the operating room.
Discussion: The difficulties in providing airway has been reported in all publications about patients with CdLS. Owing to the disorders in the mouth structure, difficult intubation and gastroesophageal reflux, aspiration risk has been increased. In our case, the use of LMA was the first choice since it was appropriate for the operation, and it did not present any problems for the respiratory system. Since CdLS has a risk of malignant hyperthermia, halothane and nitrousoxide should be avoided.2 Because of the patient had undergone surgery previously and the problem was not developed in inhaled anesthetics, inhalation anesthesia was used in the maintenance of anesthesia. And there was no problem.
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Learning points: In patients with CdLS, LMA is a good alternative to tracheal intubation in appropriate patients, as difficult airway is a problem in terms of anesthetists.

05AP08-5
High frequency oscillatory ventilation in acute respiratory distress sindrome in an infant as the last treatment strategy before ECMO therapy

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Background: High frequency oscillatory ventilation (HFOV) is an unconventional mode of mechanical ventilation that maintains lung recruitment with pressure variations oscillting at very high rates around the mean airway pressure used after the failure of conventional ventilation in infants or adults suffering from acute lung injury.
Case Report: 11,5 months old male infant in the Pediatric ICU on conventional mechanical ventilation develops severe acute lung injury after a complicated, prolonged interstitial pneumonia with severe respiratory acidosis and high inspiratory pressure oxygen demands. The infant had previously a month ago suffered from persisting pulmonary infiltrates and effusions after a varicella infection. He was born with a hereditary glicosilation disorder resulting in hypogammaglobulineamia and after the varicella infection he developed cough with fever. He was treated with Acylovir without improvement and sent to a centre for infectious diseases for three days, where he was diagnosed viral pneumonia without futher need for medicamentous therapy. At new admission to the Pulmolgy department he had fever and cough for five days with a purulent nose secretion. He received high flow oxigen and BAL bronhoscopy showed diffuse alveolar hemorrhage. On the twelfth day of admission after respiratory and hemodynamic unstability ,he was analgosedated, intubated and mechanically ventilated. He developed pulmonary hypertension. Gas analyses showed severe respiratory acidosis. Since conventional mechanical ventilation did not improve acidosis we decided that HFOV was the treatment choice, because he was unstable to transport to a center which provided ECMO. He became stable, ventilation and oxygenation was improved, gradualy returned to conventional ventilation and extubated.
Discussion: In HFVO oxygentaion can be separated from ventilation as they are not dependent on each other as the conventional ventilation. Our treatment indicates that high-frequency oscillatory ventilation, utilizing an aggressive volume recruitment strategy, results in significant improvement in oxygenation compared with a conventional ventilatory strategy designed to limit increases in peak airway pressures.
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Learning points: HFOV improved ARDS therefore treatment with ECMO vas avoided.

05AP08-6
Anesthetic Management of a child with a medium risk anterior mediastinal mass

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Background: Anterior mediastinal masses (AMM) are rare in children and a real challenge to pediatric anaesthesiologists because they may compromise the airway, the lungs and in our case the heart function. 1
Case Report: A 12 years old male patient, with dyspnea, non-productive cough, low grade fever, upper back pain and anorexia. The CT scanning revealed a cystic mass 18X11X14,5 cm located in the anterior mediastinum displacing the left lung, compressing the left main bronchus and the pulmonary artery.The EEG, the echocardiography and the arterial blood pressure and the spirometry measurements were normal. He was classified as medium risk according to Blank and de Souza classification 2 . Anesthesia was induced by titrating anesthetic factors to keep patient's spontaneous ventilation in a half-sitting position because dyspnea increased in the supine position. Tracheal intubation with a left double lumen tube followed after administering a non-depolarizing muscle relaxant. Pressure controlled ventilation was applied with peak inspiratory pressure values of 45-50 cm H2O. During surgery, hypotension due to massive hemorrhage was resuscitated. The surgical manipulations proximal to the heart caused episodes of arrythmia and mild hypotension that were resolved after the total resection of the mass, that was a teratoma. After the end of the procedure the patient was transferred intubated in a stable condition in the ICU.
Discussion: A thorough preoperative clinical and radiological screening and assessment is necessary in children with AMM. Subglottic collapse because of the loss of negative intrapleural pressure is the main risk after spontaneous ventilation discontinuation. For minor procedures the spontaneous ventilation is recommended but in major ones PPV is unavoidable 3. The cardiac rhythm and output may be compromised due to manipulations near the heart, fact that happened to our patient and has not been referred by other authors.
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Learning points: The spontaneous ventilation avoids the risk of subglottic collapse but major procedures require endotracheal intubation and PPV. Difficult ventilation, risk for severe bleeding, cardiac arrythmias and compromise in cardiac output should be taken into account.

05AP08-8
Not all you see is what it seems to be: challenges in pediatric foreign body aspiration

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Background: Pediatric foreign body aspiration (FBA) is an emergency that can lead to asphyxia and death[1]. Radiologic imaging is often diagnostic but errors and discrepancies in Radiology reach 3-5%[2]. Detailed clinical history and physical evaluation are mandatory to assess the need of further investigation with bronchoscopy.
Case report: 3-year-old girl, ASA II (recurrent wheezing with frequent Pediatry-Alergology consultation), proposed for urgent rigid bronchoscopy due to suspected metallic material ingestion. No signs of respiratory distress at the FB ingestion moment nor at the hospital. Normal physical examination, apart from facial and lip wounds and traces of powder in the inferior molars. The radiologic study showed a radiopaque image in the upper right pulmonary lobe in the thoracic AP X-Ray and in the trachea or esophagus in the cervical X-Ray. Small traces of FB were detected in the stomach. At the pre-anesthetic visit, regarding the absence of clinical signs compatible with FBA in a child with bronchial hyperreactivity, the possibility of imaging acquisition/interpretation error was questioned. Direct digital imaging acquisition was performed, with no images compatible with FB. Initial findings were considered artifacts and the bronchoscopy was cancelled.
Discussion: FBA displays a wide spectrum of manifestations and the diagnosis is a challenge. It requires suggestive history or witnessed episode, acute manifestations and/or airway compromise and radiologic study to search for alternative causes, identify and localize the FB and rule out complications1. In a clinically stable child, after a thorough pre-anesthetic evaluation, although positive radiologic imaging, high level of clinical suspicion is imperative due to its low sensibility in the initial course of FBA. A multidisciplinary approach determined that the early results were a false positive (secretions, endoluminal sections, calcified/ in ossification structures overlap, artifacts). This conduct is indispensable not only to avoid diagnosis and treatment delays in a possibly fatal scenario but also to avoid pediatric high risk unnecessary invasive procedures in remote locations.
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Learning points: Preanesthetic evaluation importance. Multidisciplinary approach in challenging cases. Patient safety in Pediatric Anesthesia.

05AP08-9
Feasibility and safety of using i-Gel or an Ambu laryngeal mask airway for paediatric magnetic resonance imaging: a case series

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Background: Almost all children undergoing magnetic resonance imaging (MRI) require general anaesthesia (GA) or sedation because the procedure depends greatly on patient cooperation. GA using an endotracheal tube is often the first choice for children with neurological or developmental disabilities. The feasibility of using supraglottic airway devices (SGAs) during MRI for such groups of children has not yet been determined.
Methods: This was a retrospective, observational study at a single centre. From October 2016 to July 2018, paediatric patients (< 18 years old) scheduled for MRI under GA using an SGA for airway maintenance were included. GA was induced through a combination of thiamylal or propofol with fentanyl and low-dose cisatracurium in the space next to the MRI room. An Ambu laryngeal mask airway (LMA) or i-Gel was then inserted before the patient was transferred to the MRI room. For patients with aromatic L-amino acid decarboxylase (AADC) deficiency, a lumbar puncture was performed for gene analysis before transferal. GA was maintained through sevoflurane during the scan. All patients had their SGAs removed at the end of the procedure. The patients with AADC deficiency were admitted to the intensive care unit (ICU) for overnight observation. Others were sent to the post-anaesthesia care unit (PACU). Respiratory, haemodynamic, and procedural data were collected from medical records.
Results: Thirty children (median age 4 years and body mass index = 15 kg/m^2) underwent a total of 38 MRI exams during the investigation period. Nineteen (63%) were regarded as high risk (i.e., American Society of Anaesthesiologists grade III or IV). Among this group, 13 children with diagnosis of AADC deficiency or mitochondrial disease were prone to anaesthesia-related respiratory depression. Eighteen scans were performed using an Ambu LMA (47 %) and 20 using i-Gel (53 %). The mean duration of the procedure, anaesthesia, and PACU stay were 50.87 (± 18.0), 83.66 (± 21.7), and 62.29 (± 10.7) minutes respectively. The median oxygen saturation (SpO_2) was 100% during both the procedure and recovery period. The lowest observed SpO_2 was 97% in the PACU, and 95% in the ICU. All scans were successfully completed. No respiratory events occurred throughout the procedure or recovery period.
Conclusion: This case series demonstrated that sevoflurane through an SGA, either i-Gel or an Ambu LMA, is reliable and safe for ill children undergoing MRI.

05AP09-1
The correlation between preoperative anxiety in children and the speed of processing of cognitive tasks (simple reaction time and dual task) in children after adenotonsillectomy

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Background and Goal of Study: Preoperative anxiety is a very unpleasant feeling for a child. It can often be accompanied by significant physiological changes such as tachycardia, stress hormones release, emergence delirium, and negative postoperative change of behavior. Anxious children have more painful and slower postoperative recovery at home. The aim of the research is to determine whether there is a correlation between preoperative anxiety in children and the speed processing cognitive tasks.
Materials and Methods: A prospective study was performed at KBC Split with 64 children (ASA I or II) aged 6-13 years after adenotonsilectomy. The assessment of cognitive functions was done by computer software PsycheE with simple reaction time and parallel reaction time (dual task). Each subject was examined preoperatively, 2 h and 24h after surgery. Preoperative anxiety in children was established by the m-YALE scale for assessing anxiety in children.The data were statistically analyzed with repeated measures ANOVA with Bonferroni post hoc test, Friedman and Mann-Whitney.
Results and Discussion: The total reaction time before anesthesia was statistically significantly related to preoperative anxiety of children (Spearman's ρ = 0.35; P = 0.006). Preoperatively, more anxious children had a longer reaction time before anesthesia. The simple reaction time was statistically significantly different in children with different anxiety. Interaction of the time after anesthesia and children's anxiety levels was statistically significant in total reaction time (P = 0.012) and movement time (P = 0.003).
Conclusions: More anxious children had poorer results in the total reaction time along with the movement time during basal cognitive function tests. More anxious children had poorer total time and movement time results after taking the basal cognitive function test, which is taken before anaesthesia and surgical procedure. Given that psychological changes following childhood hospitalization greatly affect the child´s future emotional and cognitive development, suppression of anxiety is one of the most important preoperative measures for children.
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05AP09-2
Is emergence time related to emergence agitation in pediatric patients?

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Background and Goal of Study: Emergence agitation (EA) and post-operative behavioral changes (POBC) are common unpleasant symptoms after general anesthesia (GA).This study was designed to examine whether clinical emergence time and/or emergence time that measured by process EEG have any effects on the incidence of EA.
Materials and Methods: This was a prospective observational study conducted in children between 3 and 12 years of age who underwent anesthesia. Each child's baseline behaviors were evaluated preoperatively using the Emotionality Activity Sociability and Impulsivity survey, the Modified-Yale Preoperative Anxiety Scale, and the Post-Hospitalization Behavior Questionnaire. Anesthetic management data and clinical emergence time were recorded by the nurse anesthetist. Emergence times measured by process EEG (the time period which state entropy level over sixty to eighty) were recorded separately. At the PACU, EA symptoms were evaluated using the Pediatric Anesthesia Emergence Delirium (PAED) scale. POBC scores were evaluated by telephone interviews using the PHBQ at post-operative days (POD) 1, 3, and 7. Statistical significance was set at p <0.05.
Results and Discussion: Ninety-one pediatric patients were enrolled in this study. Preoperative baseline behaviors were not related to either EA or POBC nor was any relationship found between emergence time and the incidence of EA or POBC. There were statistically significant differences between the children who had EA (PAED >10) and other factors including age, ASA physical status and pain score (p-values = 0.043, 0.042 and <0.001 respectively). Separation anxiety was found to be significantly higher at PODs 1,3 and 7 in the children who had EA. (p-values = 0.046, 0.048 and 0.037, respectively) The children who had severe EA (PAED > 12) tended to have maladaptive eating behaviors at PODs 1, 3 and 7 (p-Value = 0.024, 0.014 and 0.035, respectively, adj. ORs (95% CI) = 22.29 (1.16,427.72), 30.33 (1.45,634.98) and 33.58 (0.68,1656.73), respectively). Higher levels of state entropy at the time of airway device removal were correlated with post-operative abnormal eating behaviors. Attention to pain control and deep airway device removal technique could help to reduce the incidence of EA and POBC.
Conclusions: Emergence time had no effect either on the incidence of EA or POBC. Severe EA had some effects on postoperative behavioral changes.

05AP09-3
The Effect of Premedication with Clonidine in Children's MAC-BIS50 for Sevoflurane

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Background and Goal of Study: Clonidine is a useful premedication in children; however, it has been known to cause delayed emergence from anesthesia. Hence, we used Bispectral index (BIS) monitoring, which is often used as means of measuring the sedative effects of anesthetics, and examined the relationship between clonidine premedication and the minimum alveolar concentration of sevoflurane for maintaining a BIS below 50 (MAC-BIS50) in children.
Materials and Methods: With approval from the Ethics Committee, in two to four year-old pediatric patients undergoing general anesthesia with sevoflurane, we compared the MAC-BIS50 values of the patients who received 4 μg/kg clonidine to those who did not. We inducted anesthesia with sevoflurane in oxygen and administered rocuronium. After tracheal intubation, we maintained a concentration of end-tidal sevoflurane for 10 minutes and measured the BIS value. We calculated the MAC-BIS50 value for sevoflurane in both groups with logistic analysis and compared the dose-response curves.
Results and Discussion: Twenty-nine patients received clonidine and 29 patients did not. The MAC-BIS50 for sevoflurane were calculated to be 2.35% (95% confidence interval [CI], 1.92 - 2.65%) with premedication and 2.22% (95% CI, 1.76 - 2.52) without premedication. There was no significant difference between the two groups on a logistic curve (p=0.34).Our finding shows that drug titration with BIS monitoring may be difficult in children who receive clonidine because BIS does not reflect the effects of clonidine accurately.
Conclusions: Premedication with clonidine had no significant effect on MAC-BIS50 values in 2 to 4 year-old patients undergoing general anesthesia with sevoflurane.

05AP09-4
Multichannel EEG monitored paediatric general anaesthesia: preliminary results

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Background and Goal of Study: Effects of general anesthesia (GA) on young brain are more and more often investigated (1-3). We have studied the cerebral effects of an usual sevoflurane (S) based GA using a global multiparameter EEG approach.
Materials and Methods: For this prospective observational study, we included 23 children (general & OPH surgery) anaesthetized with our usual sympathetic-guided S based GA protocol (S6% induction in O2 *vs* O2/N2O + iv suf 0.1µg.kg^{-1} / S2-3% maintenance in O2/air). A 16 channels EEG was blindly recorded before GA induction until final awakening applying frequency(F), time(T) or power(P) domains analysis. Data (means±SD) have been analyzed using Multivariate Analysis of Variance (MANOVA).
Results and Discussion: Table1 depicts demographics. Neither arterial hypotension nor bradycardia has occured, in normocapnic context (Tab2). No EEG asymmetry was detected. Successive EEG patterns were first alpha band predominant (T1), second delta band predominant (T2-T4), third, theta band predominant during maintenance (T5-T7) and finally coexistent alpha-delta bands at T10-T11. EEG discontinuity was recorded in 87% of children (Tab1) always contemporary to S6% induction at T3-T4 (Tab2) corresponding to a deep brain P depression (T4-T6) maybe deleterous(3). P increase depicts excitation phase (T2). During GA induction, surimposed grapho-elements (rythmic or not) have never been detected. Frequency derived parameters (Tab2) remained consistent with published data (2,3) regarding the reversible GA mechanism on the EEG.
Conclusion: This study depicts in details the S GA EEG successive aspects. The deep EEG depression during GA induction argues for a S concentration ajustment (reduction) to avoid the risk of overdosing and toxicity.
References:
1. 1.BJA 2015;i66-i76/ 2.EJA 2018;35:49-59/ 3.Ped Anesth 2017;27:251-62

Table 1
Demographics and frequency parameters, electroencephalographic suppression – discontinuity and power characteristics are presented as means ± SD

Demographics	
Sexe	18M / 5F
Age	4.1 ± 2.2 yo (1-10 years)
GA procedure duration (minutes)	58.9 ± 12.1
Frequency domain analysis	
Spectral Edge Frequency (SEF - Hz) - Before GA (T1) - GA maintenance (T5-T7) - Awake postGA (T10-11)	 27.7 ± 11.6 ± 22.4 ±
Median EEG Frequency (MEF - Hz) - Before GA (T1) - GA maintenance (T5-T7) - Awake postGA (T10-11)	 11.7 ± 3.2 ± 9.4 ±
Time domain analysis **Electroencephalographic suppression – discontinuity (3)** (= BSR > 5 / Power < 40µV²)	
Incidence (at least one time)	87% 20/23
Cumulative duration (minutes)	7.5 ± 0.7
Power	29.5 ± 12.0
Sevoflurane Etcc (%)	5.7 ± 0.1
Power domain analysis	
Absolute Total Power (ATP - µV²) - Before GA (T1) - GA maintenance (T5-T7) - Awake postGA (T10-T11)	 386.1 ± 22.7 106.7 ± 12.3 288.4 ± 19.8

Table 2
Parameters evolution over time as mean±SD from before GA induction (T1) until final awakening (T11). Up, in yellow, S end-tidal concentration, below in blue, Spectral Edge and Median Frequencies (SEF, MEF), in green, Absolute Total Power (ATP) and in violet, Burst Suppression Ratio (BSR). Bottom, HMDY and EtCO2 values. Values in red are respectively significantly different (p<0.05) from the previous ones following MANOVA

	T1 Before Induction	T2 Excitation	T3 LOC	T4 Airway control	T5 Incision	T6 Perop	T7 Stop GA	T8 Spontaneous ventilation	T9 Inverse excitation	T10 Extubation	T11 Awake
StEVO (% Etcc)	**0**	**6.2±1.1***	**6.6±1.4**	**5.8±1.2**	**3.2±1.1***	**2.6±0.6**	**2.4±0.5**	**0.8±0.3***	**0.5±0.4**	**0.2±0.1**	**0**
Spectral Edge Frequency (Hz)											
Fp1-Cz	28.8±7.7	29.2±5.7	16.1±5.9*	8.5±2.7*	12.4±5.4	14.5±2.7	15.2±5.3	17.5±6.2	22.2±5.7	26.4±5.1	29.1±5.6
F3-Cz	27.7±7.1	29.8±7.8	14.4±4.8*	10.1±4.6*	12.6±6.6	14.1±4.1	14.1±3.6	17.7±5.1	25.4±3.1	21.1±6.7	30.2±5.1
F7-Cz	28.1±9.2	24.1±6.3	13.1±6.2*	9.5±3.6*	11.5±5.6	12.6±4.4	15.5±4.4	20.8±5.5	22.4±4.2	19.5±3.3	29.4±6.4
C3-Cz	24.1±6.1	29.2±7.7	15.4±6.0*	9.6±2.8*	10.8±5.1	15.6±5.8	13.1±3.1	27.8±6.4*	23.1±5.1	26.1±4.7	27.4±4.1
P3-Cz	29.1±7.9	26.2±5.7	11.2±6.5*	9.8±2.9*	13.7±4.5	14.4±6.6	14.2±2.1	25.4±5.1*	23.7±5.8	22.4±7.5	30.4±5.8
T3-Cz	26.4±6.1	29.4±7.4	14.3±4.8*	9.6±1.4*	13.1±4.4	13.5±5.4	14.7±3.2	17.8±6.2	24.1±6.1	25.1±4.4	27.6±4.1
T5-Cz	25.1±5.2	29.7±4.5	13.6±3.3*	9.7±2.8*	12.4±3.1	17.4±4.8	14.3±3.8	15.4±4.1	22.1±4.2	24.2±4.2	28.8±7.2
O1-Cz	26.1±5.1	29.1±6.1	17.1±4.8*	10.4±3.4*	10.7±4.7	13.6±4.4	15.4±3.4	20.7±6.1	22.8±6.1	23.2±4.8	26.7±5.1
Fp2-Cz	23.2±5.5	29.4±7.4	11.8±8.5*	7.7±2.5*	11.4±4.7	9.7±3.5	14.4±3.2	18.4±3.1	20.1±3.5	19.4±4.5	28.2±8.4
F4-Cz	28.1±6.7	29.7±7.9	14.2±4.7*	9.7±4.3*	12.4±4.7	15.4±4.4	14.1±3.2	18.7±4.7	20.4±4.7	20.2±5.7	29.4±6.4
F8-Cz	25.2±5.1	28.8±6.2	16.2±3.1*	9.6±1.5*	14.2±4.5	12.7±5.5	14.8±4.7	19.4±4.6	21.2±4.1	20.2±5.8	27.4±7.1
C4-Cz	24.1±6.1	27.1±6.8	17.2±4.8*	9.1±2.3*	14.7±4.8	13.2±6.2	15.4±6.2	20.1±4.1	20.6±5.1	25.4±3.4	30.9±8.1
P4-Cz	28.1±5.8	29.2±7.9	13.7±4.6*	8.8±2.7*	11.4±6.1	9.8±4.8	13.1±6.6	21.2±6.2	22.4±5.4	24.2±3.2	28.8±7.4
T4-Cz	28.9±7.6	26.4±4.8	11.7±5.5*	8.2±1.7*	10.0±3.2	11.2±4.4	14.2±3.7	20.7±5.5	22.7±4.6	21.4±6.6	27.1±6.6
T6-Cz	23.2±5.1	29.4±7.1	12.8±3.8*	9.1±2.8*	11.4±3.8	14.4±3.8	14.1±3.9	18.4±5.2	19.4±4.6	22.4±6.5	28.7±8.4
O2-Cz	27.1±7.2	29.1±7.8	14.7±6.5*	7.4±1.4*	13.2±2.1	10.7±3.2	15.1±4.4	19.6±4.6	19.1±6.1	21.7±6.1	29.7±8.3
Median Frequency (Hz)											
Fp1-Cz	10.4±3.4	11.1±3.2	6.1±1.4*	2.1±0.1*	2.8±0.4	3.8±0.5	5.1±0.9	7.4±1.0	11.1±1.7	12.1±1.7	10.4±3.4
F3-Cz	9.6±2.5	12.1±3.2	8.2±2.2*	5.1±0.1*	1.8±0.1	4.4±0.1*	3.4±0.2	6.8±1.2*	11.8±2.9*	10.8±2.8	9.6±2.5
F7-Cz	10.4±3.6	9.4±3.4	7.4±2.8*	0.8±0.1*	2.1±0.2*	4.1±0.1*	2.9±0.2	6.6±0.9*	12.1±1.1*	11.1±2.1	10.4±3.6
C3-Cz	10.1±1.1	10.4±3.1	6.6±0.3*	0.7±0.2*	2.2±0.1*	2.8±0.2	3.6±0.3	7.1±1.0*	11.4±1.8*	10.4±1.2	10.1±1.1
P3-Cz	10.2±2.5	10.4±1.6	8.0±1.2*	1.6±0.4*	2.6±0.4*	3.2±0.2	3.4±0.4	5.2±0.7	9.7±1.1*	10.7±2.0	10.2±2.5
T3-Cz	8.8±2.4	10.4±1.8	5.4±0.8*	0.6±0.1*	3.1±0.3*	3.1±0.4	3.1±0.2	6.4±1.2*	11.4±2.1*	11.4±1.2	8.8±2.4
T5-Cz	10.4±2.3	8.4±1.2	6.7±1.1*	0.7±0.2*	2.4±0.2*	3.0±0.2	2.8±0.3	4.4±0.7*	9.6±1.2*	11.1±0.8	10.4±2.3
O1-Cz	9.2±2.2	11.1±2.1	7.2±0.9*	1.1±0.1*	2.1±0.1*	4.5±0.4*	4.8±0.4	7.2±1.4*	12.6±1.4	12.4±0.8	9.2±2.2
Fp2-Cz	10.1±2.2	9.8±3.1	6.0±0.6*	0.7±0.1*	1.8±0.2*	2.7±0.2	4.2±0.8	6.5±3.1	12.9±1.0*	13.1±1.7	10.1±2.7
F4-Cz	11.4±7.7	10.4±1.7	7.8±0.6*	1.1±0.1*	2.2±0.2*	2.5±0.3	4.1±0.6	6.8±1.7	12.7±1.8*	12.0±2.1	11.4±7.7
F8-Cz	12.4±3.5	9.6±1.1	5.7±0.2*	2.4±0.2*	1.7±0.5	4.2±0.1*	3.4±0.2	7.4±1.8*	11.7±1.5	12.6±1.5	12.4±3.5
C4-Cz	9.8±2.8	9.1±0.8	6.4±0.3*	3.4±0.2*	2.8±0.2	3.3±0.1	3.3±0.2	5.4±0.8	10.7±1.8*	10.4±0.9	9.4±2.8
P4-Cz	8.9±2.1	10.1±0.9	5.7±1.1*	0.6±0.1*	2.4±0.6*	3.2±0.4	3.0±0.8	6.6±1.1*	9.9±0.8	10.1±1.1	8.9±2.1
T4-Cz	9.6±2.2	10.7±1.4	7.4±0.9*	0.9±0.2*	1.4±0.2	4.1±0.2*	3.4±1.1	5.8±2.6	12.9±1.9*	12.6±2.2	9.6±2.2
T6-Cz	10.6±3.2	11.7±2.1	5.9±1.3*	1.4±0.6*	1.5±0.1	2.8±0.3	3.9±0.4	7.1±1.9*	12.8±0.8	10.8±1.7	10.6±3.2
O2-Cz	10.0±2.4	10.4±0.7	6.8±0.5*	1.5±0.3*	2.3±0.2	3.7±0.4	2.8±0.3	7.9±1.4*	13.4±1.4	12.9±2.4	10.0±2.4
Absolute Total Power (µV²)											
Fp1-Cz	387.1±12.2	406.7±42.2*	166.4±32.2*	38.4±2.2*	68.5±16.2*	106.7±17.8*	123.4±72.1	134.4±24.1	201.4±14.1*	154.4±10.6*	266.4±24.2*
F3-Cz	265.4±21.5	368.2±42.5*	148.1±32.8*	30.4±2.5*	78.4±22.5*	122.4±21.1*	132.1±70.5	121.4±21.5	168.7±22.5*	165.4±21.5*	355.1±21.8*
F7-Cz	204.3±13.6	366.4±43.4*	201.4±21.3*	35.1±4.6*	89.1±11.4*	108.4±33.7*	102.6±13.2	99.4±18.0	184.8±18.4*	201.1±13.6*	266.7±14.8*
C3-Cz	210.7±23.1	409.8±51.1*	209.9±31.8*	42.8±5.1*	89.1±21.8*	132.4±21.2*	144.4±18.4*	114.7±19.5	181.8±22.1*	210.7±21.1	307.4±20.4*
P3-Cz	187.4±22.5	434.2±42.5*	177.4±32.5*	40.0±8.5*	101.2±18.5*	164.7±12.4*	121.4±20.1*	105.9±24.4	183.5±20.1*	187.4±22.5	321.2±20.8*
T3-Cz	339.4±20.4	559.4±54.4*	127.6±21.1*	26.7±3.4*	127.7±11.0*	150.2±30.0*	113.4±19.9*	121.6±23.2	144.2±19.2	139.4±20.4*	268.7±21.1*
T5-Cz	304.7±27.3	475.7±37.3*	171.2±27.8*	44.1±5.1*	87.4±12.3*	181.4±24.1*	133.4±20.3	98.4±18.8	196.1±26.8*	304.7±27.3*	308.7±21.2
O1-Cz	208.7±21.2	506.6±44.2*	151.7±26.1*	34.7±3.2*	94.6±13.7*	104.9±20.1*	86.7±11.1	99.1±10.1	141.1±19.1	208.7±21.2*	198.1±22.7
Fp2-Cz	410.1±37.7	442.2±32.2*	136.7±42.0*	30.8±2.0*	138.4±12.2*	98.7±12.6*	182.4±21.4*	100.4±11.1	184.1±22.2*	147.6±25.3	324.5±27.1*
F4-Cz	415.4±27.7	388.1±50.2*	211.7±23.5*	33.4±2.8*	77.4±15.6*	181.1±23.4*	108.4±14.7*	96.1±11.5	184.0±18.7*	181.4±32.7*	385.2±21.1*
F8-Cz	307.4±18.8	400.3±36.4*	192.5±34.1*	45.8±4.6*	86.4±13.4*	170.4±22.4*	106.1±14.6*	121.4±15.2	174.3±25.5*	226.5±24.4*	281.4±16.6*
C4-Cz	189.4±22.8	467.3±41.1*	132.4±28.6*	33.4±2.1*	76.4±11.1*	109.7±16.4*	136.1±20.9*	106.4±21.4*	152.4±21.7*	198.4±25.8*	322.4±23.6*
P4-Cz	209.9±29.1	387.4±36.5*	161.4±31.6*	37.5±2.8*	104.8±16.4*	111.4±21.8*	113.9±19.7	108.1±14.4	147.3±21.1*	204.5±22.3*	186.2±14.4*
T4-Cz	388.7±24.2	498.2±46.4*	122.1±18.1*	33.1±2.4*	138.7±23.4*	99.8±11.1*	128.5±18.8	103.6±12.8	111.9±19.4	208.8±27.3*	177.4±27.1
T6-Cz	178.8±19.2	366.3±47.3*	183.1±34.1*	43.9±2.3*	87.7±13.3*	134.1±18.6*	97.8±14.2	111.0±21.4	174.1±20.1	165.1±25.8	316.5±11.0*
O2-Cz	311.2±22.4	409.6±41.2*	134.1±34.1*	43.2±2.8*	81.6±11.2*	131.1±22.4*	124.7±23.1	109.4±10.6	146.2±11.6*	208.8±21.8*	321.4±21.7
Burst Suppression Ratio											
Fp1-Cz	0	0	8.1±1.4*	35.1±3.5*	0*	0	0	0	0	0	0
F3-Cz	0	0	13.6±2.3*	28.1±1.8*	31.1±1.1*	0*	0	0	0	0	0
F7-Cz	0	0	11.1±1.5*	44.8±1.8*	0*	0	0	0	0	0	0
C3-Cz	0	0	9.4±2.1*	47.6±2.2*	0*	0	0	0	0	0	0
P3-Cz	0	0	12.8±2.6*	38.7±4.4*	21.6±3.4	0*	0	0	0	0	0
T3-Cz	0	0	13.7±1.4*	36.1±3.9*	4.1±0.6*	0*	0	0	0	0	0
T5-Cz	0	0	14.7±1.4*	49.4±4.1*	0*	0	0	0	0	0	0
O1-Cz	0	0	9.4±1.7*	27.9±4.7*	0*	0	0	0	0	0	0
Fp2-Cz	0	0	17.1±3.4*	22.4±1.8*	6.1±0.4*	0	0	0	0	0	0
F4-Cz	0	0	8.2±1.9*	34.7±5.9*	18.1±2.2*	0	0	0	0	0	0
F8-Cz	0	0	5.6±2.6*	38.2±4.7*	14.7±2.8*	0	0	0	0	0	0
C4-Cz	0	0	14.7±1.6*	47.5±2.7*	11.1±1.0*	0	0	0	0	0	0
P4-Cz	0	0	16.8±3.5*	41.9±4.7*	0*	0	0	0	0	0	0
T4-Cz	0	0	11.1±2.7*	23.5±3.1*	6.1±0.6*	0	0	0	0	0	0
T6-Cz	0	0	12.2±2.2*	41.2±5.0*	0*	0	0	0	0	0	0
O2-Cz	0	0	14.7±2.2*	36.6±4.8*	7.4±1.1*	0	0	0	0	0	0
Mean arterial Pressure (mmHg)	68.1±11.2	63.4±12.1	57.6±10.1	63.3±8.5	60.4±12.8	57.1±14.1	59.7±12.3	66.1±7.7	69.4±7.2	60.8±11.1	64.4±8.1
Heart Rate (bpm)	102.2±12.2	119.4±18.2	81.4±9.8*	82.1±11.6	78.4±10.1	86.1±8.7	86.1±8.7	81.7±9.6	91.1±12.1	87.4±10.2	82.1±7.5
EtCO2 (mmHg)	-	38.4±6.1	37.4±4.4	36.6±5.1	33.3±4.2	34.7±5.4	32.4±4.2	39.6±4.4	37.7±7.1	36.4±3.7	-

05AP09-5
Multichannel EEG monitored general anaesthesia in monozygotic pediatric twins: a case report

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Background: Potential influence of genetic on brain activity (BA) and EEG of twins (T) has been studied regarding sleep components (1,2) and behavioral (3). Impact of general anesthesia (GA) remains unknown. We present the case of a EEG monitored GA of monozygotic T.
Case Report: 5yo male T (T1, T2) respectively 17/17kg and 105/106cm, were operated for strabism using our usual sympathetic-guided sevoflurane (S) based GA protocol (S6% induction in 100% O2 + iv SUF 0.1µg.kg-1 /S2-3% maintenance in 40% O2/air). GA was monitored by a 16 channels EEG from before GA until final awakening. T EEG data were analyzed regarding their similarity, and then were compared respectively, to 2 similar children (C1, C2) regarding general surgery and GA regimen and 2 others (C3, C4) ventilated with an equimolar O2/N2O gas mixture. In EEG, parameters from Frequency (F), Time (T) and Power (D) domains were trended and compared. In absence of EEG asymmetry and topographical variation (MANOVA) we averaged the respective F, T and P values of each parameter as mean±SD in each child for comparison (Fisher p<0.05). EEG results of T are displayed on Fig1. Comparison with other children is depicted on Fig2.
Discussion: Regarding T results (Fig1), absence of difference between F, T and P EEG parameters allows to conclude to similarity of GA effect on the BA especially during induction induced depression (T2-T3, ↑BSR, ↓P). Comparison to C1 & C2 testifies to similarity of profile between T and no T children. In C3 & C4, significant persistent BA depression (Fig2, T3-T8) is N2O induced with a specific profile (first fleeting ↑BSR and persisting ↓P).
Conclusion: While T EEG profile remain similar to non T, N2O induces specific BA depression.
References:
1.Clin EEG Neurosc 2014; 45: 193-200/ 2.Sci Rep 2018 DOI:10.1038/s41598-018-25590-7/ 3.J Child Psychol Psych 2018; 59: 966-72

Figure 1

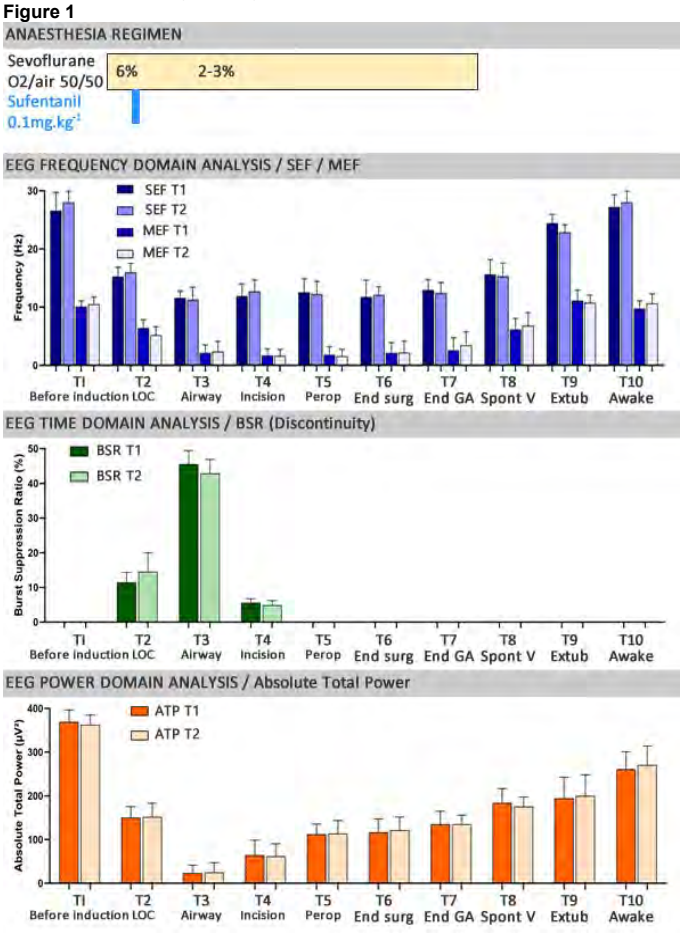
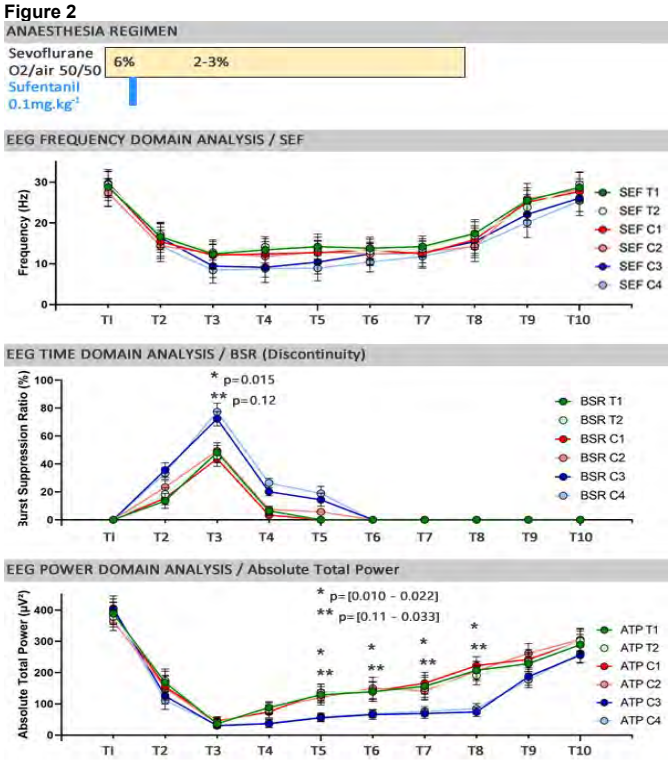


Figure 2



05AP09-6
BIS index monitoring of induction for pediatric anaesthesia: intravenous vs. inhalation anesthesia

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Background and Goal of Study: The bispectral index(BIS), which is a measure of hypnotic component of anesthesia, can be used for an adequate dosing of anesthetics. The study compared standardised anesthesia induction technice IV(propofol) vs. inhalation(sevofluran) for pediatric patients monitored by BIS. BIS index below 40 at any point of anesthesia is associated with multiple risk. Goal of our study is to evaluate which anesthesia induction technique for pediatric patients mostly used in our institution gives too deep induction monitored by BIS index(below 40).
Materials and Methods: One hundred pediatric patients for elective one day surgery (ASA I and II) between 3-10 years of age were randomly divided into two groups IV(P-group, n=50) and inhalation(S-group, n=50). Standardized anesthesia technique were used and BIS index and MAP, after the induction of anesthesia, before securing airway, were monitored and recorded. Data were analysed by SOFA stat softver1.4.6..
Results and Discussion: BIS index below 40 were recorded in patients in S-group n=30 and in P-group n=14. There were statistical significance by Mann Whitney U test in recorded BIS index of two anesthesia technique (p<0,001). BIS index below 20 were recorded in S-group n=10 and P-group n=1 (p<0,001). We did not find statistical significance in variation of MAP ±20% between patients who had BIS index less than 40 and patients with BIS index more than 40 (p=0,1905).
Conclusions: Inhalation anesthesia in our data carries the statistical significance risk of too deep induction but without significant haemodynamic disorders. One day surgery in our research is the limiting factor to offer an answer whether the too deep anesthesia induction in pediatric patients is related with cognitive disorders.

05AP09-7
Dandy Walker Syndrome and Anaesthetic Management

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Background: Dandy-Walker Syndrome (DWS) is characterized by cystic dilatation of the 4thventricle resulting in the expansion of cerebellum hypoplasia and posterior fossa1.Obstructive hydrocephalus caused by dilatation of the third ventricle and lateral ventricles often occurs. Vertebral and cardiac anomalies are accompanied by 50%2. We aimed to present, the patient with cardiac anomalies and vasogenic shock with DWS.
Case Report: A 6-year-old female patient, 20 kg, received medical treatment for convulsions since age of 4 months. Ventriculoperitoneal shunt (V-P) insertion was planned for congenital hydrocephalus. Aberrant Right Subclavian Arterial Syndrome and patent foramen ovale were detected in the preoperative examination. 2 mg/kg tiyopental, 0.6 mg/kg rocuronium, 1 mcg/kg fentanyl were used for induction. Arterial monitorization was applied. Difficulty intubation was not seen. Hypotension occured at the end of the operation and adrenaline -noradrenaline infusion was started. When spontaneous breathing was sufficient, patient was extubated after one hour under adrenaline infusion.
Discussion: As a result, it is important to keep in mind that cardiac malformations may be accompanied by DSW in patients who are detected and that patients are well prepared in this respect. In this patient who was followed in ICU for 48 hours, adrenalin infusion was not discontinued and vasogenic shock could be developed due to sudden intracranial pressure change. Cerebral perfusion, blood and intracranial pressure in balance during the peroperative period are important in terms of decreasing postoperative complications.

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05AP09-8
Clinical case of malignant hyperthermia in 14y old child undergoing dental procedure under general inhalation anesthesia
*Learning our lessons before not after

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Background: Malignant hyperthermia (MH) is a hypermetabolic, life threatening, potentially lethal syndrome (mortality rate 5% when following MH management protocols up to 70% without application of specific antidote2) that is genetically conditioned but anesthesia triggered. Clinical manifestation includes hypercapnia, tachycardia, hyperthermia, rhabdomyolysis, trismus, muscle rigidity, tachypnea, hyperkaliemia and eventually cardiac arrest.
Case report:14y old boy, presented to an ambulatory dental clinic for gingival cyst extirpation. Clear medical history, non-allergic, no comorbidity, one febrile seizure at the age of 1. ASA I.1. No premedication. Inhalation induction to general anesthesia with Sevoflurane and N2O, endotracheal oral intubation- 6,5tube. Opioid i.v.analgesia (fentanyl). Monitoring of HR, BP (noninvasive), Sat02, RR, Vt. No capnography monitoring. Stable hemodynamics- HR 82/min, BP 125/80mm Hg, Sat02 98%. Maintenance of anesthesia-Sevoflurane, N20 and fentanyl. Rapid decrease in blood pressure and tachypnea occurs at 40minute after induction. High body temperature- 39.7C (axillary measurement). 50minutes after induction- Adrenaline, Dexamethasone, Antiallersin i.v without recognition of the diagnosis. No specific treatment, antidote application or cooling was accomplished. Patient was submitted to specialized emegrency center- UMHATEM "N. I. Pirogov", Department of Pediatric Anesthesia. Patient arrived intubated, unconscious, no breath sounds and thoracic excursions, no BP nor palpable pulse. Midriatic pupils. Immediate CPR was performed. Simultaneously MH treatment was started following AAGBI Safety guidelines3. Exitus letalis registered 1hour after CPR initiation.
Discussion: Anesthesiologists should never underestimate adequate monitoring of patient's vital signs or neglect unspecific, but typical for MH , clinical signs. Significant attention should be paid during ambulatory anesthesia and NORA where conditions could be reduced.
References:
1. Handbook of clinical anesthesia, Barash;
2. Cote&Lerman's Practice of anesthesia for infants&children;
3. Association of Anesthetists of Great Britain and Ireland.
Learning points: It is essential to always monitor EtCO2, especially when administrating volatile anesthetic agent and depolarizing muscle relaxant. Fast and accurate application of MH ISafety guidelines protocols should be prior point of care, "gold standard"- 20minutes after MH clinical presentation or even suspection for such.

05AP09-9
Mechanisms of shock during scoliosis surgery – the role of prone position

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Background: Hypotension (hTA) and haemodynamic instability are common multifactorial complications in scoliosis surgery. Prone positioning is associated with prolonged abdominal compression causing an increase in thoracic pressure and congestion of the valveless epidural veins. This scenario favors blood loss and stroke volume decrease. In our remarkable case, prone positioning was probably the main cause of combined hypovolemic and obstructive shock during scoliosis corrective surgery.
Case Report: 14y girl, ASA III, history of neuromuscular atrophy and cerebral palsy, very low BMI (7,6 Kg/m2) and restrictive lung disease, proposed for scoliosis corrective surgery. General anaesthesia was administered, and booth central venous and intra-arterial pressures were monitored. Careful prone positioning was performed with padding under iliac crests and upper thorax. At 2h of surgery, severe hTA develops, refractory to fluid resuscitation and dopamine infusion. 1h later a 300ml blood lost was estimated and worsening in hTA, tachycardia and metabolic acidosis were recorded, with no significant response to blood transfusion nor dobutamine and norepinephrine infusions. At surgery end, patient was turned to supine with immediate raise in blood pressure, with subsequent reduction and cessation of vasopressor infusions. Upon transfer to ICU patient was stable with no complications recorded post operatively.
Discussion: We believe that initially inapparent abdominal compression from prone position might have been exacerbated during spine manipulation and possibly some degree of dispositioning, resulting in inferior vena cava obstruction. The hypovolemic state due to increased blood loss was unresponsive to corrective measures (low blood pressure and acidosis persisted). Decreased venous return combined with increased intrathoracic pressure probably resulted in decreased end diastolic volume dictating a state of obstructive shock. The major role of prone position is, in this case, empathized by prompt shock resolution upon supine positioning.
Learning points: Haemodynamic derangements during scoliosis surgery are multifactorial but upon instability we should be aware that prone position may be a major player. We emphasize the importance of frequent positioning revaluation and effective communication with surgical team minimizing abdominal compression and patient dispositioning. Additional data about the role of cardiac output monitoring in similar situations is lacking.

Neuroanaesthesiology

06AP01-1
Anesthesia for stereotactic brain biopsy for patient with significant cardiac disease and severe neurological deficits

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Background: Anesthesia for awake craniotomy is procedure that is tolerated well but requires careful patient selection. This at times precludes patient with extensive neurological deficits[1]. For patients with significant cardiac disease presenting for non-cardiac surgery, careful evaluation of risk factors and investigations help to choose anesthetic techniques that are most suitable to the perioperative condition of the patient[2]. This case is unique because of both cardiac risk factors and significant neurological deficits which requires a comprehensive knowledge of neuroanesthesia principles and skills such as advanced airway management, scalp blocks and accurate management of hemodynamics.
Case Report: A 71-year-old male presented for an urgent stereotactic brain biopsy. The patient was awaiting coronary artery bypass surgery and replacement of his ascending aorta. His cardiac angiogram showed an occluded RCA with a 70% LAD in stent stenosis, 80% D1 and 100% left circumflex occlusion with preserved ejection fraction. Prior to his elective surgery he developed memory issues and expressive aphasia. He developed facial asymmetry with moderate to severe right side weakness with drift in both arm and leg. In view of both significant cardiac and neurological deficits and after discussion with the family and surgical team, we proceeded to perform monitored anesthesia care with routine monitors, invasive arterial blood pressures, dextmedetomidine infusion and scalp blocks.
Discussion: Risk stratification and post-operative disposition are still essential considerations to make informed decisions and to reduce perioperative morbidity and mortality[3].We chose to proceed with monitored anesthesia care as it was the safest technique even though the patient had severe neurological deficits as this option would maintain perfusion pressure from both a cardiac and neurological perspective
References:
1. Dziedzic T., and Bernstein M.: Awake craniotomy for brain tumor: indications, technique and benefits. Expert Rev Neurother 2014; 14: pp. 1405-1415
2. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management
3. 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery
Learning points: This case highlights the need for a multi-disciplinary approach, risk stratification and informed decision making with the perioperative team and family in order to improve patient outcomes.

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06AP01-2
Perioperative management of two patients with anti-NMDA receptor encephalitis, including a 13-year-old adolescent

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Background: Anti-N-methyl-D-aspartate receptor (NMDAR) encephalitis is a rare autoimmune disease characterized by a flu-like prodrome followed by rapid development of mental disorder, seizures, and dyskinesia. This disease is challenging because many sedative drugs interact with NMDAR. There are only a few reports concerning the perioperative management of patients with anti-NMDAR encephalitis1.
Case report: Case 1 was a 35-year-old woman (168 cm, 92.5 kg) with no remarkable medical history admitted to a mental hospital because of disorientation. On day 41 she was transferred to our hospital with suspected anti-NMDAR encephalitis because of an ovarian tumor on MRI. On day 51 the tumor was resected via TIVA using propofol. After surgery followed by administration of steroid and plasma exchange (PE), she recovered safely and was discharged on day 76. Case 2 was a 13-year-old adolescent (160 cm, 54 kg) with no medical history admitted to another hospital because of tonic generalized seizure and irrelevant verbalization. On day 10 she was transferred to our hospital, and her ovarian tumor was confirmed by MRI. On day 14 surgery was performed and she was maintained under dexmedetomidine and midazolam sedation. From day 17 hypotension and sinus arrest of several seconds' duration developed, and dexmedetomidine was switched to thiamylal. She was discharged on day 61. At 1-year follow-up, her neurological status was slowly improving.
Discussion: The most important aspect of perioperative management of patients with anti-NMDAR encephalitis is the choice of sedative drug. We used propofol, dexmedetomidine, thiamylal, and midazolam. In Japan, use of propofol as a sedative drug is prohibited for children because of the severe complication, propofol infusion syndrome2; therefore we could not use propofol in the 13-year-old girl. To our knowledge there are few reports of perioperative management of patients with anti-NMDAR encephalitis, especially young adolescents3. In these cases we maintained perioperative sedative management with propofol, dexmedetomidine, thiamylal, and midazolam without deterioration of encephalitis.
References:
1. Broderick DK A & A Case Reports 2: 83-5, 2014.
2. Krajcova Crit Care 19: 398, 2015
3. Liang Medicine 96: e9177, 2017.
Learning points: Dexmedetomidine, thiamylal, and midazolam might be a useful choice for the sedative management of young adolescent patients with anti-NMDAR encephalitis.

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06AP01-3
Awake craniotomy in high risk patients. A case report

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Background: Awake-sleep-awake technique for awake craniotomy involves an intermittent airway manipulation at different moments during surgery. High-risk patients relatively contraindicated as obese, difficult airway, severe chronic obstructive pulmonary disease, obstructive sleep apnea or long procedures, the anesthetic management remains unclear.
Case Report: A 58-year-old man with medical history of hypertension, smoker, asthma, claustrophobia and type II obesity (BMI 39'7) presented for resection of a large right-side temporoinsular low grade glioma. Given the location, he was offered for cortico-subcortical mapping for speech, motor and visual testing. Before surgery, the patient was trained on intraoperative tests. A monitored anesthesia care (MAC) with ECG, pulse oximeter, invasive arterial blood pressure, depth of anesthesia and EtCO2 through nasal cannulas was performed. The patient was premedicated with midazolam 2mg. Sedation was induced with an infusion of dexmedetomidine 0'5 µg/kg/h and remifentanil 0'06 µg/kg/min, and adjusted during surgery according to needs. Before the intended awakening for neurological assessment, both infusions were discontinued and resumed for tumor resection and closure. A bilateral scalp block was performed using 1% lidocaine + 0'375% ropivacaine (30ml total volume). Pin sites and line incision were infiltrated. Additional infiltration of the temporalis muscle and dura matter was done. During pain complains a bolus of 100µg fentanyl was administered. The patient was breathing spontaneously and comfortably sedated with eyes closed when not stimulated but answering when spoken to him (OAA/S ≥3, Ramsey 2-3, BIS>60). Total surgery length was 10 hours and no complications appeared. Patient referred a high satisfaction level.
Discussion: Dexmedetomidine and remifentanil provided an optimal level of sedation and analgesia, keeping spontaneous breathing and comfort. These seem to be ideal conditions to safely carry out these procedures in high-risk patients.
References:
-Garavaglia MM et al. Anesthetic approach to high-risk patients and prolonged awake craniotomy using dexmedetomidine and scalp block. JNeurosurgAnesthesiol 2014;26:226-233
Learning points: The introduction of safer drugs allows to perform this procedure without airway manipulation. Moreover, the keys to a successful surgery are a good scalp block technique and great multidisciplinary team work.

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06AP01-5
Case Report: Management of A Rare Case of Severe Reverse Takotsubo Cardiomyopathy in Acute Cerebellar Hemorrhage

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Background: Classic Takotsubo cardiomyopathy is typically described as a transient systolic dysfunction of the apical segments of the left ventricle in absence of obstructive coronary disease, occuring in the setting of acute subarachnoid haemorrhage in the context of neurlogy insults. We describe a rare variant of Reverse Takotsubo cardiomyopathy in a young patient with cerebellar hemorrhage.
Case Report: A 31 year old gentleman presented with unconsciousness at 8pm while exercising at the gym. On arrival, he was found to have GCS 3, sluggish pupils 2/2 and frothing from the mouth. He was intubated immediately and an urgent CT Brain revealed a 4.4 x 2.5cm acute left cerebellar bleed with severe mass effect & hydrocephalus. CT COW showed a left cerebellar AVM. ECG showed ST elevations in anterior leads and Troponin was elevated. In ICU, the patient had respiratory failure from neurogenic pulmonary edema requiring high ventilatory requirements with FiO2 of 1.0 & PEEP 15. Decision was made to insert an EVD and stabilise the patient overnight before performing a posterior fossa decompression in the prone position. Urgent CVM referral was made & 2DE showed preserved LVEF and no RWMA. The patient required high noradrenaline requirements in the meantime with some improvement of respiratory function & posterior fossa decompression

proceeded in the morning. Postop, patient returned to ICU with subsequent resolution of neurogenic pulmonary edema but increasing hypotension requiring addition of dobutamine and vasopressin support. 2DE was done again showing LVEF 30% with basal RWMA(reverse Takotsubo). A decision was made to insert IABP without anticoagulation with rapid improvement of hemodynamic status by the next day. IABP was removed within a day and a repeat 2DE 1 week later showed improvement in EF. Patient was subsequently discharged GCS 15 with a view for AVM excision at a later date.
Discussion: Takotsubo cardiomyopathy is well described in the literature likely caused by catecholaimne mediated injury and/or vasospasms. The variant of reverse Takotsubo cardiomyopathy presents in patients of younger age and often have an emotional or physical stress trigger. We report the management of this entity which is also largely supportive & early insertion of IABP which significantly helped in recovery of cardiac function.
Learning points: A rare form of neurogenic cardiomyopathy is reported with its successful management.

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06AP01-6
Fatal air embolism secondary to irrigation of craniotomy wound by hydrogen peroxide

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Background: In neurosurgery, hydrogen peroxide is used as an antiseptic and haemostatic. Hydrogen peroxide use can result in air bubbling and gas embolism especially in a bloody field and low central venous pressure. Although the outcome of gas embolism is generally favourable, fatal cases are frequently reported. We report here a case of fatal gas embolism after the use of hydrogen peroxide in a neurosurgical wound
Case Report: We present a case of a 14 years old male who was involved in a high speed motor vehicle collision. He was transferred to our hospital 3 hours after the accident. On primary survey, a large scalp laceration in the temporoparietal area and no other obvious major injuries, neurologically he was confused, his GCS was 12 and deteriorating, his airway was patent, respiratory rate was 22 breaths per minute with an oxygen saturation of 98% on 2 liters oxygen via nasal cannula. Breath sounds was fairly audible and equal without obvious chest injury. Heart rate was 110 beats per minute, regular and no adventitious sound could be detected. Blood pressure was 100/60 mm Hg. Brain CT, chest and long bone X rays, abdominal ultrasound, revealed parietal bone depressed fracture and subdural hematoma. No other fractures or abdominal collection could be revealed. Emergency craniotomy was scheduled. Secondary survey just before induction of anesthesia revealed deteriorating conscious level GCS was10; the other parameters were nearly the same.1.5 hour after induction of anesthesia, patient hemodynamics were stable then the surgeon started to irrigate the wound by hydrogen peroxide when all of sudden the end-tidal CO2 dramatically decreased to less than 10 mmHg. SpO2 decreased gradually then the signal got lost. Blood pressure was unobtainable. The electrocardiogram showed initially sinus tachycardia at 150 beats/min and multiple PVCs that developed into VF. Millwheel murmur was hardly auscultated. Surgery team was informed, anesthetics were discontinued, manual ventilation with 100% oxygen was begun and patient was positioned on head down position , a central line was hardly inserted and its aspiration confirmed air embolism and wound was irrigated by saline and covered. CPR for 30 minutes failed and the patient died.
Discussion: Although irrigation of neurosurgical wounds by hydrogen peroxide is not uncommon, it seems dangerous practice that may lead to fatal air embolism and should be omitted.

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06AP01-7
LPS-induced lung injury does not lead to cognitive decline in non-ventilated mice.

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Background and Goal of Study: The acute respiratory distress syndrome (ARDS) is a complex disease pattern with high mortality rates despite advances in critical care. Even survivors often suffer from cognitive impairment. The cause for this neurological impairment is uncertain, but several mechanisms are in discussion, e.g. cerebral inflammation. Even mechanical ventilation itself seems to induce cerebral inflammation, but its significance in patients with ARDS isn't examined yet. To answer this question, we examined cognitive performance and cerebral inflammation in mice over 4 days after induction of lung injury without mechanical ventilation.
Materials and Methods: After approval of the state and institutional animal care committee we performed the study according to international guidelines for the care and use of laboratory animals. 70 mice performed a standard neurocognitive test. Then we induced an acute lung injury by inhalation of lipopolysaccharide (lps) in 60 of them. For assessment of cognitive decline every day all surviving animals performed the same test again, afterwards 15 animals were sacrificed and the brains and lungs were removed for assessment of cerebral and pulmonal inflammation. 10 animals served as controls. As marker for inflammation we assessed the mRNA-expression of IL-6 by real-time PCR. Statistical analyses were done with Kruskal-wallis test for multiple comparisons. A p-value < 0.05 was considered significant.
Results and Discussion: We found a significant increase in pulmonal IL-6 on day 1 and 2 after lps inhalation compared to control ($p<0.0001$ each), compared to day 3 ($p=0.0003$ vs. day 1, $p=0.027$ vs. day 2) and compared to day 4 ($p<0.0001$ vs. day 1, $p=0.0013$ vs. day 2). Cerebral IL-6 showed no difference between the groups. There was no difference in the neurocognitive score before or after induction of lung injury or between the groups. There could be several reasons for these negative results. First, our lung injury may be not profound enough, even though we found severe pulmonal inflammation. Second, the neurocognitive tests used are validated for traumatic brain injury and may not be capable to detect the deficits that accompany an acute lung injury.
Conclusions: From this data can be concluded, that an isolated lung injury doesn't lead to cerebral inflammation or cognitive decline within 4 days in mice, that are not mechanically ventilated. Maybe long-time ventilation is more deleterious than assumed

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06AP01-8
Inferior petrosal sinus sampling under conscious sedation with dexmedetomedine

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Background: The inferior petrosal sinus sampling is a diagnostic method to differentiate a Cushing´s disease from Cushing´s syndrome due to an ectopic adrenocorticotropic hormone secreting tumors.
Case Report: A 25 year old female with antecedent of Cushing Syndrome dependent of ACTH, obesity grade II, SAHOS and Hashimoto thyroiditis, was made a petrosal sinus venous sampling was indicated. At physical exam: patient weighing was 84.1kg with 158 of height. For anesthesia was given a loading dose of dexmedetomidine 1mcg/kg/h over 5 minutes followed by an infusion of 0.3 – 0.5mcg/kg/h and remifentanil 0.5mcg/kg/min. Bilateral femoral puncuture site was infiltred with 2% lidocaine with epinepfrine, catheterization of the right and left femoral veins. Femoral catheters were advanced bilaterally up to the inferior petrosal sinuses. Catheter location was confirmed by fluoroscopy, 10mcg of IV desmopressin were administered then blood samples were taken at the petrosus veins and periferic veins alt 3 – 5 – 10 and 15 minutes. The procedure lasted for sixty minutes. The patient manteined stable hemodynamics thoughout the procedure, tolareted the cathterism well. The infussions were stopped at the end of the procedure, the patient was taken to the postanesthetic care unit.
Discussion: Usually this procedure is made with general anesthesia. Some medications such as propofol, thiopental and etomidate can suppress ACTH secretion and in that way alter the results of the prove. They have direct antiesteroidogenic effects on adrenal cells and are a weak inhibitor of adrenal steroidogenesis.
In the reported case the patient was in conscious sedation, this has many advantages such as constant evaluation of neurological state.
References:
1. BARNWAL, N. et al. "Dexmedetomidine for conscious sedation in bilateral inferior petrosal sinus sampling." Research and innovation in Anesthesia , 2016.
2. Fragen , RJ. Et al."The effect of propofol on adrenocortical steroidogenesis: a comparative study with etomidate and thiopental." Anesthesiology, 1987.
3. MF, Keil."Anesthesia during petrosal sinus sampling and possible interference with corticotropin (ACTH) levels." Poster presented at European Congress of Endocrinology, 2015.
Learning points: Agents such as dexmedetomindine and remifentanil in low doses during this procedure offers two advantages: no interference with steroid hormones secretion and monitoring of neurologic functions, without respiratory depression.

06AP02-4
The effect of repetitive isoflurane exposure on serine synthesis pathway during the developmental period in Caenorhabditis elegans

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Background and Goal of Study: Serine synthetic pathway plays an essential role in the development and function of the nervous system. This study was performed to investigate whether serine synthetic pathway was affected by repetitive volatile anesthetic exposure using C. elegans, and its relation with anesthesia-induced neurotoxicity.
Materials and Methods: Synchronized worms were divided into two groups, the control and the isoflurane group. The worms of the isoflurane group were exposed to isoflurane for 1 h at each larval stage. Chemotaxis index was evaluated when they reached the young adult-stage in both groups. Also, RNA was extracted from the young adult-worms and the expression of C31C9.2, F26H9.5, and Y62E10A.13 was evaluated with real time polymerase chain reaction in both groups. At the same time, L-serine level of worms was measured. After phosphoserine phosphatase inhibitor, glycerophosphorylcholine (GPC), and L-serine were treated, the change of chemotaxis index was determined together.
Results and Discussion: In young adult worms exposed to isoflurane, the genetic expression of C31C9.2, F26H9.5, and Y62E10A.13 were decreased, and significant decrease was shown in Y62E10A.13. The serine level in worms was also lower in isoflurane group compared to the control group (5.13 ± 1.44 vs. 7.65 ± 0.81 pM, n = 5 in each group, p = 0.009). An exposure of phosphoserine phosphatase inhibitor, GPC, reduced the chemotaxis index to a similar degree as repeated isoflurane exposure (52.9% in GPC group vs 58.7% in the isoflurane group). Repetitive isoflurane anesthesia did not worsen the chemotaxis index (61.1%) in the GPC-treated worms. In this condition, the L-serine level of both group was low similarly (5.22 ± 1.19 vs. 4.90 ± 1.36 pM, n = 5 in each group, p = 0.702). When L-serine was supplied to C. elegans, the deteriorated chemotaxis index by isoflurane recovered (78.1% in the control group vs. 75.5% in the isoflurane group, p = 0.465).
Conclusions: Serine synthetic pathway was negatively affected in C. elegans by repetitive isoflurane exposure. Especially, Y62E10A.13, corresponding to phosphoserine phosphatase, was influenced mostly, which was followed by low L-serine level. Supplementation with L-serine could restore the chemotaxis index.

06AP02-5
Anaesthetic considerations for deep brain stimulation surgery in Tourette syndrome patients based on the effect on micro-electrode recordings and tic severity in a case series

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Background and Goal of Study: Deep Brain Stimulation (DBS) is an accepted treatment modality for patients with medication resistant Tourette syndrome (TS). In DBS surgery, local anaesthesia has long been the technique of first choice. However, perioperative, patients may experience anxiety, pain and may have severe tics, therefore sedation is desirable. During DBS surgery, micro-electrode recordings (MER) are often used to optimise target identification. Of concern are the effects of anaesthetic drugs on the quality of MER and targeting. Little is known about the anaesthetic effects on MER in TS patients. In this case series, we describe our experience with different anaesthesia regimens on the quality of MER and tic severity.
Methods: We retrospectively reviewed the medical and anaesthesia records of all TS patients who underwent DBS surgery between January 2010 and January 2018. Demographic data, targets, used anaesthetics and quality of MER were collected and analysed. Every hemisphere was analysed separately. After filtering spiking activity from broadband data, individual spikes were identified by threshold crossings and principal component analysis with K-means clustering. Vocal and motor tics which caused artifacts in the MER data were manually selected using visual and auditory inspection.
Results: Seven patients underwent surgery for implantation of bilateral DBS electrodes. In six patients the internal globus pallidus (GPi) was targeted and in one patient the thalamus. All procedures were performed with local anaesthesia and conscious sedation. Conscious sedation consisted of propofol, midazolam, remifentanil, clonidine or dexmedetomidine. Sedation was continued during neurophysiological testing. In total, 14 hemispheres were analyzed. Good quality MER and clinical testing were obtained in 11 hemispheres. In three patients the quality of MER were poor and could not be explained by anaesthesia alone as anaesthesia protocols were equal during neurophysiological mapping. No tic related complications occurred.
Conclusion: Local anaesthesia with conscious sedation in TS patients is needed in order to optimise patient comfort and suppress severe tics. Our experience in DBS surgery for TS patients of the recent years have showed that when low-dose anaesthetic drugs are used, its clinically relevant effects on MER of the thalamus and GPi are minimal and patient comfort can be achieved with adequate tic suppression.

06AP02-6
Dopaminergic Pathway Modifies Anaesthetic Properties of Propofol: in vivo Animal Experiments

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Background and Goal of Study: Mechanism of general anaesthesia is not elucidated until now, however, GABA regulating neural pathway is considered as an important target for achieving hypnosis. Recently, dopaminergic pathway is focused concerning to reanimation process of anaesthesia. Dopamine receptor antagonist, droperidol (Dro), was reported to modify the depth of anaesthesia. The current study preliminarily investigated the role of dopamine receptor subtypes for propofol (Pro) anaesthesia.
Materials and Methods: Male adult mice were given Pro (2.5, 3.75, 5.0, 7.5 and 10.0 mg/kg, each n = 10) intravenously to determine the hypnotic dose. Achievement of hypnosis was defined as a loss of the righting reflex (LRR). The 50% effective dose (ED_{50}) was calculated using probit analysis. The anaesthetic time was defined as the time between LLR to recovery of reflex after doubly dosing of ED_{50} of Pro. Simultaneously, 0.1- and 1.0-mg/kg quinelorane (Qui, dopamine $D_{2/3}$ receptor agonist), 0.1-mg/kg Dro or haloperidol (Hal) with or without Qui were administered. The changes in ED_{50} and anaesthetic time were compared using ANOVA (a $P < 0.05$: significant).
Results and Discussion: The hypnotic dose of Pro was 5.8 ± 1.5 mg/kg (ED_{50} ± SD). Qui showed no effect on the ED_{50} (Fig. a) and anaesthetic time (Fig. b) of Pro, even high dose (1 mg/kg). Simultaneous administration of Dro decreased the hypnotic dose and prolonged the anaesthetic time, and co-administration of Qui and Hal decreased ED_{50} of Pro and prolonged the anaesthetic time. D_2 agonist failed to modify the anaesthic propaties of Pro. Whereas Dro, D_2 antagonist, enhanced the anesthetic properties of Pro and the effect was found in Hal when Qui was co-administered.

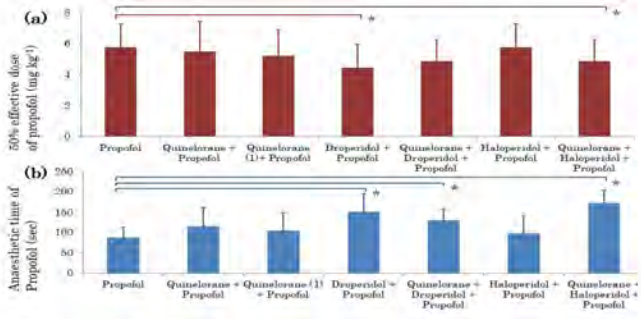

Fig. The effect of quinelorane (0.1 and 1.0 mg kg^{-1}), droperidol (0.1 mg kg^{-1}), haloperidol (0.1 mg kg^{-1}), and quinelorane (0.1 mg kg^{-1}) and droperidol or haloperidol on the 50% effective dose of propofol (a) and the anaesthetic time of propofol (b) (after 11.6 mg kg^{-1} propofol administration). Data was expressed as mean and SD. *: $P < 0.05$ among the groups.

Not like as methylphenidate, a well-known dopaminergic stimulant, Qui failed to antagonize the hypnotic activities of Pro. Qui enhanced the anaesthetic action of Hal.
Conclusion: Dopaminergic pathway might play an important role for general anaesthesia in relation to receptor subtypes, however, the actions seemed complex.
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06AP02-7
The effect of blood glutamate scavenger pyruvate on the development of depression in rats after stroke

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Background and Goal of Study: Post-stroke depression (PSD) is a common and serious complication following stroke. Both stroke and depression have independently been associated with pathologically elevated glutamate levels in the brain's extra-cerebral fluid (ECF). There is positive correlation between plasma glutamate levels and severity of depressive symptoms in patients with major depression. We have previously demonstrated that scavenging blood glutamate with pyruvate increases the brain-to-blood glutamate efflux and consequently improves neurological deficit, reduces cerebral edema, infarct zone and blood brain barrier (BBB) breakdown. The objective of the present study was to investigate the efficacy of long-term pyruvate treatment on the course of post-stroke depression.
Materials and Methods: Eighty Sprague-Dawley male rats were randomly assigned into one of three groups: Middle Cerebral Artery Occlusion (MCAO) plus pyruvate treatment (n=30), MCAO plus placebo treatment (n=30), and sham operated rats (n=20). The pyruvate was administrated in drinking water, in dose of 180mg/kg/day (in three divided doses) for 30 days after MCAO. Equal volumes of drinking water without pyruvate were given to the placebo group. The depressive behavior was assessed by sucrose preference test during six following months after stroke. The neurological status, brain infarct zone, brain edema, BBB breakdown (by MRI technique) and blood glutamate levels were also evaluated.
Results and Discussion: Our results showed that rats after MCAO demonstrated post-stroke depressive behavior that was significantly improved by the administration of pyruvate treatment. Already after two months of observation, the rats given pyruvate demonstrated behavior that did not differ from the sham operated rats. The placebo group rats continued to show significant depressive behavior compared with sham operated rats. Treatment with pyruvate also led to reduced glutamate levels 24 hours after MCAO and improved neurologic recovery. Pyruvate treatment reduced lesion volume, brain edema and the extent of BBB permeability 24 hours post-MCAO.
Conclusions: Glutamate scavenging with pyruvate appears to be an effective as a method in providing neuroprotection following stroke and as a therapeutic option for the treatment of PSD by reducing the consequent elevations in CNS glutamate levels.

06AP02-8
Induction of diffuse axonal brain injury in rats based on rotational acceleration.

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Background and Goal of Study: Traumatic brain injury (TBI) is one of the major causes of death and disability. Diffuse axonal injury (DAI) is a widespread axonal damage developed after TBI. A rapid axonal stretch injury triggers secondary axonal changes that can vary in extent and severity. Within hours to days after the primary injury, biochemical changes will lead to the loss of axonal function. The most vulnerable areas are the brainstem, thalamus, parasagittal white matter of the cerebral cortex, and corpus callosum. DAI is usually associated with poor outcome and often results in burdensome health-care costs. A more complete understanding of DAI is required to develop more effective treatments. The animal models are useful tool for better understanding of the pathophysiology and development of effective treatments. The objective of the present study was to develop a simple reproducible, reliable model that will cause widespread white matter damage without additional skull fractions and contusions.
Materials and Methods: 26 adult male Sprague-Dawley rats weighing 350-400 gr were randomly divided to DAI (n=13) and control (n=13) groups. The rat lateral head rotation device was used to turn the head rapidly from 0 to 90° in the coronal plane. The force applied on animal's heads was equal for all rats. At 48 hours after injury, the brains of all rats in injury and control groups were removed and evaluated for existence DAI by immunochemical staining of βAPP. Immunohistochemical analysis of beta-amyloid precursor protein (βAPP) accumulation is currently the gold standard clinical and experimental technique for assessment of DAI. All stained sections were examined under a light microscope to analyze the extent of axonal damage. Immunoreactive cells were counted manually at a magnification x 200.
Results and Discussion: Small cellular strains were detected with βAPP. Areas with βAPP-positive axons were observed in the thalamus 48 hours post injury representing isolated diffuse axonal brain injury.
Conclusions: In the present study we developed a simple reproducible, reliable DAI model based on rotational acceleration that caused widespread white matter damage without additional skull fractions and contusions. Such a model will enable a better understanding of the pathophysiology of DAI and the development of more effective treatments.

06AP02-9
Main hemodynamic parameters in anesthesia, including alpha2-adrenoagonist

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Objective: To assess changes in CI and MAP during anesthesia, including alpha2-adrenoagonist.
Methods: The study included 118 patients (mean age 50.5±13.6 (Mean ± Std)) who underwent planned surgical treatment about brain tumors. In all patients induction of anesthesia included: muscle relaxants, hypnotics (propofol), opioid analgetic (fentanyl 4.8±0.6mcg/kg) + alpha2-adrenoagonist (clonidine or dexmedetomidine). Maintenance of anesthesia: hypnotic (propofol), opioid analgetic (fentanyl 1.3±0.4mcg/ kg/h) + alpha2-adrenoagonist (clonidine or dexmedetomidine). All patients were divided into three groups, depending on the alpha2-adrenoagonist used and its dosage. In group I (26 patients) induction of anesthesia: clonidine 1.5±0.4mcg/kg; maintenance of anesthesia: clonidine 0.4±0.15mcg/kg/h. In group II (58 patients) induction of anesthesia: dexmedetomidine 1.5±0.4mcg/kg; maintenance of anesthesia: dexmedetomidine 0.4±0.2mcg/kg/h. In group III (34 patients) induction of anesthesia: dexmedetomidine 0.7±0.1mcg/kg; maintenance of anesthesia: dexmedetomidine 0.2±0.1 mcg/kg/h. All three groups are statistically comparable by sex, age, initial blood pressure, initial heart rate, position on the operating table and localization of the brain tumor.
Results: In group I, after induction anesthesia, CI 2.0 ± 0.35 l/min/m2, MAP 68 ± 14 mm Hg. After positioning the patient on the operating table, CI 1.9 ± 0.6 l/min/m2, MAP 72 ± 20 mm Hg. At the stage of tumor removal, CI 1.9 ± 0.5 l/min/m2, MAP 79 ± 17 mm Hg. At the stage of wound closure, CI 2.1 ± 0.5 l/min/m2, MAP 84 ± 11 mm Hg. In group II after induction anesthesia, CI 2.0 ± 0.4 l/min/m2, MAP 91 ± 19 mm Hg. After positioning the patient on the operating table, CI is 1.8 ± 0.3 l/min/m2, MAP 89 ± 17mm Hg. At the stage of removal CI 1,8 ± 0,3 l/min/m2, MAP 89 ± 15 mm Hg. At the stage of wound closure, CI 1.9 ± 0.4 l/min/m2, MAP 92 ± 17 mm Hg. In group III after induction of anesthesia, CI 2.0 ± 0.35 l/min/m2, MAP 82 ± 14 mm Hg. After positioning the patient on the operating table, CI is 1.8 ± 0.4 l/min/m2, MAP 72 ± 13 mm Hg. At the stage of removal of CI 1.9 ± 0.3 l/min/m2, MAP 78 ± 13 mm Hg. At the stage of wound closure, CI 1.9 ± 0.45 l/min/m2, MAP 89 ± 13 mm Hg.
Conclusions: With anesthesia, including an alpha2-adrenoagonist, CI is lower than the reference value at a normal MAP level. These values are stored at all stages of the operation.

06AP03-1
Can propofol lead to an increase in seizure threshold over the course of electroconvulsive therapy?

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Background and Goal of Study: Propofol can act as a pro or anticonvulsant agent in a dose-depended fashion. Propofol at higher doses act as anticonvulsant, but it can also have pro-convulsant effects at lower doses. An increase in seizure threshold is usually expected over the course of consecutive administrations of electroconvulsive therapy (ECT). However, this rise can be much more pronounced with larger doses of propofol. Objective of this study is to evaluate the effects of 2 different dose regimens of propofol (low dose: <1mg/kg, high dose: >1mg/kg) on the duration of the seizures, the required energy for the seizures, and the seizure threshold over the course of ECT.
Materials and Methods: The electronic medical records of 165 patients receiving 971 sessions of ECT were analyzed retrospectively. Patients were evaluated in two groups according to the according to propofol doses that they had received for ECT. Group LP (n=91): patients who received low dose propofol (<1 mg/kg). Group HP (n=74): patients who received high dose propofol (>1 mg/kg).
Results and Discussion: The required energy for seizures in Group HP were significantly higher than the Group LP in the 3rd, 4th, 5th, 6th, 7th, 8th, and 9th sessions ($p<0.05$). The duration of seizures in the Group HP were significantly lower than the Group LP in the 1st, 2nd, 4th, 5th, 7th, and 8th sessions ($p<0.05$). Higher electrical stimulus was needed to acquire a minimum length of seizure (>25sn) during the course of ECT in higher propofol doses. Although there was an increase in the seizure threshold over the course of ECT in both groups, this increase was found to be much more pronounced in the high-dose propofol group according to

the low-dose propofol group (Figure-1). Longer duration of seizures was observed in the low-dose propofol group.
Conclusions: Higher doses of propofol in induction of anesthesia can lead to a more progressive rise in seizure threshold over the course of electroconvulsive therapy than lower doses of propofol.

Table-1: Perioperative vital parameters of the patient.

		Heart Rate (bpm)	Blood Pressure (mmHg)	SpO_2 (%)	$EtCO_2$	BIS	TOF (%)
	Preoperative	109	155/102	93	-	97	-
Anesthesia induction	Induction	100	136/90	100	-	40	0
	Intubation	112	146/93	100	-	45	0
	Incision	93	132/87	98	46	50	0
	Trocar insertion	99	138/88	95	40	42	0
Anesthesia maintenance	10. min	83	105/74	96	36	45	0
	20. min	78	110/78	95	35	50	0
	30. min	80	113/81	95	36	48	0
	40. min	81	108/80	94	38	51	0
	50. min	76	106/72	94	37	43	0
End of anesthesia	0. min; Sugammadex	74	111/81	95	37	40	84
	10. min	79	109/85	94	36	38	105
	20. min	65	121/92	93	37	40	100
	30. min; Theophylline	83	115/78	97	38	41	100
	40. min; Extubation	88	132/80	93	-	93	104

BIS: Bispecteral Index; TOF: Train-of-Four Stimulation

06AP03-2
The efficacy of dexmedetomidine-based monitored-anaesthesia care for paediatric gamma knife radiosurgery

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Background and Goal of Study: Gamma Knife Radiosurgery (GKRS) is a minimally invasive neurosurgical procedure, generally performed under moderate sedation using local analgesia. However, in the paediatric population, the increased treatment time, restricted head movement and moderate sedation is considered to be intolerable. The aim of this study is to evaluate the efficacy of dexmedetomidine-based monitored-anaesthesia care (MAC) for paediatric GKRS.
Materials and Methods: After local ethics committee approval (180319), a retrospective case review of consecutive paediatric GKRS managed under dexmedetomidine-based MAC was conducted. Intraoperative dexmedetomidine infusion rate and incidence of perioperative complication was analysed based on anaesthetic charts and surgical dictations. Plasma concentration of dexmedetomidine was calculated by NONMEM® 7.3. Paediatric use of dexmedetomidine was approved by Institutional Review Board (2016114) and written parental consent was obtained for all patient data.
Results and Discussion: Between January 2017 and December 2018, 27 procedures of GKRS required anaesthesia care across 19 paediatric patients. Of these, 18 procedures, across 14 paediatric GKRS cases (age of 10 ± 1 years old; 10 procedures for arteriovenous malformation, 3 for atypical meningioma, 3 for ependymoma and 2 for medulloblastoma) were managed with intravenous dexmedetomidine. The mean irradiation time and sedation time was 118 ± 46 minutes and 270 ± 66 minutes, respectively. All patients received supplemental oxygen through nasal cannula. No patients required emergency invasive airway management. Intravenous sedation was commenced with loading dose of dexmedetomidine (6 µg/kg for 10 minutes) and boluses of ketamine and fentanyl. Dexmedetomidine infusion rate was subsequently changed between 0.3 and 1.0 µg/kg/h according to the patient's heart rate when the Leksell frame® was affixed. The level of dexmedetomidine plasma concentration was comparable with that used for patients in intensive care, though the required infusion rate was higher than in adult cases (0.2-0.7 µg/kg/h). None of the patients complained about intraoperative awareness.
Conclusions: Dexmedetomidine provides ideal sedative condition for paediatric GKRS as it preserves spontaneous ventilation without disturbing surgical flow. Although the loading dose of dexmedetomidine was equivalent to an adult's, a higher infusion rate might be required when invasive procedures are applied.

06AP03-3
Comparing the effect between continuous infusion and intermittent bolus of rocuronium for intraoperative neurophysiologic monitoring of neurointervention under general anesthesia

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Background and Goal of study: Medical researchers have been reluctant to use neuromuscular blocking drugs (NMBD) during the use of intraoperative motor evoked potential (MEP) monitoring despite the possibility of patient movement. In this study, we compared the effects of no NMBD and continuous rocuronium infusion on the incidence of patient involuntary movement and MEP monitoring.
Materials and Methods: In this study, eighty patients who underwent neurointervention with MEP monitoring were randomly assigned into two groups. After an anesthetic induction, bolus of rocuronium 0.1 mg/kg was injected when it was needed (for patient involuntary movement or at the request of the surgeon) in group B, and 5 mcg/kg/min of rocuronium were infused in group I study participants. The incidence of patient involuntary movement and spontaneous respiration, the mean MEP amplitude, coefficient of variation (CV), the incidence of MEP stimulus change and train-of-four (TOF) count were compared.
Results and Discussion: The incidence of involuntary movement and spontaneous repiration were measured as significantly lower in group I (5.1%, 0 % in Group I vs 30%, 15 % in Group B, $p<0.05$). The incidence of undetectable MEP did not differ as measured in both groups. Monitoring of the MEPs were successful in both groups, and the MEP variability that were calculated by CV were significantly lower in the infusion group ($p<0.05$).

CV of MEP amplitude (mV)	Group I (n=39)	Group B (n=40)	P value
Right Arm	33.13±22.91	53.27±26.77	.001
Left Arm	30.00±23.14	55.26±29.78	.000
Right Leg	35.41±21.66	51.55±28.60	.013
Left Leg	39.53±24.43	54.43±33.79	.025

Previous literature reported that successful MEP monitoring was performed when they kept the TOF count 1 to 2. In the present study, we could maintain that the TOF count between 1 to 2 with the rocuronium infusion rate of 5 mcg/kg/min was sufficient.
Conclusion: We conclude that the continuous infusion of rocuronium effectively inhibited the involuntary movement and spontaneous respiration of the patient while enabling MEP monitoring.
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06AP03-4
Could intraoperative magnesium sulphate protect against postoperative cognitive dysfunction

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Background and Goal of Study: The pathogenesis of postoperative cognitive dysfunction (POCD) has gained great attention in the last years. Effective, evidence-based prevention strategies for its occurrence are not currently described. Goal is to study whether intraoperative magnesium sulphate could have a protective effect against developing POCD and to study the effect of intraoperative magnesium sulphate on serum level of S100B; the marker of neuronal degeneration
Materials and Methods: This is a prospective randomized controlled trial carried out on 80 patients undergoing elective laparoscopic cholecystectomy. Patients were randomly assigned into one of two groups; the first group received conventional general anaesthesia only (40 participants) (conventional anaesthesia group) and the second group received conventional general anaesthesia with extra administration of intraoperative magnesium sulphate 30 mg/kg as loading dose over 10 minutes then maintenance dose 10 mg/kg/hour (40 participants) (Mg sulphate group). Cognitive assessment for both groups was done preoperative and 1 week postoperative using Paired Associate Learning test (PALT) and Benton Visual Retention test (BVRT). Quantitative determination of serum S100B was done for both groups in the basal sample and postoperative sample by applying an enzyme-linked immunoabsorbent assay technique on an automated ELISA platform.
Results and Discussion: Regarding cognitive tests, postoperative PALT in conventional anaesthesia group was significantly lower than preoperative PALT (P-value = 0.043), but in Mg sulphate group, there was no statistically significant difference between pre and postoperative PALT (P-value = 0.134). Postoperative BVRT in conventional anaesthesia group, was significantly lower than preoperative BVRT (P-value = 0.015), but in Mg sulphate group, there was no statistically

significant difference between pre and postoperative BVRT (P-value = 0.151). Regarding serum level of S100B, postoperative S100B in conventional anaesthesia group was significantly higher than preoperative S100B (P-value = 0.006), but in Mg sulphate group, there was no statistically significant difference between pre and postoperative S100B (P-value = 0.293)
Conclusions: Intraoperative Mg sulphate attenuates POCD and neuronal degeneration occurring following conventional general anaesthesia.

06AP03-5
Preoperative serum alkaline phosphatase and neurologic outcome of cerebrovascular bypass

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Background and Goal of Study: This study was designed to evaluate the relationship between preoperative ALP (alkaline phosphatase) level and postoperative major neurologic complications in patients undergoing cerebral bypass surgery after diagnosis of cerebral vascular stenosis or occlusion.
Materials and Methods: A retrospective analysis of a prospective database of all patients undergoing cerebral bypass surgery after diagnosis for cerebral vascular stenosis or occlusion between May 2003 and August 2017 was performed. Patients were divided into 3 groups (lower group; ALP < 60 IU/ml, middle group; ALP 60~76 IU/ml, higher group; ALP > 76 IU/ml). The incidence and risk of neurologic events according to ALP level were analyzed.
Results and Discussion: A total of 211 cases were suitable for analysis (lower=65, middle=66, higher=80). The incidence of adverse neurologic event and acute infarction of each group showed significant differences between three groups (P = 0.014, and P = 0.016) and patients in the higher ALP group tended to have the highest complication rate. On Kaplan-Meier time to event curves, as ALP increased, the incidence of acute infarction significantly increased (log rank = 0.048).
Conclusions: The level of preoperative serum ALP could be an independent prognostic risk factor for adverse neurologic event or acute infarction in the patients who undergo cerebral bypass surgery for vascular stenosis or occlusion. In cases of high preoperative serum ALP, more careful surgical technique and patient management will be needed to prevent postoperative complications and improve outcomes.

06AP03-6
Moderate to light sedation by midazolam might induce natural sleep

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Background and Goal of Study: We previously investigated the effect of sedation by midazolam or propofol on memory and perception of several kinds of stimuli using healthy volunteers. In that study, we once determined the effect-site concentration of sedatives at loss of response to verbal command (Ce-LOR), and we controlled the Ce of sedatives at 3/4 of Ce-LOR, 1/2 of Ce-LOR and 1/4 of Ce-LOR, with this sequence. We defined these 3 levels of sedation as “deep”, “moderate”, and “light”, respectively. We used BIS monitor and our original software “BSA for A2000”, and raw EEG data as well as EEG derived parameters were recorded on a computer during whole study periods. BIS values that minimally affected by electromyograms were well correlated with the sedation level, however we noticed the strange changes of BIS values when sedation level was changed from “moderate” to “light”. BIS values often decreased even the Ce of sedative was decreased in some midazolam cases. Then we investigated the cause of this strange change of BIS by inspecting the raw EEGs.
Materials and Methods: After approval of local ethical committee we enrolled 10 male volunteers (22.8±1.5 yr). Midazolam was administered using a syringe pump with the aid of pharmacokinetic simulation by TIVATrainer software (Ver 8.0, EuroSIVA). We compared the BIS values that minimally affected by electromyograms in each point. We also inspected the raw EEG.
Results and Discussion: BIS values were 73.4±1.2, 81.8±1.6, and 89.1±2.4 at “deep”, moderate”, and “light” level, respectively. And BIS value significantly decreased between “moderate” and “light” to 63.9±13.6, but it was 72.4±3.2 during between “deep” and “moderate”. Decrease of BIS more than 10 between “moderate” and “light” level was observed in 7 participants. Visual inspection of raw EEG revealed that the decrease of BIS was accompanied by the intermittent emergence of spindle wave which was often observed in stage II of slow wave sleep. Of course, spindle wave could be observed during anesthesia with anesthetic that potentiates $GABA_A$ mechanism. However in such situation, spindle wave was almost continuously observed.
Conclusions: We found that BIS value decreased during moderate to light sedation but not during deep to moderate sedation in some cases. Emergence of intermittent spindle wave indicated that moderate to light sedation by midazolam might induce natural sleep.

06AP03-7
The risk of minimal use of rocuronium bromide on the postoperative residual neuromuscular blockade in patients undergoing longtime spine surgery with intraoperative neurophysiologic monitoring.

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Background and Goal of Study: During spine surgery with intraoperative neurophysiologic monitoring (IOM), neuromuscular blocking agent (NMBA) can be used in limited to avoid decrease of muscle response to nerve stimulation. Furthermore, such cases with long surgical time, the effect of NMBA may be easily regarded as minimal because of small dose and short duration. However, there can be a risk of residual neuromuscular blockade when a small dose of NMBA was used.
Materials and Methods: We investigated retrospectively electronic medical records of patients undergoing spine surgery. (IRB #2018-11-044) Patients receiving spine surgery with more than 3 hours under total intravenous anesthesia was included. Patients with spine surgery without IOM, using volatile anesthetics, with neuromuscular disease, without intraoperative neuromuscular monitoring records were excluded. The primary outcome was the incidence of Train-of-Four ratio (TOFR) <0.9 at the end of surgery.
Results and Discussion: In a total of 95 patients, 37 patients showed TOFR <0.9 at the end of surgery. The incidence of TOFR <0.9 at the postoperative anesthesia care unit was 6.5%. In univariable logistic regression, gender, rocuronium overdose, and T1 appearance time showed statistical significance. In multivariable logistic regression, T1 appearance time was an independent factor predicting TOFR<0.9 (Table 1).

	Univariable analysis		Multivariable analysis	
variables	OR (95% CI)	P	OR (95% CI)	P
Elderly	0.791 (0.344-1.819)	0.582		
Female	2.509 (1.003-6.279)	0.049	2.522 (0.900-7.071)	0.079
BMI	1.042 (0.923-1.176)	0.510		
Overdose	2.649 (1.121-6.258)	0.026	2.104 (0.815-5.432)	0.124
Rescue dose	0.804 (0.311-2.075)	0.651		
T1 appearance	1.018 (1.004-1.032)	0.011	1.016 (1.002-1.031)	0.031

Conclusions: Although NMBA was used minimally, its effect can be prolonged, thereby causing residual paralysis. Therefore, even single administration of NMBA with minimal dose, intraoperative neuromuscular monitoring is mandatory. T1 appearance time also may be helpful to predict residual blockade in clinical practice.

06AP03-9
Influence of an “electroencephalogram (EEG) based” monitor choice on the delay between the predicted propofol effect site concentration and the measured drug effect

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Background and Goal of the Study: Clinicians can optimise propofol titration by using two sources of pharmacodynamic (PD) information: the predicted effect site concentration (Ceprop) and the electroencephalographically (EEG) measured drug effect. Relation between these sources should be time-independent, i.e. perfectly synchronized. In reality, various issues corrupt time-independency leading to asynchrony caused by hysteresis. This can result in conflicting information making drug dosing difficult. In this study we first tried to quantify and minimize the hysteresis between the Ceprop (Schnider model) and EEG measured drug effect using nonlinear mixed effects modelling (NONMEM).Further we measured the influence of EEG based monitor choice, namely Bispectral index (BIS) vs qCON monitor, on propofol PD hysteresis.
Material and Methods: We analysed the PD data from 165 patients undergoing propofol-remifentanil anaesthesia for outpatient surgery. Drugs were administered using target controlled infusion pumps (TCI). Pumps were programmed with Schnider model for propofol and Minto model for remifentanil. We constructed 2 PD models (direct models) relating the Schnider Ceprop to the measured BIS and

qCON monitor values. We quantified the models' misspecification due to hysteresis, on an individual level, using the root mean square of errors (RMSE). Subsequently we attempted to minimize the RMSE, i.e. optimize the PD models' predictions, by adding a lag factor to both models. (lag PD models)
Results and Discussion: There is a counter clockwise hysteresis between Ceprop and BIS/qCON values. Not accounting for this it resulted in a direct PD model with a Ce50 of 6.24 and 8.62 µg/ml and RSME (median and interquartile range (IQR)) of 9.38 (7.92-11.23) and 8.41(7.04-10.2) for BIS and qCON, respectively. Adding a modelled lag factor of 49 seconds to the BIS model and 53 seconds to the qCON model improved both models' prediction significantly, resulting in similar Ce50 (3.66 and 3.62 µg/ml for BIS and qCON) and lower RMSE (median (IQR) of 7.87 (6.49-9.90) and 6.56 (5.28-8.57) for BIS and qCON
Conclusion: There is a significant, monitor dependent, "Ceprop vs EEG measured drug effect" hysteresis. Not accounting for it leads to conflicting PD information and false high, monitor-dependent, Ce50s for propofol. Adding a lag term improved the PD model performance, "pump-monitor" synchronyand and made the estimates of Ce50 for propofol realistic and monitor-independent.

06AP04-1
Anaesthesia in fronto-orbital advancement: a single center 4-year retrospective review

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Background and Goal of Study: The aim of this study was to evaluate anaesthetic management in fronto-orbital advancement (FOA) in order to analyse blood loose and blood components use.
Materials and Methods: A retrospective chart review was performed for patients diagnosed with craniosynostosis who underwent FOA at our institution through January 2015 to August 2018. Anaesthesiological parameters were analysed, blood loss and blood transfusion rate were measured. Calculated blood loss was based on preoperative/postoperative haemoglobin values and transfusion volumes.
Results and Discussion: 41 patients matched inclusion criteria, their mean age was 13,7 months (SD=7,4) at a mean weight of 9,9 kg (SD=2,2). Syndromic craniosynostosis was observed in 5 patients (12,2%). Mean basal hematocrits was 36,16% (SD=2,14). Mean duration of surgery was 230 minutes (SD=80,1). Controlled hypotension was maintained with remifentanil-sevoflurane in 40/41 patients (97,6%) and tranexamic acid was administered in 30/41 patients (73,2%). Mean calculated blood loss was 22,3 mL/kg (SD=14,6), or 27,9% of estimated blood volume (SD=0,2), all patients but one were transfused in operating room (transfusion rate 97,6%) and FFP was administered in 10/41 patients (24,4%). No detection of venous air embolism was found based on End-tidal CO2.

	CALCULATED BLOOD LOOSE mL/kg (MEAN+/-SD)	PRBC mL/kg (MEAN+/-SD)	FFP %	FFP mL/kg (MEAN+/-SD)	ICU TRANS-FUSION %	ICU FFP %
UNILATERAL FOA (n=24)	15,7 (10,9)	21,7 (10,1)	16,7%	17,8 (8,3)	8,3%	0
BILATERAL FOA (n=17)	32,3 (16,3)	32,7 (16,5)	35,3%	17,1 (7,5)	17,6%	5,9%

All patients were admitted to ICU after surgery (average ICU length of stay was 1,27 days, SD=0,59). Mean hematocrits on ICU admission was 38,28% (SD=6,75). 5 patients were transfused (12,2%) and 1 patient was administered FFP during ICU admission. Average PRISM score was 2,95 (SD=2,75). The average postoperative length of stay was 5,3 days (SD=1,2).
Conclusions: The results obtained in our institution resemble the published data[1]. Patients undergoing FOA will suffer moderate bleeding. It is necessary to implement blood saving measures. Future interventions are required.
References:
1. Seruya et al. Factors Related to Blood Loss During Fronto-Orbital Advancement. Journal of Craniofacial Surgery, 23(2), 358–362.

06AP04-2
Airway management with supraglottic device during coiling of unruptured cerebral aneurysm

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Background and Goal of Study: to show our experience regarding the feasibility of supraglottic devices (SGD) for airway management in unruptured intracranial aneurisms (UIAs) requiring endovascular treatment (EVT)[1].
Materials and Methods: Retrospective review between 2010 and 2018. Primary outcomes: 1) repositioning of SGD, 2) need of orotracheal intubation (OTT), 3) airway complications. Secondary outcomes: airway management, aneurysm complexity and history of previous subarachnoid haemorrhage (SAH), haemodynamic monitoring and intra- and postoperative complications. Statistical data were analysed using t test and X2 test.
Results and Discussion: 190 patients included and divided in two groups: SGD 133 (70%) and OTT 57 (30%). Forty-seven(24%) patients had complex aneurysms or previous SAH. Thirty-three (70%) of these required OTT compared to 24 out of 143 (16.7%) with non-complex aneurysms. In the SGD group, 130 patients were managed with i-gel®, 2 with Proseal LMA® and 1 with Supreme LMA®. No incidences were recorded in 97% of the cases. Three patients required SGD repositioning and 1 OTT due to inadequate ventilation. No desaturation or bronchial aspiration was recorded. In the OTT group, two patients had bronchospasm and one laryngospasm during awakening. Four patients died in the postoperative period (2 of each group). Two patients suffered intraoperative bleeding (OTT group) and 2 postoperative bleeding (SGD group). Between 2010-2014, 53 (92%) patients were intubated and 37 (88%) monitored with invasive arterial blood pressure (IBP). From 2015 to 2018 only 4 (7%) patients underwent OTT and 5 (12%) received IBP monitoring.
Conclusions: SGD, in agreement to less invasive protocols, may be considered as a feasible alternative airway management in selected patients proposed for EVT of UIAs.
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06AP04-3
Supraglottic devices for Airway management in Awake Craniotomy

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Background and Goal of Study: Awake craniotomy is a technique for mapping sensory, motor, and cognitive function during various neurosurgical procedures, including tumor excision from eloquent areas, epilepsy surgery, and deep brain stimulation; However, patient communication for functional mapping is required only during manipulation close to eloquent areas and patients are "sedated" during other parts of the procedure, so the description "awake" is somehow misleading. Different methods for anaesthesia management have been explored, reaching from so called awake-awake-awake technique to "classic" sleep-awake-sleep technique. Furthermore, airway management ranges from supplying nasal oxygen to tracheal intubation. The use of laryngeal masks in a sleep-awake-sleep technique has been described previously, but its safety has not been assessed.
Materials and Methods: We conducted a single-center, retrospective analysis of 29 patients who underwent awake craniotomy. Nasal fiber optic intubation (FOI) was performed in 21 Patients while 8 patients received laryngeal mask (LM) for airway management. Ventilation, including incidence of critical airway outcome and perioperative complications was evaluated. The primary outcome was airway and pulmonary complications. Secondary outcomes were: 1) duration of ventilation, 2) oxygen saturation, 3) length of ICU stay.
Results and Discussion: There were no anesthesia-related critical events. However, one patient in the FOI group required conversion to a different airway management technique. Two patients in each group were diagnosed with pulmonary complications during ICU treatment, without statistical significance between groups. However, patients in the FOI group were diagnosed with blood aspiration and pulmonary edema, while the two patients in the LM group were treated for pneumonia. Furthermore, 3 patients from the FOI group had oxygen saturations below 98% in both asleep phases, while desaturation was not observed in the LM group. Most notably, duration of mechanical ventilation in the second asleep phase was significantly lower in the LM group compared to the FOI group (LM 63±24 vs. FOI 326±79; min.; p=0,004).
Conclusions: In summary, LM is a feasible airway management method for patients undergoing awake craniotomy, resulting in reduced ventilation duration compared to FOI procedure. Pulmonary complications did not reach significant levels between both groups, while oxygenation seems more stable in the LM group.

06AP04-4
Effects of Dexmedetomidine during Craniotomy for Brain Tumour Resection and Cerebrovascular Surgery: Interim Analysis of a Randomised Controlled Double-Blind Trial

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Background and Goal of Study: Dexmedetomidine (DEX) may benefit patients undergoing craniotomy because of its anaesthetic-sparing and neuroprotective effects; however, DEX infusion reduces cardiac output and cerebral blood flow. Goal-directed fluid therapy (GDFT) improves intraoperative perfusion and postoperative outcomes. Thus, we hypothesise that infusion of DEX combined with GDFT application during craniotomy may reduce intraoperative haemodynamic risk and improve postoperative outcomes.
Materials and Methods: This is an interim analysis of a randomised, double-blind trial including 50 adult patients who underwent elective craniotomy. The patients were equally divided into a DEX group (infusion of DEX 0.5 mcg/kg h) and control group (infusion of an equivalent saline dose). All patients received total intravenous anaesthesia (TIVA) and scalp block to maintain a bispectral index (BIS) of 40–60. Intraoperative GDFT was applied using a Flotrac/Vigileo system to maximise the stroke volume.
Results and Discussion: The characteristics and intraoperative profiles of the groups were comparable. There was a trend of shorter intensive care unit stay in the DEX group (DEX vs. control: 1.7 ± 1.1 vs. 2.1 ± 1.6 days; p = 0.267), but the general postoperative outcomes, including length of hospital stay (DEX vs. control: 11.2 ± 6.1 vs. 10.4 ± 4.7 days; p = 0.605), prolonged mechanical ventilation (16% vs 20%; p = 1.000), and the patients requiring antihypertensive agents after surgery (44% vs 44%; p = 1.000), were comparable. Furthermore, despite the DEX group had a trend of lower average intraoperative cardiac index than control group (2.8 ± 0.71 vs. 3.2 ± 0.76 L/min/m2; p = 0.0956), intraoperative serum lactate changes were comparable (DEX vs. control: 0.24 ± 0.82 vs. 0.23 ± 0.75 mmol/L; p = 0.9814). In this interim analysis, we found that the benefits of DEX for craniotomy may be diluted by the settings of BIS-guided TIVA and scalp block. Although a lower cardiac index was observed in the DEX group, it did not cause serum lactate accumulation. Because serum lactate change is sensitive to the intraoperative perfusion state and highly correlated with postcraniotomy outcomes, the haemodynamically adverse effects of DEX appeared negligible when GDFT was applied.
Conclusion: Infusion of DEX during craniotomy is associated with a irrelevant reduction in cardiac index. The therapeutic effects of DEX on brain surgery may be explored after completion of this study.

06AP04-5
Controlled arterial hypotension during resection of cerebral arteriovenous malformations

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Background and Goal of the Study: Controlled hypotension is often applied during resection of cerebral arteriovenous malformations to restrict intraoperative bleeding and to maintain the clarity of the surgical field. To do so, blood pressure is lowered below the lower autoregulation limit. We hypothesized that controlled hypotension does not impair the outcome of the patients.
Materials and Methods: In a retrospective study, patients (aged ≥ 11 years) were included, in whom resection was performed by the same surgeon (J.S.) between 2003 and 2012. Anesthesia protocols were analyzed for blood pressure values, blood loss and the medication used to induce the hypotension. Furthermore, the neurological outcome was assessed using the modified Rankin scale (mRS) and the postoperative occurrence of neurological deficits. At the surgeon's request, controlled hypotension was performed whenever hemostasis proved to be difficult.
Results and Discussion: 56 protocols were evaluated. There was a division into a hypotension group (n=28; mean age 35±12 years) and a control group (n=28; mean age 34±13 years). Groups were comparable with respect to age, gender, and baseline blood pressure. However the hypotension group showed a significantly higher Spetzler-Martin-Grading (median grade of 3) than the control group (median grade of 2). Blood pressure was lowered to a systolic pressure of 82±7.5mmHg and a mean pressure of 56.8±7.4mmHg for a median duration of 58 minutes. In the hypotension group there was a 300ml higher blood loss (p=0.002) and a significantly higher rate of neurological deficits (16 vs. 7 patients, p=0.03), which was mainly due to a higher rate of hemiparesis (9 vs. 2 patients, p=0.044). The majority of these deficits were transient. Nevertheless, significantly more patients with permanent neurological deficits remained in the hypotension group (n=9) than in the control group (n=2). Receiver operating characteristic (ROC) analysis revealed duration (area = 0.77) and degree (a = 0.73) of hypotension as well as Spetzler-Martin-Grading (a = 0.68) as predictors of postoperative hemiparesis. There was no difference in postoperative functional outcome (mRS) between groups.
Conclusions: Controlled hypotension should be regarded as an ultima ratio measure to restrict intraoperative bleeding. As a precaution, it should be applied as short and as little pronounced as possible.
Acknowledgements: This abstract contains part of the doctoral thesis of KR.

06AP04-6
Operational performance of endovascular acute stroke treatment during business hours versus night and weekend: an observational single centre analysis

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Background and Goal of Study: Acute ischemic stroke is a time critical condition in which rapid initiation of reperfusion therapy is related to outcome. In patients eligible for endovascular therapy, several organizational factors may delay fast intervention during night-time and weekends.
Materials and Methods: In this retrospective study, all patients (n=78) who underwent endovascular treatment for acute ischemic stroke from 20-01-2017 to 05-10-2018 in our tertiary stroke centre were included. In 15 (19%) patients time recordings were incomplete. In the remaining 63 patients, operational steps were compared when undergoing treatment during business hours (week days from 8h to 18h) (BH) versus out-of-business hours (OBH). Data are presented as median [IQR] and compared by the Wilcoxon rank sum test.
Results and Discussion: A total of 26 (41%) BH patients were compared to 37 (59%) OBH patients. Time from emergency department (ED) arrival to endovascular recanalization was 130 min [103-184] and 144 min [116-205] for BH and OBH group, respectively (P=0.37). The time interval between ED arrival and arrival in the procedure room was the largest in the entire process, but was not different (P=0.48) between BH (62 min [48-89]) and OBH (74 min [44-110]). Time from arterial puncture to revascularisation (duration of procedure) was 41 min [28-60] vs. 36 min [30-59] in the BH and OBH group, respectively (P=0.72). Time from start general anaesthesia to puncture was 16 min [14-21] vs. 16 min [10-25] in the BH and OBH group, respectively (P=0.94). Time from arrival in procedural room to start anaesthesia was 1 min [0-5] vs. 3 min [1-10] in the BH and OBH group, respectively (P=0.24).

Conclusions: Operational performance of endovascular ischemic stroke therapy at our centre is similar during BH and OBH. The time window between arrival at the ED and in the procedure room is large and should be the focus of future multicentre quality improvement projects.

06AP04-8
The Anaesthetic Biobank of Cerebrospinal Fluid - methods and baseline results

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Background and Goal: Most knowledge of the neurobiology of the cerebrospinal fluid (CSF) comes from CSF of patients with neurological symptoms or suspected neurodegenerative diseases. We established the Anaesthetic Biobank of Cerebrospinal Fluid (ABC) to facilitate future research using CSF from patients scheduled for elective surgery under spinal anaesthesia. This gives the unique opportunity to study CSF neurobiology in the general population and to help estimate baseline levels of biomarkers of neuropsychiatric diseases. In 2017 we reported the methods and the influence of aspiration of CSF on block height (abstract 06AP02-11). The purpose of the current abstract is to describe the initial technical and laboratory findings.
Materials and Methods: All patients ≥18 years scheduled for surgery under spinal anaesthesia are invited to participate. A Montreal Cognitive Assessment (MoCA) and screening neurological examination are performed preoperatively. During IV cannulation 20 ml blood is collected and then 10 ml of CSF is aspirated during spinal puncture prior to local anaesthetic injection. Patient characteristics, medical history, details of surgery and spinal anaesthesia and postoperative hospital stay are recorded and registered. Sensory block height is measured at 10 minutes after spinal injection. 10 ml of blood and the first 2 ml of CSF is sent immediately for routine laboratory analyses. The remaining blood and CSF is centrifuged and stored at -80˚C. Qalb is calculated as the ratio of CSF to plasma albumin concentration, as a quantifier of blood brain barrier (BBB) function.
Results: We have enrolled 275 patients (age 18-87 years, BMI 19-45 kg/m2) between October 2016 and November 2018. CSF was obtained in 254 patients (92% of included patients). The median block height was dermatome T8 (IQR T6 – T10). Type of local anaesthetic used had a significant effect on the extent of block (isobaric bupivacaine T6, hyperbaric bupivacaine T8, hyperbaric prilocaine T9; p=0.001). Qalb was significantly correlated with age (p<0.001; r=.420), BMI

(p<0.001; r=.242) and MOCA-score (p=0.046; r=-.187) and associated with gender (p<0.001) and ASA-score (p<0.001).
Future developments: Our goal is to further expand our research into the fundamental neuro(patho)physiology of CSF and BBB function. In collaboration with our laboratory, analyses of monoamine neurotransmitters and steroids has started. We hope to collaborate with other interested hospitals in the future.

06AP04-9
Postoperative cognitive dysfunction in patients undergoing spinal neurosurgery.

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is hard to detect and is associated with increased postoperative mortality and disability. During surgery in prone position, serious complications, like cardiovascular system depression may develop, causing hypotension, hypoxia that might reflect on POCD. The goal of this study was to find out whether patients after spinal neurosurgery in prone position suffer from POCD and identify factors that might influence POCD development.
Materials and Methods: In prospective study, patients had neurosurgery in prone position under standard general anesthesia. Preoperative hemoglobin, hematocrit level and intraoperative data like blood loss, length of the surgery, intraoperative mean arterial pressure (MAP) was fixed. Patient's cognitive function was controlled twice - preoperatively and two days after the surgery, using the Montreal cognitive assessment scale (MOCA).
Results and Discussion: In the study were included 22 patients (male-13, female-9, age 50+/-16,23 years). 17 underwent microdiscectomy, 3 - transpedicular fixation; 2 - spinal tumor resection. 10 out of 22 patients (45%) showed cognitive function decline for 1-4 points. The decrease of cognitive function was discovered to be independent to sex (p=0,65), blood loss (0,331), hemoglobin (0,483), hematocrit (0,129), length of the surgery (0,745), intraoperative MAP (p=0,786). Medium MOCA score before surgery was 25,64+/-3,71, MOCA after - 25,4+/-3,32. Patients with POCD had higher medium age (53.6+/-15 and 44.3+/-15), lower medium preoperative hematocrit level (40.3%+/-3 vs. 42.6+/-5), blood loss (166.0ml+/-108 and 200.0ml+/-108), shorter medium length of the surgery (108.7min+/-29 and 118.4min+/-50), higher intraoperative MAP (92.8mmHg+/-11 and 85.1mmHg+/-10) compared to the rest of the group. There was no difference in medium Hb levels (14.3g/L+/-1 and 14.5g/L+/-1).
Conclusions: 45 % of patients showed decreased postoperative cognitive function after spinal neurosurgery in prone position. We did not find any association between postoperative cognitive decline, preoperative laboratory findings and intraoperative parameters.

06AP05-1
Role of brain monitoring in cerebral hypoperfusion early detection

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Background: Internal carotid endovascular treatment can lead to ipsilateral hemiferae ischemia .Clinical evaluation, bispectral cerebral monitoring (BIS) and occlusion carotid test complement each other at diagnostic and therapeutic evaluation. Dexmedetomidin leads to a superficial sedation, it interruption permits a vigil state patient, verbal command responding. The aim of this case report is to describe the BIS pattern following intraoperative proximal test carotid occlusion .
Case Report:39 years old patient, female, systemic arterial hypertension, normal neurological exam unless stiff neck, submitted to cerebral angiography. Oriented, conscious, initial medial arterial pressure (MAP) = 77, Heart Rate (HR)=72 bpm, BIS monitored, sensor placed at right side hemisphere. After dexmedetomidin infusion, BIS maintained between 96 and 98. Cerebral angiography shows a small internal carotid aneurism . Dexmedetomidin infusion was turned off , then baloon oclusing carotid test was performed . After ten minutes the patient was completely awake to clinical evaluation: MAP = 80, HR 68 bpm, BIS 95. During carotid occlusion test , BIS monitoring lowed from 95 to 79, and new deficits appeared, as example left hemiparesia. There were no hemodynamic variations. After baloon deflation, patient returned to pre-surgery neurologic parameters and aneurism embolization was not indicated.
Discussion: BIS monitoring early detected cerebral hypoperfusion signs. A 20% BIS lower during occlusion carotid test might correspond to cerebral ischemia detection, with 83% sensibility and specificity[1].
References:
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Learning points: BIS pattern following intraoperative baloon oclusing carotid test

06AP05-2
The value of a near infrared spectroscopy based clinical algorithm in patients undergoing spinal surgery and its relation to postoperative cognitive decline.

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Background and Goal of Study: A significant number of patients present with postoperative cognitive decline (POCD) after non-cardiac surgery. Adequate intraoperative cerebral blood flow and oxygen supply is one of the inciting causes for POCD. Near infrared spectroscopy (NIRS) devices provide noninvasive, continuous monitoring of cerebral oxygenation. NIRS based algorithm can help to manage intraoperative cerebral desaturation and avoid cerebral injury. The goal of the study was to determine the value of cerebral oxygenation monitoring and NIRS based intraoperative patient management during spinal surgery and its possible relation to POCD.
Materials and Methods: 48 patients undergoing spinal neurosurgery were included. Throughout the surgery regional cerebral oxygen saturation (rScO2) was monitored (INVOS 4100). Baseline rScO2 values were determined before induction of anaesthesia. If intraoperative rScO2 dropped bilaterally or unilaterally under 20% from baseline values or showed an absolute drop under 50%, NIRS based algorithm (Denault, 2007) was initiated. To evaluate cognitive function, Montreal - Cognitive Assessment (MoCA) scale was used before and after the surgery.
Results: In 4 patients NIRS clinical algorithm was used (59±16 years). 2 patients underwent spinal tumor resection, 1 - transpedicular fixation, 1 - microdiscectomy. The lowest rScO2 observed was 44%. Medium time spent under 20% from baseline values or absolute 50% was 12±5 min. All the other intraoperative measurements like mean arterial blood pressure, heart rate, peripheral oxygen saturation, end - tidal carbon dioxide remained stable during reduction of rScO2. rScO2 reductions occurred in prone position. Correct heads position was verified. All patients received Ephedrine boluses (5-20 mg). No other interventions were necessary as rScO2 came back to the baseline values. Patients, where NIRS algorithm was applied, had bigger blood loss (350±57ml) and longer medium time of the surgery (185±60min) compared to the rest of the group (blood loss 244±119 ml, p=0.2; operation time 108±32min, p=0.02). None of those 4 patients showed POCD.
Conclusions: Near infrared spectroscopy based clinical algorithm is a valuable guide for intraoperative patient management during spinal neurosurgery. Significant rScO2 drop may occur with stable intraoperative measurements, staying otherwise unrecognized.

06AP05-3
Synchronous effect of anaesthetics on functional magnetic resonance, EEG and clinical data. Protocol description and first results.

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Background and Goal of Study: Sedation outside the operating room should provide loss of consciousness, analgesia and spontaneous ventilation (1-2). Current monitors don't detect the moment of loss of consciousness (LOC) and few of them report about patient's pain. Our project aimed to correlate the Functional Magnetic Resonance Images (fMRI), the electroencephalogram (EEG) (CONOX ™, Fresenius) and the clinical parameters to improve the detection of LOC and consequently to improve the comfort and safety of patients.
Materials and Methods: We simultaneously recorded fMRI, EEG and clinical parameters (respiratory rate (RR), heart rate (HR) and pulse oximetry (SpO2) on volunteers. After baseline recording, propofol infusion was started using target controlled infusion (TCI) at 3.5 µg/mL, increasing 0.5 µg/mL every 2 min until reaching the LOC. Then, remifentanil TCI was started at 0.5 ng/mL, progressively increasing 0.5 ng/mL every 4 minutes until reaching 1.5 ng/mL, while the volunteer received a controlled painful stimulus in the nail bed. Subjects received 2 litres/min of nasal oxygen. All fMRI images, EEG recordings and clinical data were collected. Pharmacokinetic data were recorded using the Rugloop® program.
Results: Preliminary data (mean±SD) from the first 23 volunteers (12 men and 11 women, age 25±2.7 years) are shown. LOC was reached at 397±181s, being 400±242s in men and 394±90s in women. Propofol concentrations at LOC were 3.9±0.76µg/mL, being 3.7±0.9µg/mL in men and 4.2±0.4µg/mL in women. Lowest SpO2 and lowest RR observed were 92±10.6% and 4.4±4.17 breaths/min, respectively. Six patients presented SpO2 <90%. Seven patients presented apnea, defined as 0 breaths/1 minute. One patient required airway rescue (neck extension) without needing airway tools. No naloxone was used in any patient.
Discussion and conclusion: Sedation with propofol and remifentanil at clinical doses achieved during fMRI is safe, although it requires close monitoring. Times and concentrations of propofol have been analyzed up to the LOC. Subsequently, the fMRI images, the EEG recording and the clinical data can be correlated to obtain determining information to identify the LOC and adjust the doses.
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06AP05-5
Uncertainties of somatosensory evoked potentials during neurosurgical operation

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Background and Goal of Study: The objective of measurement of bio-signals in Measurement Uncertainty is not to determine a true value as closely as possible, but to permit assignment of an interval of reasonable values to the measurand. The measurement uncertainty is composed of type A and B, depending on whether or not they are evaluated by statistics, and mathematical probability theory. In this investigation we determined uncertainties in amplitude and latency of somatosensory evoked potentials (SSEP) that is useful in monitoring sensory neural pathways, thereby preventing nerve injuries while many variables are involved in incorrect data production of SSEP.

Materials and Methods: After IRB approval, in a 45-year-old male patient undergoing cervical laminectomy, SSEP was monitored using ISIS IOM SYSTEM (inomed, Emendingen, Germany) to calculate uncertainties as defined in Results.
Results and Discussion: Uncertainties (amplitude (mV) and latency (ms), respectively) of type A (SD/√5) based on 5 measurements by one tester, type B (SD/2) between two different testers, type B (Resolution (0.005)/√3) based on resolution of equipment, type B (Correction uncertainty= Measurement uncertainty/2, the measurement uncertainty for which are 0.4 (amplitude) and 0.2 (latency)) based on calibration of equipment, Combined standard uncertainty (√5 measurements by 1 tester^2 + 1 measurement between 2 testers^2 + Resolution^2 + Correction uncertainty^2) and Expanded uncertainty (Combined standard uncertainty□2) were 0.3389 (2.7811±0.7579) and 0.6071 (24.0196±1.3575), 0.371(2.8620±0.7424) and 1.401 (23.6252±2.8063), 0.003 and 0.003, 0.2 and 0.1, 0.8403 and 1.5301, and 1.6806 and 3.0602, respectively.

Conclusions: Reference standards of amplitude and latency were 2.7811 ± 1.6806 (mV) and 24.0196 ± 3.0602 (ms), respectively. Expanded uncertainty (1.6806) of amplitude was approximately 50% more than mean value (2.7811). Reasonable explanation for this would be the effects of variables on SSEP such as electromagnetic waves (diathermy and warming blanket, etc), temperature, blood pressure, gender, BMI, etc. Thus, meticulous attention is required in interpreting SSEP.

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06AP05-6
Comparison of BIS™-ELECTROENCEPHALOGRAPHIC SUPPRESSION RATIO IN ELECTIVE NEUROSURGERY WITH AND WITHOUT NEUROMUSCULAR BLOCKADE: A RETROSPECTIVE ANALYSIS WITH ICM+™ SOFTWARE

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Background and Goal of Study: Monitoring of intraoperative motor evoked potentials (MEPs) in elective neurosurgery limit the use of neuromuscular blocking agents (NMBA) and usually requires an increment in the dose of opioids (remifentanyl) and a deeper hypnosis (propofol) to avoid patient movements. However, depth of anesthesia associates with postoperative delirium. One of the subparameters of the bispectral index (BIS™) monitor is the suppression ratio (SR), quantifying the percentage of suppression during burst suppression pattern. We hypothesized that total intravenous anesthesia without continuous NMBA infusion causes a higher SR.
Materials and Methods: Observational retrospective analysis of prospectively collected data in the neurosurgical theatre at Hospital Clinic de Barcelona. We studied 40 patients with continuous intraoperative monitoring of invasive arterial blood pressure (ABP) and optimal signals both from BIS™ and rSO_2 recorded with ICM+™ software. A non-invasive autoregulation index (COx) was calculated online as the correlation between 10-s averaged values of rSO_2 and mABP over a 300 s period (intact autoregulation when COx < 0.3). Two different groups were compared: Group 1 (n=20, patients with NMBA infusion) and Group 2 (n=20, no NMBA infusion). For each patient we studied the percentage of time in suppression with respect to the total time of the surgical procedure. Magnitude of SR was classified in four ranks (0-10; 11-20; 21-30 and >30).
Results and Discussion: Although 82.9% of the patients had SR<10 (with no differences between groups), the percentage of time in SR was significantly higher for the group without NMBA infusion (52.46 ± 33.32 vs 28.56 ± 23.14, p = 0.012). However, there were no significant differences in the BIS value neither during the whole surgery nor during the suppressions. Patients >65 years spent more percentage of time in SR (58.71 ± 27.7 vs 29.59 ± 27.61, p = 0.003). No differences between groups were found related to rSO_2, mean intraoperative ABP or COx.
Conclusion: Anesthesia maintenance without continuous NMBA infusion during neurosurgical procedures seems to induce a higher suppression ratio that should be monitored. Further studies are needed to analyze the incidence of delirium in this particular setting.
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06AP05-7
Cerebral autoregulation is impaired during deep hypothermia – a porcine multimodal neuromonitoring study

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Background and Goal of Study: Effects of brain temperature modulation on cerebral haemodynamics are unclear. We aimed to investigate changes of dynamic cerebral autoregulation (AR) indices during induction of deep hypothermia (HT) in a porcine model mimicking the clinical scenario of accidental hypothermia.
Materials and Methods: Thirteen pigs were surface-cooled to a core temperature of 28°C. High-frequency monitoring included brain temperature, arterial blood pressure (MAP), intracranial pressure (ICP), brain tissue oxygen tension (PbtO2) and regional oxygen saturation (rSO2) assessed by near-infrared spectroscopy to calculate AR-indices (pressure reactivity index (PRx), oxygen reactivity index (ORx) and cerebral oximetry index (COx)).
Results and Discussion: Brain temperature decreased from 39.3 °C (±0.8 °C) to 28.8 °C (±1.0 °C) within a median 160 minutes (IQR 146-191 min) reflecting a rapid induction of deep HT (-4°C/h). MAP and cerebral perfusion pressure (CPP) remained stable until a brain temperature of 35°C (69±8 mmHg, 53±7 mmHg) and decreased to 58±17 mmHg and 40±17mmHg at 28°C (p=0.031 and p=0.015). Despite the decrease in MAP and CPP, brain oxygenation increased (PbtO2: +5 mmHg, p=0.037; rSO2: +7.3%, p=0.029). There was no change in ICP during HT induction. Baseline AR-indices reflected normal cerebral AR and did not change until a brain temperature of 34°C (ORx), 33°C (PRx) and 30°C (COx). At lower temperature AR-indices increased (PRx: p<0.001, ORx: p=0.02, COx: p=0.03), reflecting impaired cerebral AR.
Conclusions: Cerebrovascular reactivity is impaired at lower brain temperature levels. While these temperatures are usually not targeted in clinical routine this should be kept in mind when treating patients with accidental deep hypothermia.

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06AP05-8
Barbiturate Coma for Neuroprotection – more questions than answers

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Background and Goal of Study: Strong hypnotics have been demonstrated to reduce intracranial pressure (ICP) in case of severe traumatic brain injury (TBI) and intractable brain edema after vascular neurosurgery and the most popular agent is still Thiopental. But serious adverse effects of this treatment modality including systemic hypotension and long recovery time make clinical application of barbiturate coma (BC) questionable. The aim of this study is to compare the clinical outcome in patients with severe TBI treated with or without BC for neuroprotection after early extensive neurosurgical decompression.
Materials and Methods: 30 patients with severe TBI were enrolled. Group1 (n=15) were treated with BC (thiopental average dose 5,7mg/kg/h), instituted for 2 days following hemicraniectomy. In Group2 (n=15) no BC was used. BIS index score, ICP - epidural fiberoptic catheter, recovery time (assessed by MOAAS score) and systemic complications were recorded.
Results and Discussion: Preoperative mean GCS score was similar in two groups of patients - Group1: 6,4 - range 3-8; Group2: 6,7 - range 3-8. On the first, second and third postoperative day BIS index scores were 28,7/27,7/31,4 in Group1 and 31,4/32,7/36,8 in Group 2. Mean ICP was 16,8/24,3/14 in Group 1 and 17,4/25,1/15,7 in Group2. To maintain systemic normotension Dopamine in mean dose of 8,9mcg/kg/min was used in 100% of patients from Group1 and in 13,3% of patients from Group2 (4,5mcg/kg/min). Recovery time was longer (38,5h) in Group1 and only 8,6h in Group2. The neurological outcome was similar in two groups at the expense of higher frequency of systemic complications in Group1–

pneumonic consolidation (36,4%), electrolyte imbalance (24,3%), leukocytosis (48,5%), arrhythmia and acidosis 30,3%.
Conclusions: The brain has the ability to protect itself against ischemia. Using BC for Neuroprotection after extensive surgical decompression raises more questions than answers.
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06AP06-1
Effect of two anaesthetic regimes with dexmedetomidine as adjuvant on transcranial electrical motor evoked potentials during spine surgery

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Background and Goal of Study: Intraoperative transcranial motor evoked potential (TcMEP) is a useful tool in detecting spinal cord dysfunction. The quality of intraoperative TcMEP is influenced by various factors. Choosing appropriate anaesthetics is vital for proper interpretation. We aimed to compare the effect of two anaesthetic regimes with dexmedetomidine as adjuvant on amplitudes of TcMEP during spine surgery.
Materials and Methods: Thirty patients between 18-60 years scheduled for elective dorso-lumbar spine surgery with TcMEP monitoring were randomised into three groups. Patients received either propofol (group-P) 100-150 mcg/kg/min or desflurane (group-D) (<0.5 MAC). In both the groups infusions of dexmedetomidine 0.6 mcg/kg/hr and fentanyl 1 mcg/kg/hr was administered. In the standard group (group-S) patients received propofol 100-150 mcg/kg/min, fentanyl 1 mcg/kg/hr along with equal volume of saline (placebo). TcMEP amplitudes were recorded bilaterally from electrodes placed at least in one set of muscles with motor origin rostral and one set of muscle caudal to the spinal level of lesion at different time points. One way analysis of variance (ANOVA) was used for parametric distribution of data. Kruskal–Wallis test was used for comparison for non-parametric data distribution of data. A p value of less than 0.05 was considered significant.
Results and Discussion: Three patients (2 from group-D, 1 from group-P) were excluded after allocation. 27 out of 30 patients were analyzed. The demographic and surgical characteristics of patients were comparable. The stimulation voltage needed to elicit the responses in all the three groups was comparable. There was no difference in brachioradialis muscle amplitudes observed between the groups at different time points. But, in the right brachioradialis muscle we found reduced amplitudes at baseline in group-D (p=0.04) and at 120 mins in group-P (p=0.03). We noticed reduced amplitudes of bilateral brachioradialis muscle in group-P at 60 mins (p=0.01) and 90 mins (p=0.02) with respect to baseline. For lower extremity we measured amplitudes of TcMEP in tibialis anterior (TA) and did not find any difference in amplitudes between groups at different time points.
Conclusions: We observed that desflurane-dexmedetomidine combination did not hinder TcMEP as compared to both standard and propofol-dexmedetomidine group. Thus this combined regime can be used in surgeries requiring motor evoked potential monitoring.

06AP06-2
Predictors of unfavorable outcome in aneurysmal subarachnoid hemorrhage

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Background and Goal of Study: The mortality after aneurysmal subarachnoid hemorrhage (aSAH) has improved because of better diagnosis and management of complications as well as early obliteration of the aneurysm. Neurogenic pulmonary edema (NPE) is a clinical syndrome which is related to acute increase of intracranial pressure and consequential release of catecholamines into the circulation. The aim of this study is to identify the independent predictors of an unfavorable outcome (Glasgow Outcome Score 1, 2 and 3) in aSAH patients.
Materials and Methods: 262 aSAH patients (162 females) are prospectively included in the study. Clinical characteristics, electrocardiographic (ECG) changes, serum cardiac and inflammatory biomarkers were measured on admission. Outcome was assessed 3 months after admission. Univariate and multivariate analysis of these data was performed in order to predict the unfavorable outcome.
Results and Discussion: 156 patients (54.37%) had unfavorable outcome. Comparison revealed that patients with unfavorable outcome were significantly older (54.37±10.56 vs. 49.13±10.77, P<0.001) and sustained more severe SAH (82.7% vs. 39.6%, P<0.001). These patients developed NPE (10.3% vs. 2.8%, P=0.023), hydrocephalus (34.0% vs. 20.8%, P=0.020), and had higher frequency of rerupture (28.2% vs. 3.8%, P<0.001). The independent predictors of an unfavorable outcome were Hunt and Hess grade ≥ 3 (OR 4.291; 95% CI 2.168–8.491, P<0.001), higher systolic blood pressure on admission (OR 1.020; 95% CI 1.002–1.038, P=0.030), higher heart rate on admission (OR 1.024; 95% CI 1.001–1.048, P=0.038) and rerupture (OR 4.961; 95% CI 1.461–16.845, P=0.010).
Conclusions: These data suggest that rerupture is associated with unfavorable outcome, as well as high blood pressure and heart rate.
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06AP06-3
Endovascular mechanical thrombectomy - anesthesia quality issues

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Background: Endovascular mechanical thrombectomy in acute ischemic stroke (AIS) is one of the most expanding, advancing and challenging clinical field during the past few decades. Still there is ongoing debate on the kind of anesthesia to be preferred. General anesthesia (GA) or conscious sedation (CS) remains a matter of (neuro)anesthesiologist's choice.
Clinical case-series: We present a single "mothership" center experience that has a high volume neurointerventional level. During the last year, half of all procedures were thrombectomies - in total, 80 cases. We preferred general endotracheal anesthesia, with target controlled infusion (TCI) technique using propofol and remifentanil, and rocuronium for intubation. Short acting drugs allow rapid neurological examination after procedure. Using this strategy, we avoid excessive BP variability, patient's movements are decreased, airway is secured and optimal carbon dioxide control levels are achieved.
Discussion: AIS outcome is dependent on rapid diagnosis and early treatment, namely, the time factor. The effect of anesthetic technique on the success of reperfusion is still a discussion topic. Therefore, challenge for anesthesiologist is understanding of the current and the future developments in that specific field. 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 and neuroprotection that can be essential for a favorable outcome. "Time is brain" and dedicated team members are time saving. Taking into account our clinical experience, as well as technical factors, we found GA the most suitable anesthetic technique for that kind patients.
Conclusions: Although optimal anesthetic management for AIS remains controversial, due to lack of evidence from randomized trails, experience of the team may yield a greater effect on the outcome than an anesthesia technique. In stroke "mothership" center establishing, one of the milestones is creation of a competent neuroanesthesiologist who is able to provide care for that kind patients. Drugs fine titration, accurate BP and respiratory function monitoring, good plan in dealing with possible complication and close cooperation with neuroradiologist are essential for favourable outcome.

06AP06-4
Period prevalence of perioperative anemia among neurosurgical patients in the largest University Hospital Centre in Croatia

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Background and Goal of Study: Prevalence of anemia in neurosurgical patients varies, depending on the population and type of surgery, from 2,7% to almost 50% [1]. The goal of this investigation was to estimate the period prevalence of perioperative anemia among neurosurgical patients in our institution.
Materials and Methods: Neurosurgical patients admitted to University Hospital Center Zagreb from the beginning of January to the end of August 2016, were included in this retrospective descriptive study. The following data were collected using hospital information system: age, sex, initial diagnosis (cerebrovascular disease, intracranial tumor, trauma, spinal pathology), type of surgery (elective/emergency), hemoglobin levels at admission and at discharge from the hospital and number of hospital days. Inclusion criteria were: neurosurgical disease or trauma, age 12- 85 years, GCSS 3-15 . Exclusion criteria were: major systemic disease, previous blood transfusions within one year, previous or current chemotherapy and patients younger than 12 years. Descriptive statistical analysis were performed using Statistica, StatSoft, San Diego, California 2012.

Results and Discussion: From all included patients (n=882), after exclusion, number fell to n=726. Serum hemoglobin values at admission were recorded in 718 patients, 336 men and 382 woman. Of these, 443 patients have had serum hemoglobin values recorded at admission and at discharge from hospital (61,75 %). Values of serum hemoglobin at admission were 133.67 ± 20.7 g/L (X ± SD, N=718) whereas levels at hospital discharge were 118.63 ± 17.1 g/L (N=443). If cut off value of hemoglobin was set to 130 g/L for men, and 120 g/L for women, according to WHO definition of anemia, then 25% (84/336) males and 28,53% (109/382) women were anemic at hospital admission. At hospital discharge anemia was present in 62,69% (121/193) of males and in 84 % (201/250) of women. At hospital discharge in 38,3% of patients (275/718) serum hemoglobin value was not determined.
Conclusions: Period prevalence of anemia in neurosurgical patients is much more significant at hospital discharge. More efforts should be done to record serum hemoglobin levels at discharge of neurosurgical patients from hospital.
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06AP06-5
Delay in the awakening after frontal craniotomy. Epileptic status how frequent it is? Differential diagnosis.

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Background: Delay in the awakening is a complex multifactorial process in which the anesthesiologist may have to integrate several information and must be able to suspect pathologies with high morbimortality such as epileotic status.
Case Report: We present a case of a 76 year-old male who is going to be reinterviened of a pituitary macroadenoma with frontal extension which will be accessed by frontal craniotomy. Induction is carried out with propofol, fentanyl and rocuronium and maintenance with desfluorane and remifentanyl. Surgery occurs without incidence with a total length was 4 hours. When surgery ends and we proceed to wake up the patient he presents rhythmical and repetitive movements (probably myoclonus) in upper right limb and mouth, with spontaneous breathing, haemodinamical stability, Bisespectral index (BIS) of 96 and train of four ratio (TOFr) >0.9. Metabolical alterations, hypothermia were discarded. Also a CT was performed with no further alterations. 3 hours later, the patient recovers consciousness and can be extubated, with residual right hemiparesis which recovers within 3 hours.
Discussion: Epileptic status is defined as a single epileptic seizure lasting more than five minutes or two or more seizures within a five-minute period without the person returning to normal between them. Intracranial surgery carry a high risk of developing postoperative epileptic crisis. The incidence of these crisis are related to medical history of epilepsia, parietal or frontal neurosurgery and inversely propotional to the age. When all the common causes are discarded, the most frequent causes are: pneumocephalus and intracerebral hemorrhage which were discarded in the CT. BIS take importance in the differential diagnosis because both pneumoencephalus and intracerebral hemorrhage and other complications present a low BIS.
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Learning points: Bisespectral index may be important in the delay of the awakening differential diagnosis. As the confirmatory diagnosis electroencephalogram could not be done, high BIS with TOFr>0.9 may help us to suspect that outpatient suffered a short duration epileptic status with post critical sequelae. BIS data has a high correlation with electroencephalogram in the prompt detection of epileptic status.

06AP06-7
Dynamic of the jugular venous oxygen saturation during clipping ruptured aneurysms of intracranial arteries

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Background and Goal of Study: To assess changes in the values of the jugular venous oxygen saturation during clipping ruptured aneurysms of intracranial arteries during general anesthesia with Inhalational anesthetics: Desflurane and Sevoflurane.
Materials and Methods: Two groups of patients with SAH were examined who were background of rupture of aneurysms of intracranial arteries and underwented surgery under general anesthesia. Group 1 included 15 patients who were operated under general anesthesia with using Desflurane as the main inhalation anesthetic; group 2 included patients who were operated using Sevoflurane as main inhalation anesthetic. The patients of groups 1 and 2 had no statistically significant differences in age, localization of causal aneurysm, severity of the patient's condition on the Hunt-Hess scale (2[2.0;2.5]) and CT severity of SAH on the Fisher scale (3[3;3]). Control of the jugular venous oxygen saturation was carried out using a CeVOX monitor (Pulsion Medical Systems), a fibrooptic sensor was installed through a catheter in the jugular vein at the level of the jugular bulb. Recorded data of jugular venous oxygen saturation at the next stages of intervention: I - prior to the induction; II – after the start of the flow of inhalation anesthetic before skin incision; III – during the surgery, before clipping of the aneurysm; IV – during surgery after clipping of the aneurysm and V – after the termination of the flow of inhalation anesthetic after the operation.
Results: Data are presented at the table ($Sat0_2j$,%, Me[25%;75%])

Group /stage	I	II	III	IV	V
1	64[63;65]	78[79;80]	81[80;82]	69[68;70]	63[61;65]
2	63[61;65	72[70;73]	74[73;75]	67[66;68]	62[61;63]
p	≥0.05	≤0.05	≤0.05	≤0.05	≤0.05

Conclusion: We obtained data on a higher level of SatO2j in the group of the patients with Desflurane anesthesia compared to the patients where the main anesthesia was performed with Sevoflurane can be regarded as a result of a more pronounced decrease in CMRO2 in patients of 1st group. Lowering $CMRO_2$ is a positive response to an inhalation anaesthetic, as reduced metabolism and reduced consumption of O2 by the brain that could improve anoxic protection of the brain.

06AP06-8
Deep Brain Stimulation in Parkinson's Disease. An experience of 11 years.

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Background and Goal of Study: Deep brain stimulation (DBS) is an efficacious surgical treatment in selected cases of Parkinson´s disease. Proper anaesthetic management is paramount to balance patient comfort without interfering with neurophysiology. We aimed to describe anaesthetic experience, evaluate perioperative complications as well as length of stay in hospital in all patients with Parkinson disease that underwent DBS in our hospital.
Materials and Methods: Retrospectively collected data from medical records of all patients with Parkinson disease that underwent DBS. Statistical analysis was performed with SPSS 22.0® In our hospital, preoperative stereotatic frame is placed under local anaesthesia. Sedation with dexmedetomidine is the technique of choice for electrode placement that is confirmed by microlectrode recordings and macrostimulation. Standard ASA monitoring and bilateral BIS® are used. Oxygen is provided through nasal cannula. If necessary, propofol and/or fentanyl are added in bolus and 'scalp block' is done prior to cranial incision. Sedation is assessed with Ramsay Scale, patient comfort by Visual Analogue Scale, hemodynamic changes and respiratory depression are also recorded during the procedure. Postoperative recovery is performed in the intermediate care unit.
Results and Discussion: 82 DBS procedures took place in our hospital since 2007 (mean of 7/year). 80 patients were included (65% male and 35% female), age ranging between 47-72 yrs old (mean age: 63±5.9 yrs old). ASA II: 77.5%; ASA III: 22.5%. Replacement of end-of-life neurostimulator was required in 14 patients. Perioperative and surgical complications were recorded in 28% of the procedures, the majority being postoperative behavioral changes (8.5%; n=7). Other complications recorded: intracerebral hematoma 7.3%; infection of electrodes 6%; postoperative pneumoniae 1.2%; horner syndrome 1.2%; deep vein thrombosis 1.2%; postoperative seizure 1.2%; intraoperative anaphylaxis 1.2%. Mortality rate 1.2% (1 death on the 18th day after surgery secondary to mesenteric ischemia). Average rate of length of stay in hospital was 18±15.8 days. Our results are superposable to those of the other published series, in terms of infection rate and hemorrhage.
Conclusions: Sedation with dexmedetomidine in DBS was effective, with few effects. DBS is a complex technique that requires the coordination of a multidisciplinary team with experience in this area.

Cardiac, Thoracic and Vascular Anaesthesiology

07AP01-1
Can analgesia by intercostal catheter be an alternative to epidural analgesia for thoracotomy? A prospective study, preliminary results

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Background and Goal of Study: Providing analgesia after thoracotomy is essential for both analgesia and recovering respiratory mechanics. Epidural analgesia is known as the gold standard for thoracotomy. But epidural analgesia may have some undesirable systemic effects. This study is designed to compare the analgesic effects of analgesia provided by intercostal catheter to epidural catheter after thoracotomy.
Materials and Methods: Patients undergoing thoracotomy, ASAI-II, 18-75 aged were divided into two groups by sequential randomization. As the surgeon closes the case, he made intercostal block with 100 mg bupivacaine for both groups. For intercostal catheter group, the surgeon put the intercostal catheter to the intercostal place. After the surgery an anesthesiologist placed the epidural catheter between T6-8 epidural places and did the test dose for epidural with 40 mg lidocaine. As the patient extubated, for intercostal catheter group, analgesic infusion started, for epidural group the infusion started by the movement of patient's legs. The dose of analgesic is setted as 300 mg/dayn for both groups. A blind anesthesiologist recorded the data for different times and activities. Both groups' catheters removed as the chest tube removed. The data is evaluated with one sample and independent sample t-test and chi-square if show normal distribution with Kolmogorov-Smirnov test.
Results and Discussion: Both group showed similar values for demographics. First analgesic requirement was earlier in intercostal group but this result did not show significant difference. Maximum VAS values also similar between groups (p>0,05). The VAS values also recorded by movement , coughing and at rest, these values were not significantly different also (p>0,05). Post-thoracotomy pain is one of the most challenging problem for thoracic anaesthesiologists. Epidural analgesia is known as the best method but still studies are needed for alternative methods. Intercostal catheter may provide analgesia for thoracomy also. Placement of intercostal catheter is easier than epidural catheter. Intercostal catheter may be advantageous in means of complications. Besides intercostal blockage does not have systemic effects.
Conclusions: This preliminary results show that analgesia provided by intercostal catheter may be an alternative method to epidural analgesia for thoracotomy.

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07AP01-2
Use of low-dose ketamine at anaesthesia and its influence on postoperative analgesia in patients in thoracic surgery

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Background and Goal of Study: The strategy of adequate postoperative analgesia should be implemented already during the course of anesthesia. In this regard, much attention is drawn to the medicines for non-opioid anesthesia including ketamine. This study aims to assess the effect of low-dose ketamine in anesthesia on the quality and safety of postoperative pain relief in thoracic surgery patients.
Materials and Methods: The study included two groups of 20 patients in each, who underwent thoracoscopy in conditions of endotracheal anesthesia based on sevoflurane and fentanyl. Patients of the 2nd group, unlike those in the 1st, were injected ketamine intravenously at a dose of 0.25 mg/kg before the incision and during the maintenance of anesthesia, ketamine was infused at a rate of 0.25 mg/kg/h. The dynamics of postoperative pain was assessed using a Visual Analogue Scale (VAS) in 1, 3, 6, 9, 12, 18 and 24 hours after the surgery, the time of the first requirement of the analgesic and its daily consumption, as well as the incidence of PONV.
Results and Discussion: In both groups, a satisfactory quality of postoperative analgesia was achieved, both at rest and at coughing. At the same time, in patients who got ketamine, the intensity of pain in points according to the VAS, starting from the 3rd hour of the postoperative period, was significantly lower than that in the control group (1.1±0.7 and 1.6±0.5 at rest; 1.8±0.8 and 2.5±1.1 when coughing, respectively). This regularity remained for the first postoperative day. This effect going beyond the timeframe of the actual analgesic action of ketamine is probably due to the reduction of the phenomenon of hyperalgesia and the inhibition of central sensitization. In addition, the use of ketamine in patients of the 2nd group allowed us to lengthen the time of the first analgesic requirement significantly (115.3±27.5 min. versus 78.7±20.2 min. in the 1st group) and reduce its daily dose (42.5±15.3 mg versus 55.8±18.5 mg in the 1st group). The opioid-sparing effect of the drug probably determined the lower incidence of the syndrome PONV in the 2nd group (1 out of 20 (5%) compared with the control group (4 out of 20 (20%)).
Conclusion: Thus, the introduction of low-doses of ketamine in the anesthesia scheme gives opportunity to achieve a higher quality of postoperative analgesia, as well as to reduce a dose of narcotic analgesics and lessen the frequency of unfavorable effects such as PONV.

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07AP01-3
Dexmedetomidine decreases lidocaine consumption in opioid free anesthesia based on the Analgesia Nociception Index.

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Background and Goal of Study: In the recent context of « opioid crisis », opioid free anesthesia (OFA) has gained in popularity. OFA consists on a multimodal pain management using different analgesic and antihyperalgesic molecules. It is postulated that use of more agents at smaller doses further maximizes desired effects while minimizing the side effects. However, there is poor evidence concerning the number, the drug combinations, and the way to manage the doses during the surgery. The Analgesia Nociception Index (ANI), is a surrogate marker of perioperative nociception that has prooved it's utility in dosing intraoperative analgesics (1). The aim of the present study was to find out if dexmedetomidine may reduce intraoperative lidocaine requirement in an OFA protocol using continuous lidocaine perfusion adjusted on the ANI.
Materials and Methods: In this prospective monocenter study 60 consecutive patients undergoing scheduled vascular surgery under general anesthesia were included between April 2017 and December 2018 divided in two periods. For all patients anesthesia was maintained by target controlled propofol to keep the BIS between 40 and 60. During period 1 analgesia was maintained by lidocaine perfusion adjusted to keep the ANI between 50 and 70 (Lido group). During period 2, dexemedetomidine (0.3µg/kg/h) was added to the lidocaine protocol (LidoDEX group). The patients in the two periods were matched according to age, gender, BMI, and type of surgery in a ratio of 1:2. Lidocaine and propofol average doses were compared between the two groups using a Mann-Whitney test. Results are expressed as median [CI95%].
Results: Twenty patients were included in the Lido group and 40 patients in the LidoDEX group. Average lidocaine dose was 0.028 [0.021- 0.035] mg/kg/min in the Lido group and 0.018 [0.012- 0.024] mg/kg/min in the LidoDex group; p<0.001. Average propofol dose was 0.10 [0.10 - 0.11] mg/kg/min in the Lido group and 0.10 [0.09 - 0.11] mg/kg/min in the LidoDEX group; p=0.49.
Conclusion: This study shows that adding dexmedetomidine to an OFA protocol significantly decreases lidocaine consumption based on the ANI. This suggests that this association may help in reducing lidocaine adverse events and toxicity.
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07AP01-4
Sevoflurane enhances the inhibitory effect of ex vivo lung perfusion on the activation of the inflammasome NLPR3 in lungs obtained from non-heart-beating donors

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Background and Goal of Study: Donor scarcity is the most important limiting factor for lung transplantation. Ex vivo lung perfusion (EVLP) may favor the recovery of lungs, modulating lung damage secondary to ischemia-reperfusion (I/R). During I/R, ROS stimulate tissue inflammation and induce pyroptosis, which is strongly regulated by inflammasome NLRP3. Pre-implantation lung preconditioning in an EVLP circuit may attenuate the expression and/or activity of NLRP3. In addition, administration of sevoflurane, which possesses cytoprotective properties and attenuates inflammation and apoptosis secondary to I/R, may enhance the modulation of the NLRP3 complex during the period of ex vivo ventilation. The aim of the study was to investigate the expression and/or activity of NLRP3 in response to lung I/R, and its possible modulation by EVLP and sevoflurane.
Materials and Methods: The surgical procedure consisted of a left lung transplantation model: 1- Hypoxic cardiac arrest was induced in donor pigs and lungs were harvested; 2- After a 60 min warm ischemia, left lung was stored in cold preservation solution for 3 h; 3- Left lung was evaluated and reconditioned ex vivo in a lung perfusion machine for 3 h; 4- Left pneumonectomy was performed in the recipient pig followed by transplantation of the donor lung; 5- Assessment of lung function during 3 h after reperfusion; 6- Lung biopsies were performed and pigs were euthanized. Animals were divided into 3 groups: 1: ex vivo lung reconditioning with O2/air ventilation; 2: ex vivo lung reconditioning with inhaled sevoflurane; 3: same procedure without ex vivo lung reconditioning. Expression of NLRP3 components, activators, and inhibitors was determined by RT-PCR.
Results and Discussion: The mRNA expression of NLRP3, ASC, IL1, IL18 and caspase 1 decreased significantly ($p<0.01$) in the EVLP group relative to the non-EVLP group. EVLP blocked the I/R inhibitory effect on COP 1 (endogenous suppressor of NLRP3 activity) ($p<0.05$) and again this EVLP effect was enhanced by sevoflurane. EVLP did not modify the I/R inhibitory effect on Flightless-I (caspase inhibitor 1) expression, which, however, was reduced by sevoflurane ($p<0.01$).
Conclusion: EVLP may allow recovery of lungs obtained from non-heart-beating donors, turning them into valid candidates for transplantation. This beneficial effect of EVLP may be enhanced by the addition of sevoflurane during ex vivo ventilation.

07AP01-5
Effect of sevoflurane anesthesia compared to xenon anesthesia on chronic postoperative pain after cardiac surgery: a secondary analysis of a randomized controlled trial.

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Background and Goal of Study: Chronic postsurgical pain (CPSP) is commonly reported after cardiac-surgery with incidences up to 56%. Remifentanil has been linked to the development of CPSP of which a key component is central sensitization probably caused by activation of the NMDA-receptor and the subsequent influx of calcium. Xenon, as NMDA-receptor antagonist, could therefore reduce the incidence of CPSP. The purpose of this trial was to examine the impact of xenon-remifentanil anesthesia on the development of CPSP after cardiac surgery.
Materials and Methods: This is a secondary analysis of a randomized controlled trial in which CPSP was evaluated as a secondary endpoint. We enrolled 190 patients >65 years undergoing elective on-pump cardiac surgery. Patients received continuous analgesia with remifentanil and were randomized to anesthesia with equipotent concentrations of sevoflurane or xenon. CPSP was evaluated using the visual analogue scale (VAS) and the numeric rating scale (NRS) at 3, 6 and 12 months. Patients were defined to have CPSP if their VAS or NRS was > 30 or 3, respectively. Data were analyzed with JMP software, a $P<0.05$ was considered significant.
Results and Discussion: All patients were randomized to receive sevoflurane or xenon anesthesia. Baseline characteristics and total intraoperative remifentanil doses did not differ between the groups. There was no significant difference in the VAS or NRS scores and groups did not differ with regard to the incidence of CPSP at 3, 6 or 12-months after surgery (Table 1). The findings of this study should be interpreted with caution since CPSP was a secondary outcome parameter. Besides, xenon-remifentanil was only used intraoperatively while all patients received standard postoperative sedation and analgesia on intensive care unit.
Conclusion: Incidence of CPSP was much lower than reported in the literature. In comparison to sevoflurane, xenon had no effects on CPSP after cardiac surgery.

Table 1: Postoperative VAS, NRS and incidence of CPSP.

Screening tools	Xenon(n=96)	Sevoflurane(n=94)	P - value
VAS at 3 months	2/68(2%)	5/86(6%)	0.4345
	0[0-0]	0[0-0.25]	0.2540
VAS at 12 months	4/83(5%)	1/79(1%)	0.3678
	0[0-0]	0[0-0]	0.2792
NRS at 6 months	5/85(6%)	7/82(9%)	0.5461
	0[0-0]	0[0-1]	0.3410

Data are presented as median[IQR] or as absolute/total number(n/N) with the percentage of the whole. Data were analyzed by Mann–Whitney-U test or Fisher's exact-test.

07AP01-6
Impact of VAD-specific infection on early postoperative infection after heart transplantation: a single center retrospective study

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Background and Goal of Study: Patients bridged with ventricular assist devices (VAD) waiting for heart transplantation (HT) are vulnerable to VAD-specific infections. Infections to the pump, pump-pocket and driveline (DL) may require debridement or removal of the device. Heart transplantation is an unscheduled event and many recipients undergo surgery while still infected. Such VAD-specific infections may increase the risk of severe post-transplant infections and mortality. We assessed the impact of active VAD-specific infections on the incidence of severe acute mediastinitis and survival.
Methods: After review board approval, we conducted a retrospective review of all adult HT cases at our center from 2011 to October 2018. Collected date included characteristics of VAD-specific infection site and pathogen, the incidence of post-transplant infections (site and pathogen), morbidity and 30-day survival. Our primary outcome was the occurrence of severe acute mediastinitis requiring surgical debridement. Secondary outcomes included ICU length of stay and length of postoperative mechanical ventilation. Student's t-test and chi-square test were used for statistical analysis.
Results: A total of 73 adult patients were included for this study in which 91.8% (n=67) were bridged with a VAD and the average VAD support period was 990 ± 342 days. We found 38.0%(n=27) had an active VAD-specific infection at the time of HT. The majority of infections were localized to the DL site (n=20, 74%) and *methicillin-resistant staphylococcus aureus*(MRSA) was the most likely pathogen (n=6, 22.2%). Early post-transplant infections occurred in 38.3%(n=28) and *serratia marcescens* the most frequent (n=5, 17.9%). Severe acute mediastinitis occurred in 5 (17.9%) cases with the most frequent pathogen was *candida albicans*(n=2, 22.2%). Patients with active VAD-specific infections were significantly more likely to developed severe acute mediastinitis (OR 10.2 [95% CI 1.13-92.92, p=0.014]). Post-transplant infections were significantly related to increased length of ICU stay (21.2 ± 7.9 d vs 7.9 ± 3.0 d, p=0.015) and longer of mechanical ventilation periods (27.5 ± 7.0 d vs 4.3 ± 5.2 d, p=0.01). The 30-day survival rate for patients with and without post-transplant infections was 98.6% and 100.0%, respectively.
Conclusion: VAD-specific infections increased the risk of severe acute mediastinitis and morbidity but did not mortality.

07AP01-10
Anesthetic Management for the Resection of a Thoracic Sarcoma in a Patient with Neurofibromatosis

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Background: 22 y/o male with neurofibromatosis type 1 (NF1) presented with a metastatic left thoracic malignant peripheral nerve sheath (MPNST) tumor and deteriorating respiratory function.
Case Report: The patient was admitted urgently due to worsening shortness of breath. Chest CT demonstrated large conglomerate left pleural masses and pleural effusion causing right mediastinal shift. PFTs showed restrictive disease with FEV1 of 15% and DLCO of 28%. Pigtail catheters were placed with improvement in symptoms. Two days later he underwent a left thoracotomy for debulking. A mediport was in place; a thoracic epidural catheter, large bore lower extremity IVs, and arterial line were placed pre-induction. He was induced in a semi-recumbent position with sevoflurane and ketamine, gradually transitioned from spontaneous to positive pressure ventilation, and laid supine with no airway or cardiac compromise. Etomidate and remifentanil was given, an LMA was placed, bronchoscopy was performed, and then he was intubated with a 39F left DLT using video laryngoscopy. Anesthesia was maintained with sevofluorane, ketamine, epidural bupivacaine/hydromorphone and minimal rocuronium. Intraoperative course was notable for 2.7 L of EBL, requiring resuscitation, but he remained hemodynamically stable and was successfully extubated.

Discussion: MPNST are a rare sarcoma but more common in patients with NF1 who have malignant transformation of plexiform neuromas. Thoracic metastases are rare and few cases of anesthetic management exist. Patients with NF1 have neurofibromas and neuromas throughout the body, which can obstruct the airway and complicate regional anesthesia. NF1 patients may also present with restrictive lung disease secondary to pulmonary fibrosis and kyphosis. Given these considerations, we used a video laryngoscope and avoided muscle relaxants as a precaution to avoid airway compromise. The use of regional anesthesia was essential to minimize postoperative pain and permit successful extubation.

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Learning points: Anesthetic management for NF1 should include: careful airway management, the judicious use of muscle relaxants, and the use of regional anesthesia for the resection of a thoracic sarcoma.

07AP02-1
Effect of types of prosthetic valve for transcatheter aortic valve implantation on intraoperative left ventricular end-diastolic pressure

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Background: During tanscatheter aortic valve implantation (TAVI), normalization of left ventricular afterload induced by prosthetic valve deployment is expected to result in rapid improvement of systolic function and consequent improvement in diastolic function. Previously, we reported a rapid increase in the left ventricular end-diastolic pressure (LVEDP) after deployment with a balloon expandable prosthetic valve [1]. In this study, we aimed to determine the effect of types of prosthetic valves for TAVI on the LVEDP.

Methods: This retrospective observational study included patients who had undergoing transfemoral TAVI since May 2016. The patients were classified into two groups by valve type: patients treated with a balloon-expandable valve (group B) and those treated with self-expandable valve (group S). The results of intraoperative LVEDP measurements an intracardiac catheter before and after prosthetic valve deployment were compared between the two groups. In order to eliminate the effect of artic regurgitation on the LVEDP, subanalysis was performed on patients with mild or less aortic regurgitation assessed by echocardiography performed before and/or after valve deployment. Statistical analysis was performed using a nonpaired t test, the Mann Whitney U test and two way analysis of variance. A p value of < 0.05 was considered as significant.

Result: The study sample consisted of 99 patients (group B, 70; group S, 29). The LVEDP significantly increased after deployment in group B (11.4±4.2 to 13.2±5.7 mmHg), but significantly decreased in group S (14.0±6.2 to 13.4±5.4 mmHg). After excluding 36 patients with moderate or greater aortic regurgitation, 63 patients were subanalyzed, in whom the LVEDP also significantly increased after valve deployment in group B (11.2±4.2 to 13.2±5.5 mmHg), but significantly decreased after valve deployment in group S (14.7±5.2 to 12.1±4.1 mmHg).

Conclusion: TAVI with balloon-expandable prosthetic valve may increase the LVEDP compared with that with a self-expandable prosthetic valve.

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07AP02-2
Influence of a bolus administration of ephedrine or phenylephrine on cerebral oxygen saturation.

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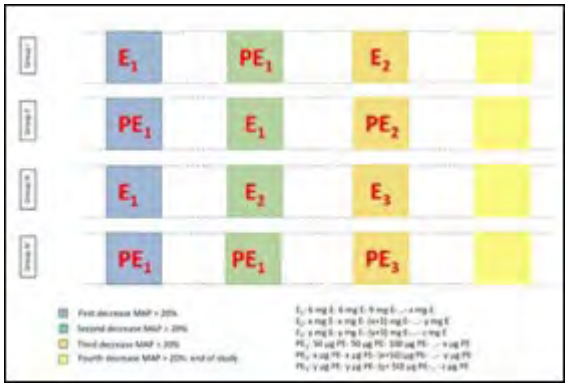
Background and Goal of Study: To maintain systemic perfusion pressure intraoperatively, phenylephrine (PE) and ephedrine (E) are usually the drugs of choice. Yet, the effect of these agents on cerebral blood flow and brain oxygenation is still controversial. Meng et al.[1] reported a negative effect of PE on cerebral tissue oxygen saturation (SctO2) whereas SctO2 remained unaffected with E. In contrast, Pennenkamp et al. [2]observed a significant positive effect of E on SctO2. However, to minimize bias, surgical stimulation should be homogeneous and administration of drugs must be standardized. Therefore, our study assessed the effect of PE and E on SctO2 in patients undergoing percutaneous transluminal angioplasty. A standardized protocol to maintain normotension was used.

Materials and Methods: A randomized four-treatment cross-over trial was applied in 28 patients under BIS-titrated anaesthesia with sevoflurane. Patients were randomized into four different groups (Figure 1). If MAP decreased more than 20% from baseline, incremental doses of PE or E were given in order to return to baseline.SctO2 was measured with near-infrared spectroscopy. SctO2and other physiologic variables were recorded. Linear mixed-modelling was used to assess the effects of PE and E on SctO2.



Results and Discussion: No crossover effect was observed between agents. Following PE, SctO2decreased significantly (-2.1% [-3.2%; -1.1%], p<0.001), whereas no changes were seen with E (0.0% [-1.0%; 1.0%]. The cause and the clinical relevance of the small decrease in SctO2after PE administration is still unknown, but our results indicate that in terms of cerebral oxygenation, E might be preferred.

Conclusion: After bolus administration, PE caused a significant decrease in SctO2, whereas E exerted no changes in SctO2.

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07AP02-3
Impact of postoperative vasoplegic syndrome after continuous flow Left Ventricular Assist Device implantation on short-term renal function.

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Background and Goal of Study: One of the most innovative medical progress in the treatment of end stage heart failure is the development of continuous flow left ventricular assist devices (cfLVAD). However, the surgical implantation of a cfLVAD is a high-risk procedure and might be complicated by postoperative vasoplegic syndrome (VS), right ventricular failure, renal failure with possible need for renal replacement therapy and mortality. In the current study, we examined whether the occurrence of postoperative VS affects short-term (<6 months) postoperative renal function in patients undergoing cfLVAD implantation.

Materials and Methods: Included were patients scheduled for primary cfLVAD implantation. Patients were classified as vasoplegic if they had the following conditions for at least three consecutive hours during the first 48 hours after ICU arrival: low systemic vascular resistance (SVR <800 dynes/s/cm^{-5}) and/or low mean arterial pressure (MAP <50 mmHg), preserved cardiac index (CI >2.5 liter/minute/m²) and high vasopressor requirements (noradrenaline >200 ng/kg/min or equivalent doses of other vasopressors. Renal function, expressed as glomerular filtration rate (GFR), was measured prior to and at 1, 2, 3 and 6 months after cfLVAD implantation. A generalized mixed model was used to compare baseline GFR measurements between patients with and without VS, as well as their GFR courses over this six month follow up period. Relative risks (RR) were calculated for the association between VS and renal failure, the need of renal replacement therapy and 30-day and one-year all-cause mortality.

Results and discussion: In this retrospective study, 160 patients were included, of which 42 patients (26%) developed postoperative VS. They had a significantly lower GFR before cfLVAD implantation (p=0.007), a different course in renal function after cfLVAD implantation (p<0.0001), a higher relative risk to develop renal failure (RR 3.4, 95% confidence interval (CI) 1.9-6.1), required more often renal replacement therapy (RR: 4.8,CI 2.0-11.4) and died more often (RR: 26.7, CI 10.1-703) compared to patients without postoperative VS.

Conclusion: Our cohort study revealed vasoplegic syndrome being associated with a worse pre-operative renal function, which continues over a six-month period post-cfLVAD implantation compared to non-vasoplegia patients.

07AP02-4
Intracardiac shunt caused by incisional ventricular septal defect after aortic valve replacement and myoseptectomy: role of complex hemodynamic monitoring (clinical case).

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Background: There is a wide spectrum of advanced monitoring tools using currently in cardiac surgery but the decision regarding optimal technique depends on clinical situation.
Case Report: A 74-year-old female diagnosed with severe aortic stenosis and hypertrophic cardiomyopathy has underwent elective aortic valve replacement and Morrow procedure. The patient was admitted to ICU, receiving mechanical ventilation and norepinephrine 0.25 mcg/kg/min. Postoperative echocardiography did not reveal any problems, but patient condition has worsened with progressing signs of hypoperfusion – lactatemia, oliguria and increasing requirements in vasopressors. The transpulmonary thermodilution (PICCO2) measurements have revealed cardiac index (CI) 1.4 l/min/m2, global end-diastolic volume index (GEDVI) 400 ml/m2 and extravascular lung water index (EVLWI) 18 ml/kg. However, there were no clinical signs of lung edema. To assess pulmonary hemodynamics, we additionally inserted pulmonary artery catheter and received following data: CI 1.7 l/min/m2, mean pulmonary arterial pressure 25 mm Hg, pulmonary arterial occlusion pressure 18 mmHg. The blood gases analysis revealed significant difference in oxygenation between mixed venous and central venous samples: 98% vs. 51%. We assumed residual left-to-right shunt; this hypothesis was confirmed by repeated transesophageal echocardiography. Based on these findings, patient was re-operated with closure of ventricular septal defect and tricuspid valve replacement. Postoperatively, the hemodynamics was stabilized (CI 2.4-2.7 l/min/m2, EVLWI 8-9 ml/kg). The patient was successfully weaned from vasopressors and mechanical ventilation, transferred from ICU and discharged home after pacemaker implantation at 28 days after surgery
Discussion: Visualization modalities (echocardiography) is the first option to detect complications after cardiac surgery, however it is operator-dependent and is possible only at certain time points. Thus, in cardiogenic shock the combined monitoring of hemodynamics and oxygen transport is vital both to diagnose and interpret the source of acute heart failure and choose appropriate tactics, as shown in our case report.
Learning points: Every monitoring device has a potential for bias; however, critical interpretation of obtained results and using the combination of methods can help in early detection of perioperative complications, provide appropriate therapeutic strategy and improve clinical outcome

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07AP02-5
Hemodynamic effects of five different intravenous anaesthetics during induction of anaesthesia.

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Background and Goal of Study: Hemodynamic stability is crucial in high-risk patients, who undergo major vascular surgery. The present study focuses on evaluation of hemodynamic effect of five different intravenous anaesthetics during anaesthesia induction.
Materials and Methods: One hundred and fifty patients, scheduled to undergo major vascular operations, were allocated to five different groups (ABCDE), based on the intravenous agent used for induction of anaesthesia: A: Propofol 2mg/kg, B: Thiopental: 3mg/kg, C: Etomidate 0.3mg/kg, D: Midazolam 0.2mg/kg and E: Diazepam: 0.3mg/kg. All patients also received Fentanyl 4mcg/kg, Lidocaine 1.5 mg/ kg and Vecuronium 0.1mg/kg. The following hemodynamic parameters were measured via radial artery catheter, along with pulmonary pressure catheter insertion: HR, BP, CVP, RVP PAP, PAOP, CO, SV. Measurements were made 5min before induction (Phase I) and 10min after tracheal intubation (Phase II). SPSS 25 package was used for statistical analysis. Paired – Samples t-test was used for comparisons between Phase I and Phase II, for every studied group, while between groups comparisons during different Phases were made using ANOVA. Level of significance was set at p=0.05.
Results and Discussion: Age, sex, BMI and ASA classification did not differ among groups (p>0.05). Mean values of measured variables are shown in the table

Mean values of measured hemodynamic variables

	A		B		C		D		E	
	Phases of Measurement									
	I	II	I	II	I	II	I	II	I	II
HR (bpm)	72	64	68	60	68	62	67	59	71	65
BP (mmHg)	142/73	114/64	140/76	113/64	135/73	112/61	135/75	116/65	144/72	116/63
CVP (mmHg)	6,4	8,1	6,6	8	6,4	7,8	6,1	7,6	6,3	7,8
RVP (mmHg)	28/5	30/6	27/5	29/7	28/5	30/7	28/5	30/5	28/4	30/6
PAP (mmHg)	26/13	28/14	26/14	28/15	27/14	28/15	27/14	28/15	26/14	28/14
PAOP (mmHg)	10,8	12	11,5	12,6	11,5	13,3	11	12	10,4	12,3
CO (L/min)	5,9	4,7	5,5	4,3	5,7	4,2	5,7	4,1	5,6	4,5
SV (ml)	83	73	82	72	84	68	89	78	76	70

Significant drop in HR, BP, CO and SV was shown between Phase I and Phase II, while CVP, RVP, PAP, PAOP were significantly elevated in all five groups studied (p<0.05). However, between groups comparisons didn't reveal statistically significant differences in either hemodynamic parameter at Phase I or II (p>0.05).
Conclusions: Induction of anaesthesia and mechanical ventilation had detrimental effects in hemodynamic, regardless of the induction agent used.
Acknowledgements: None

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07AP02-6
Anaesthetic management of laparoscopic partial hepatectomy with Fontan circulation: A case report

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Background: Congenital heart disease patients undergoing non-cardiac surgery has increase in recent years. Patients with Fontan circulation are vulnerable to long-term hepatic dysfunction and the development of related malignancies. Laparoscopic surgery in such patients presents a challenge for the anaesthetists. We present a case of successful management of laparoscopic partial hepatectomy in a single-ventricle patient with Fontan circulation.
Case Report: An 18-year-old male who underwent modified Fontan procedure at the age 6 for single-ventricle and pulmonary artery atresia was scheduled for laparoscopic partial hepatectomy for hepatocellular carcinoma. The patient was able to lead a normal in high school life and echocardiography showed normal ventricle motion. The patient received midazolam, fentanyl, and rocuronium for induction and was managed with desflurane, remifentanil, and fentanyl. In addition to standard monitoring, arterial blood pressure and central venous pressure (CVP) were monitored. After induction we measured the CVP under stable conditions (17 mmHg). We used this value as a reference for volume management and the CVP was actively maintained at this value. Pneumoperitoneum, reverse Trendelenburg position (rTP), and portal triad clamping, were all well tolerated without the need for vasopressors. Surgery ended uneventfully and the patient was extubated in the operation theatre and admitted to the ICU. The patient recovered without any complications and was discharged on POD9.
Discussion: In patients with Fontan circulation, pulmonary flow relies on the passive inflow of the venous return (VR). It is important to keep the VR enough to maintain pulmonary and systemic circulation. Pneumoperitoneum, rTP, and portal triad clamping all act negatively on the VR and can cause instability. In our case, pneumoperitoneum affected circulation the most, as it increased the intrathoracic and airway pressures lowering the VR and CVP. Furthermore, the absorption of CO2 may have increased the pulmonary artery resistance increases. It is important to minimize insufflation pressure and duration not only to maintain CVP but also to prevent CO2 embolism(1).
References:
1. K. L. Taylor, Laparoscopic surgery in the pediatric patient post Fontan procedure Paediatr Anaesth 2006; 16: 591-595
Learning points: With an understanding of the physiology of the Fontan circulation and careful fluid management, laparoscopic hepatectomy could be successfully managed.

07AP02-7
Vasopressor dose used to treat intraoperative hypotension and not the duration is strongly associated with adverse outcomes following cardiac surgery

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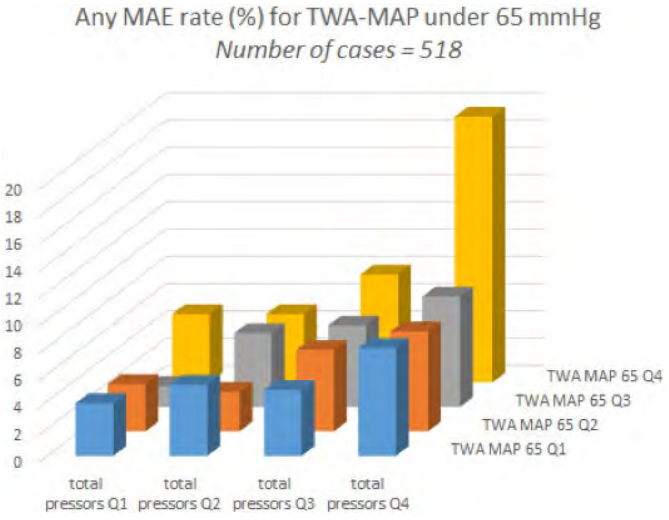
Background and Goal of Study: Intraoperative hypotension (IOH) is associated with adverse outcomes. However, a standard definition for IOH and an acceptable safe intraoperative BP threshold remains uncertain. We aimed to evaluate the association between the duration below a specific BP threshold and the dose of vasopressors used to treat IOH and adverse outcomes following cardiac surgeries.
Materials and Methods: In this retrospective, observational cohort study perioperative data were obtained from adult patients who underwent cardiac surgery between 2008 to 2016. IOH was characterized as MAP <65mmHg. Duration, Area under the Curve (AUC) and Time Weighted Average for MAP<65mmHg and the dose of vasopressors were the exposures measured. The primary outcome was defined as a composite of in-hospital complications after surgery. In confounder adjusted models, the association between exposures and outcomes were evaluated.
Results and Discussion: In total, 5157 patients were included in the analysis and 518 (10%) had adverse outcomes. Exposures were divided into quartiles. Only the fourth quartile for duration <65mmHg was associated with outcomes (OR 1.46, CI 1.1-2) whereas both the third (OR 1.52, CI 1.12-2.07) and fourth quartiles (OR 2.26, CI 1.69-3.06) for vasopressor dose were associated with outcomes.
Conclusion: Associations based on vasopressor dose were stronger than the duration below MAP<65mmHg. Anaesthesia management solely based on an absolute threshold value of BP needs to be reconsidered.

Exposure	OR (95% CI)	Exposure	OR (95% CI)	Exposure	OR (95% CI)	Exposure	OR (95% CI)
Time MAP<65mmHg Q2	0.95 (0.7-1.3)	AUC MAP<65mmHg Q2	0.99(0.7-1.3)	TWA MAP<65mmHg Q2	0.91(0.7-1.2)	Vasopressor dose Q2	1.28 (0.9-1.7)
Time MAP<65mmHg Q3	1.11 (0.8-1.5)	AUC MAP<65mmHg Q3	1 (0.8-1.4)	TWA MAP<65mmHg Q3	0.88(0.7-1.2)	Vasopressor dose Q3	1.52 (1.1-2.1)
Time MAP<65mmHg Q4	1.46 (1.1-2)	AUC MAP<65mmHg Q4	1.42(1.1-1.9)	TWA MAP<65mmHg Q4	1.40(1.1-1.8)	Vasopressor dose Q4	2.26 (1.7-3.1)



07AP02-8
Possibilities of a new nitric oxide generator device in cardiac surgery

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Background and Goal of Study: The new technology was based on the process of oxidation of atmospheric nitrogen in a nonequilibrium plasma of a gas discharge and was characterized by a high accuracy of opening time and a stable maintenance of the nitric oxyde concentration in the delivered gas mixture. On the basis of this technology, an apparatus for inhalation therapy with NO"Tianox" was developed. The device provides NO synthesis directly from the air throughout the therapy, the supply of NO to the patient's breathing circuit as well as regulation and monitoring of NO/NO2 concentration. The aim of the study was to evaluate the possibilities of "Tianox" device in adults in cardiac surgery practice.
Materials and Methods: The "Tianox" device was used in 56 patients:26 males and 30 females. A total of 146 sessions of inhaled NO therapy were analyzed:6 sessions for functional tests,100 sessions for long term (10 days) inhalation NO therapy and 40 sessions for intraoperative NO therapy during heart valves surgery with CPB were performed. Ultrasound cardiac functional parameters and lungs functional parameters were investigated. All patients signed informed consent and the study was approved by the institution ethics committee.
Results and Discussion: The results of the functional tests:a decrease in systolic PAP from 64.6±8.3 to 39.8±4.6 mm Hg (p<0.05) and mean PAP from 39.8±3.7 to 27.3±3.2 mm Hg (p<0.05), in the absence of objective and subjective signs of its adverse effects. Results of long term inhalation NO therapy:an increase in EDV(from 65.5±17.2 to 74.8±13.1 ml),a decrease in ESV(from 28.5±8.0 to 27.5±5.4 ml), an increase in SV(from 39.0±10,7 to 47.3±7.6 ml) and EF(from 57.0±1.7 to 65.1±2.0%, p<0.05), a significant decrease in mean PAP from 52.5±2.1 to 47.7±1.6 mm Hg and an increase in TAPSE from 15.2±0.7 to 17.8±1.1 mm.All of the above describes the clinical effect of exogenous NO inhalation; there were no undesirable effects registered. Carrying out inhalation NO therapy before and after CPB allowed to some extent to prevent postoperative lungs dysfunction development, which manifested itself in a reliably higher PaO2/FiO2 ratio and preservation of the initial values of lung compliance.
Conclusions: The "Tianox" device has a number of indisputable advantages and ensures the effective conduct of NO inhalations in cardiac surgery. No adverse effects were observed with this device.

07AP02-9
Outcomes of sustained low efficiency dialysis versus continuous renal replacement therapy in cardiac surgery-associated acute kidney injury: a cohort study

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Background and Goal of Study: Cardiac surgery-associated acute kidney injury (CSA-AKI) requiring renal replacement therapy (RRT) is associated with increased short- and long-term mortality. To date, there are very limited data on the relative performance of sustained low efficiency dialysis (SLED) versus continous veno-venous hemofiltration or hemodiafiltration (CVVHF) for treating severe CSA-AKI. We therefore conducted a single-centre retrospective cohort study to compare SLED versus CVVHDF with respect to their association with morbidity and mortality in patients with severe CSA-AKI.
Materials and Methods: We conducted a retrospective cohort study of patients who experienced CSA-AKI requiring RRT at the Toronto General Hospital (Toronto, Ontario, Canada) between 1 January 1999 and 31 December 2011. At the hospital, the RRT mode implemented for severe CSA-AKI was CVVHDF in the period prior to 31 March 2008, and SLED in the prior after 1 April 2011. Propensity score matched pairs methods were used to compare the outcomes of the CVVHDF period to the SLED period.
Results and Discussion: 268 patients were treated with CVVHD and 83 patients were treated with SLED. The SLED group had higher baseline hemoglobin concentration (mean±SD) g/L, 124±21 vs 127±18, standardized difference 0.13) and higher prevalence of COPD (9.6% vs 3.7%, standardized difference -0.11). In the propensity score matching analysis (n= 74 vs 74), there is no statistically significant difference between groups with regard to low cardiac output syndrome (OR 1.06, 95% CI 0.68-1.67, p=0.76), in-hospital mortality (OR 1.09, 95% CI 0.94-1.28, p=0.22), acute stroke (OR 0.97, 95% CI 0.83-1.13), postoperative myocardial infarction (OR 0.92, 95% CI 0.84-1.01), atrial fibrillation (OR 0.89, 95% CI 0.77-1.04) and postoperative sepsis (OR 1, 95% CI 0.87-1.14). The variables used for

the matching were age, BSA, sex, recent MI, urgent/emergency surgery, diabetes, HTN, COPD, PAD, CHF, LVEF, preoperative Shock or IABP, preop AF, baseline hb, RBC transfused and CPB time.
Conclusions: The use of SLED was not associated with significantly different risks of postoperative morbidity and mortality when compared to CVVHDF in the treatment of CSA-AKI. Pending the completion of an adequately-powered randomized trial, SLED appears to be an acceptable alternative to continuous renal replacement therapy for treating patients with severe CSA-AKI.

07AP02-10
Thoracoscopic sympathectomy for refractory ventricular tachycardia: a challenge for anaesthesiologists

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Background: The sympathetic nervous system plays a key role in the genesis and maintenance of ventricular arrhythmias. Sometimes surgical treatment is required due to the failure of pharmacological, electrical and/or minimally invasive therapies.
Case Report: A 52-years-old man was admitted to the coronary unit after several episodes of sustained monomorphic ventricular tachycardia (SVMT) refractory to treatment with amiodarone, procainamide and multiple discharges of the implantable cardioverter defibrillator (ICD), requiring mechanical ventilation. His medical history included a double mechanical valvular replacement, an ischemic dilated cardiomyopathy and one cardiac arrest (ICD indication). After ruling out treatable causes, an urgent bilateral cardiac sympathetic denervation by video-assisted thoracoscopy was indicated. In the operating room, external defibrillation paddles were placed and the ICD was reprogrammed maintaining procainamide infusion IV. Transoesophageal echocardiogram (TEE) was monitored. Anaesthesia was maintained with remifentanil IV, rocuronium IV and sevoflurane. A bronchial blocker was used for one-lung ventilation. One defibrillation shock was necessary to treat one single episode of SMVT intraoperatively. After surgery, the patient maintained a sinus rhythm without new arrhythmic episodes. He was discharged after 10 days under medication.
Discussion: Identifying and reversing the inducing factors is crucial for the management of arrhythmias. First choice of treatment are antiarrhythmic drugs and catheter ablation of the reentry pathways, but it may not always be successful or cannot be performed, like in our patient. The abolition of the cardiac sympathetic stimulus with a thoracic epidural anaesthesia or blockage of the left stellate ganglion may be a therapeutic alternative. In our case, a thoracoscopic sympathectomy was the most efficient treatment of refractory SVMT, but some different critical incidents may occur during the intraoperative period, such as the arrhythmogenic stimulus during surgical manipulation, the use of cardio-depressing drugs and one-lung ventilation, etc.
Learning Points: Perioperative management of complex hemodynamic disorders represents many simultaneous challenges for the anaesthesiologist since familiarity with TEE, invasive monitoring, inotropic and antiarrhythmics drugs, heart rate control devices, one-lung ventilation and advanced life support protocols are required.

07AP03-10
Anesthetic management of thoracoabdominal aneurysm rupture in a 12 year old patient. A clinical case report.

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Background: Thoracoabdominal aortic aneurysms (TAA) in childhood are very infrequent. Although the most common cause is infectious, there are other etiologies, such as inflammatory, genetic or idiopathic. Its evolution is not well known and the literature is scarce and heterogeneous. Although they usually present as sudden abdominal pain, there are other atypical presentations that could lead to failure or delay in diagnosis.
Case Report: He is a 12 years old boy, with no personal pathological history, who arrives to the hospital with sudden, 5 hours long abdominal pain, without other associated symptoms. Although stable, he remained restless and with bad general state. The pain got worse and radiated to the right lower limb. Discrete dilation of the aorta was observed in the abdominal ultrasound. The scan showed a TAA from the celiac trunk to the iliac bifurcation, with extensive dissection to both common iliac arteries. He went to surgery immediately by thoracofrenolaparotomy, retroperitoneal approach and supraceliac aortic clamping. Induction was performed with etomidate, cisatracurium and fentanyl and maintenance with sevoflurane and cisatracurium. Aorto-ilio-femoral bypass was performed, inserted a prosthesis and the visceral branches repaired. Visceral ischemia time was <50 minutes. He required transfusion of 6 red blood cells concentrates, autotransfusion support, 2 platelet pools and 2 fibrinogen grams guided by thromboelastometry. Also NA perfusion that could be removed in the immediate postoperative period. In the intraoperative cultures, no germ was isolated. The anatomopathological study found nonspecific myxoid degeneration in the aortic middle layer. After 45 days of admission, the patient was discharged awaiting the genetic tests results.
Discussion: TAA rupture in childhood is a rare and potentially life-threatening situation. In the literature we only find small series of cases of varied etiology, mainly from a surgical point of view and without a specific anesthetic management (1). In this case, the immediate treatment and the maintenance of hemodynamic stability were essential.
References:
Caicheng Ye. AAA in children: a single-center experience of 6 patients. Ann Thorac Surg 2012;93:201-206.
Learning Points: Early abdominal CT diagnose is a key in TAA. Immediate surgical treatment, close hemodynamic monitoring and transfusion guided by thromboelastometry are important aspects to reduce complications during the perioperative period.

07AP03-3
Intractable mechanical hemolytic anemia complicating mitral valve surgery: a retrospective analysis

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Background and Goal of Study: Intractable, mechanical hemolytic anemia (IMHA) following mitral valve surgery is catastrophic and often requires reoperation. We aim to investigate the patient-related risk factors and clinical characteristics of early and late onset IMHA.
Materials and Methods: We reviewed medical records of mitral valve patients from Jan 2008 to Dec 2018. IMHA was defined as valve dysfunction related to hemolytic anemia requiring repeated transfusion. IMHA developed in early postoperative period with persistent valve dysfunction was defined as early group. IMHA developed in late postoperative period after confirming normal valve function was defined as late group. Clinical characteristics of the two groups were compared by t-test and Fisher's exact test. Risk factors were analyzed by logistic regression.
Results and Discussion: The incidence of IMHA is 0.9% (25/2778) in mitral valve surgery. Early versus late onset IMHA patient ratio is 2:3. The time from prior surgery to the onset of IMHA were 1.3 (0.3, 3.0) months in early group and 120 (24, 204) months in late group. The age, sex, drinking rate and comorbidities were similar between the two groups (P>0.05). Late IMHA group had higher smoking (60% vs 10%, P=0.018) and rheumatic heart disease (73% vs 20%, P=0.015) rates than early group. Logistic regression with age adjustment revealed that smoking (P=0.035) and rheumatic heart disease (P=0.018) were associated with late IMHA. Jaundice (60% vs 80%), dark urine (80% vs 87%) and acute kidney injury (50% vs 47%) rates were similar between the two groups (P>0.05), but heart failure rate (87% vs 30%, P=0.009) was higher in late than early groups. Hemoglobin (68±14 vs 72±16 g/L) and creatinine (127±95 vs 142±121μmol/L) levels were similar, but lactate dehydrogenase (1623±1009 vs 3263±2462 IU/L) level was higher in late than early groups. Linear regression revealed a negative correlation between hemoglobin and creatinine levels (β=-3.33, P=0.018). During reoperation, late group had longer length of ICU stay than early group (9±6 vs 4±2 days, P=0.011). No statistical significance was achieved in length of hospital stay (30±20 vs 37±16 days) and perioperative mortality (10% vs 33%) between the two groups (P>0.05).
Conclusions: Smoking and rheumatic heart disease are associated with higher risk of late IMHA. Late IMHA patients tend to be in more critical condition than early IMHA patients, with higher heart failure rate and longer length of ICU stay.

07AP03-4
NAPaR: European non-interventional Post-Authorisation Safety Study of pattern of use and safety of Nordic Aprotinin.

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Background and Goal of Study: Aprotinin (AP) is a proteinase inhibitor drug. Initially introduced into clinical practice for the treatment of hyperfibrinolitic conditions, it was later used to reduce perioperative blood loss and transfusion needs. Preliminary data from the BART study suggesting an increased mortality in APtreated patients, led to its marketing withdrawal in 2008. In 2012, the European Medicine Agency revisited the totality of AP data and concluded that AP still has a place in preventing blood loss in patients undergoing isolated coronary artery bypass graft (iCABG) who are at high risk of major blood loss. As a condition to the reinstatement of AP's marketing authorisation, the Nordic Aprotinin Patient Registry (NAPaR, EUPAS11384) has been established, with AP distribution restricted to centres that perform cardiac surgery on cardio-pulmonary bypass and commit to participate in the Registry. NAPaR main objectives are to record information on the use of AP in Europe and to measure incidence of selected adverse events (death, thromboembolic event, renal dysfunction, anaphylaxy) and effectiveness of risk minimisation measures (anticoagulation monitoring, AP's test dose). Preliminary data on mortality rates are described.
Materials and Methods: Following AP relaunching, all patients exposed to AP must be entered in the NAPaR. Data are to be collected for at least 3 years or after inclusion of 12000 patients and upon Pharmacovigilance Risk Assessment Committee decision. Every 6 months, a Data and Safety Monitoring Committee (DSMC) reviews the data and advices Nordic whether or not it is recommended to continue the NAPaR.
Results and Discussion: The first patient was entered in the NAPaR in Feb-2016. Up to Jul-2018, 1419 adult patients have been treated with AP: 1175 (82.8%) from UK, 148 (10.4%) from Germany, 91 (6.4%) from Sweden, 3 (0.2%) from Austria and 2 (0.1%) from Finland. Only 3/314 patients treated on-label died, leading to an in-hospital mortality rate of 0.96%.
Conclusions: No safety signals compromising the completion of the study have been identified by the DSMC. The overall mortality rate is in line (or even better) with studies without AP.[1,2]
References:
1. Deloge E, *et al. Eur J Anaesthesiol* 2017; **34**:280–287
2. Wang X, *et al. Ann Thorac Surg* 2010; **89**:1489–1495
Acknowledgements: The study was funded by Nordic Pharma. We thank all the physicians involved in the study.

07AP03-5
Rotational thromboelastometry-guided management of congenital factor VII deficiency during an elective endovascular aortic aneurysm repair

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Background: Factor VII Padua is a type 2 variant congenital factor VII deficiency. We discuss the management conundrum in reduction of blood loss versus achieving anticoagulation during endovascular surgery in such a patient.
Case Report: We report a case of a 59 year old man with Factor VII Padua, planned for endovascular aortic aneurysm repair for a penetrating aortic ulcer. Rotational thromboelastometry (ROTEM) was used to guide the management of bleeding risk whilst maintaining anticoagulation during graft deployment. His baseline EXTEM showed an isolated prolonged clotting time (CT) as expected of his condition. 1.5mg of recombinant factor VIIa (Novoseven) was given 4 hours prior to surgery. EXTEM performed 42 minutes post NovoSeven administration showed a normalization of CT without further top-up doses, allowing surgical incision to proceed. Serial EXTEMs showed that further doses of Novoseven were not required. Heparin was omitted due to its unpredictable profile in factor VII deficiency.The patient was discharged 3 days after an uneventful procedure with minimal blood loss.
Discussion: Prothrombin time(PT)/International Normalized Ratio is conventionally used to guide NovoSeven dosing, but it has a long laboratory turnover. Conversely, ROTEM's fast result turnover time allows for rapid decision-making and guidance of further doses of NovoSeven, and is especially useful if there is significant bleeding. In particular, the EXTEM uses tissue factor as an activator, providing information on the extrinsic pathway factor activity similar to the PT. Also, ROTEM depicts the whole clotting process and can be used to rule out other causes of bleeding and identify hypercoagulability[1]. It allowed us to tread a fine line between maintaining a normal coagulation profile in view of arterial cannulation and a slightly anti-coagulated state during the stent deployment. We do not want to tip the patient into a prothrombotic state by over-dosing NovoSeven.
References:
1. Hincker A et al. Rotational thromboelastometry predicts thromboembolic complications after major non-cardiac surgery. Crit Care. 2014;18(5):549. Published 2014 Oct 8. doi:10.1186/s13054-014-0549-2
Learning points: ROTEM allows for quick monitoring of the patient's coagulation status to reduce bleeding during femoral access, while achieving an anticoagulated state desirable for graft deployment. Further studies can evaluate its effectiveness in assessing post-operative hypercoagulopathic complications.

07AP03-6
Total aortic arch replacement with frozen elephant trunk (THORAFLEX™ HYBRID GRAFT): complications and transfusion

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Background and goal of study: Aortic dissecton type 1 is associated with high perioperative complications and a significant operative mortality. Frozen Elephant Trunk (FET) technique is one of the latest to be introduced to treat extensive and complex lesions of the thoracic aorta, including the descendent portion. FET (Thoraflex™ hybrid graft) allows to treat aortic arch and descending thoracic lesions in one-time surgery with promising results. The goal of this study is to compare complications and transfusion rates in pacients with Thoraflex™ hybrid graft in our hospital and those from national and international registries.
Materials and Methods: We retrospectively studied 10 patients who underwent total aortic arch replacement with Thoraflex™ hybrid graft between 2016 and 2018 in Puerta de Hierro Hospital. We considered intraoperative extracorporeal data, transfusion rates, perioperative complications and one month mortality. Statistical analysis was performed using SPSS.
Results and Discussion: There were no differences in intraoperative data and transfusion rates. Respiratory complications were significantly higher in our group. 30% of the patients developed tracheobronchial compression by the aortic false lumen, wich increase significantly ICU stay. Paraplegia appeared in only one patient (10%) as a late complication (45 days before surgery) by an embolic event.
Conclusions: Tracheobronchial compression by the aortic false lumen was an important complication in postoperative total aortic arch replacement with Thoraflex™ hybrid graft.
References:
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07AP03-7
Chest cavity fire during emergency cardiac surgery: A case report and review of the literature

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Background: Operating room fires are a rare but potentially catastrophic occurrence[1].We report a case of a chest cavity fire associated with an air leak due to a ruptured bulla.
Case Report: A 60-year-old man presented for emergency repair of a type A aortic dissection. Past medical history was significant for chronic obstructive pulmonary disease and coronary artery bypass grafting one year prior. After induction, general anesthesia was maintained with inhaled sevoflurane (MAC 1) and intravenous propofol infusion (150 mg/hr). Surgery proceeded to sternotomy. At this point his right lung was noted to be adherent to the overlying sternum with prominent bullae. Despite careful dissection one of these bullae was punctured during sternotomy causing a significant air leak. In order to compensate for this the flows on the anesthetic machine were increased to 10 liters per minute and the proportion of inspired oxygen increased to 100%. Such was the extent of the leak that there were comments by the surgical team about the smell of sevoflurane. Shortly after this a dry pack in the presence of diathermy caught fire. This was immediately

extinguished without any injury to the patient. The rest of the operation proceeded uneventfully and he had a successful debranching repair of his ascending aorta and arch.
Discussion: Chest cavity fires are an uncommon event. Prior to this there were 6 reported cases of chest cavity fire two involving thoracic surgery ad the remainder involving left internal mammary (LIMA) dissection for coronary bypass grafting. As in our case all involved the presence of dry surgical packs, electrocautery increased inspired oxygen concentrations and patients with underlying lung disease. None of the patients involved received any permanent damage. Ours is the first case reported of a chest cavity fire in a patient undergoing redo sternotomy and in cardiac surgery not involving dissection of the LIMA.
Reference:
Anesthesiology 2013 1133-9
Learning points: Chest cavity fires though rare can occur in the presence of high inspired oxygen, electrocautery, and dry surgical packs. Patients with underlying lung disease and an airway leak are at increased risk. Care should be taken by the anesthetic team to use the minimum inspired oxygen concentration possible in these cases. It is the responsibility of the entire surgical team to be aware of this potential risk and ensure surgical packs are damp prior to placing them in the surgical field.

07AP03-8
Does the implementation of a Heparin Dose-Response Curve reduce de administration of protamin in Vascular Anaesthesia?

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Background and Goal of Study: After the implementation of the Heparin Dose-Response Curve in our daily practice in vascular anaesthesia, first described by Bull and associates, our goal is to determine if it had led to a lower administration of protramin, reducing the secondary effects related to the use this drug.
Materials and Methods: Over 130 vascular surgery patients where studied, and doses of protamin administered before and after the use of the new protocol were registered. Our practice before the Heparin Dose-Response Curve was to administer 1mg/kg heparin in any procedure, to reach ACT (Activated Clotting Time)> 200s. Protamin was administered in 1:1 ratio after it was finished. The new protocol allowed an individualized administration of protamin. The graph shows dosing of heparin in one axis in mg/kg and ACT in seconds in the other one. The baseline ACT is determined, and first bolus of 1mg/kg Heparin is administered. After 5 minutes a new ACT is obtained, those two ACT values are marked in the graph and a Dose-Response Curve is drawn between them. ACT control is performed each 30 minutes, and the new ACT is marked in the curve. It allows to know the heparin dose needed to take the ACT back over 200 sec. If the procedure has ended, given that 1mg of protamin reverses 1mg of heparin, the curve can also be used to administer the concrete dose of protamin needed. After collecting this data, an independent-samples t-test was performed in order to determine if our protocol had changed this dose.
Results and Discussion: The results showed that there is no difference between the means and therefore, the use of the Dose-Response Curve has not decreased the dose of protamin administered in our centre. A study from the data shows that the usual administration pattern has although changed, and patients receive both higher and lower protamin doses than the standard from before. Further studies need to be obtained to determine if this could be explained because the goal ACT is better reached with the use of the protocol, or if ACT obtained after the reversion is closer to the baseline than before.
Conclusions: The implementation of a Heparin Dose-Response Curve in vascular anaesthesia does not decrease the administered dose of protamin at the end of the procedure. However, further studies are needed to analyze the change observed in our daily practice, and to determine if a more accurate ACT monitorization and reacheance could explain this result.

07AP04-1
Coronary artery bypass grafting in Octogenarians: Gender differences in outcome

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Background and Goal of Study: Octogenarians undergoing coronary artery bypass procedures were reported to have worse outcome than the patients under 80 years old. The aim of our study was to investigate the impact of gender in postoperative mortality and morbidity in this high-risk group of patients.
Materials and Methods: Octogenarians who underwent coronary artery bypass grafting (CABG) from June 2012 to October 2018 in our Cardiac Surgery department were retrospectively analyzed. The following parameters were compared between men and women: Mortality, post-operative use of intra-aortic balloon (IABP), red blood cell (RBC) transfusions, hours of mechanical ventilation, reintubation, need of non-invasive ventilation (NIV), low cardiac output syndrome (LCOS), acute kidney injury (as defined by the KDIGO criteria) and atrial fibrillation (AF) occurrence.
Results and Discussion: A total of 1935 patients underwent CABG with the use of cardiopulmonary bypass (26 off-pump procedures were excluded). Octogenarian group consisted of 62 patients (3,24%) with the women being 16 (25,8%) and men being 46 (74,2%). Mean age of female patients was 81±1,3 years old, while mean age of male patients was 82±2 years old. Euro score II of female patients was 2,72±1,5, while this of the male ones was 3,13±1,9. In the Figure 1, we present thoroughly all the parameters of our study and all the statistical results. We conducted for all the parameters different chi-square tests, except from the RBC transfusion and the hours of mechanical ventilation, where two-tailed t-test was conducted. The only statistically significant parameter correlated with the gender was the occurrence of AF postoperatively, with the male patients have a higher possibility to suffer from an episode of AF.

	Female vs Male	*p*	Significant (YES) or not (NO)
Mortality	2/16 vs 2/46	*0,252*	NO
Post-op IABP	1/16 vs 4/46	*0,756*	NO
RBC transfusion	Mean value 2,27 vs 2,82 g/dl	*0,178*	NO
Hours of mech-ventilation	Mean value 13 vs 11,8 hours	*0,706*	NO
Reintubation	1/16 vs 1/46	*0,352*	NO
NIV	1/16 vs 5/46	*0,59*	NO
LCOS	1/16 vs 3/46	*0,969*	NO
AKI	4/16 vs 11/46	*0,93*	NO
AF	3/16 vs 24/46	*0,02*	*YES*

Conclusions: The rates of morbidity and mortality for our octogenarian patients undergoing CABG procedures in our department were acceptable. Our statistical analysis showed no correlation between gender and mortality, only that the occurrence of AF in men was higher.

07AP04-2
Low-opioid anaesthesia in geriatric patients during circulatory-assisted coronary artery bypass surgery.

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Background and Goal of Study: The paper is devoted to the study of the effectiveness of multimodal low-opioid anaesthesia during coronary bypass grafting (CABG) surgery under artificial blood circulation.
Materials and Methods: All the research participants gave their informed consent to be part of the study, which was approved by the Local Ethics Committee. The study included 28 patients aged 69.5±6.2 years who underwent CABG under artificial blood circulation. The patients were under endotracheal anaesthesia. The induction was performed with propofol (1.52±0.05 mg/kg), fentanyl (2 mcg/kg), pipecuronium bromide (0.08 mg/kg), and lidocaine (1 mg/kg bolus) followed by the continuous infusion of lidocaine (1.5-2 mg/kg/h), sevoflurane (1.5–2 MAC), magnesium IV (30 mg/kg) and once before the incision - ketamine (0.5 mg/kg).
Results and Discussion: The average duration of anaesthesia was 257.4±19.1 min; the duration of assisted blood circulation was 55±10 min. The mean dose of fentanyl to maintain the analgesia for the entire period of anaesthetic support was 0.94±0.03 mcg/kg/h. The hemodynamic and bispectral index values (BIS=42.25±1.6) indicated an adequate anaesthetic support and sufficient analgesia and sedation. The peripheral perfusion index (PPI=1.83±0.21) showed pronounced vasodilation, which necessitated the correction with minimal doses of norepinephrine. Standard lab values and values of stress hormonal changes in basal metabolism were within

the normal range (mean cortisol=479.3±26.4nmol/L, lactate=1.61±0.2mmol/l, glucose 6.42±0.9). Postoperative analgesia was provided with tromethamine ketorolac IM 30 mg every 8-12 hours for 2 days. The mean VAS (visual analogue scale) score of pain level was 4.6±1.2. At day one, 27.8% of patients reported the maximum intensity of pain, which was relieved with morphine; 72.2% of individuals had medium or low pain intensity.
Conclusions: The offered regimen of low-opioid anaesthesia can ensure adequate analgesia. It allows refusing the intraoperative usage of routine doses of fentanyl during cardiac surgery, as indicated by the absence of hemodynamic and endocrine-metabolic changes.

07AP04-3
Effect of Propofol target concentration on cardiac ejection function in patients undergoing coronary artery bypass surgery: a retrospective propensity-matched cohort study

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Background and objective: Ischemia-reperfusion (IR) injury during coronary artery graft surgery using cardiopulmonary bypass (CPB) is strongly related to oxidative stress and inflammation and is implicated in perioperative morbidity and mortality. Propofol, a hypnotic anesthetic agent known for its antioxidant and anti-inflammatory properties, has shown cardioprotection, mainly during reperfusion, at high plasmatic concentrations (>5 µg/ml). However, it has been recently suggested that propofol should be used with caution in patients undergoing cardiovascular procedures. We conducted a retrospective cohort study to investigate the effects of Propofol on the left ventricular ejection fraction (LVEJ) and its influence on short-term outcome in patients undergoing coronary artery surgery (CABG), under CPB.
Materials and Methods: We included 328 patients in a retrospective cohort study (Jan. 2016 to Dec. 2017). Of them, 168 had been submitted to CABG under CBP and were allocated to 2 groups depending on the target concentration of propofol during the IR period and until 15 min after aorta unclamping: [P] ≤ 2 µg/ml (gr1) and [P] > 2 µg/ml (gr2). The 2 groups were matched on a propensity-score basis. General anesthesia protocol in all patients consisted in propofol target-controlled infusion mode (TCI), adjusted to ensure anesthesia depth Entropy® values of 40-60, associated with remifentanil. The primary endpoint was the effect of propofol on postoperative LVEF. Secondary endpoints included: cardiovascular morbidities, renal morbidities, lactate at Intensive Care Unit (ICU) admission and until J2, bleeding and transfusion data, type of defibrillation, length of intubation in ICU, ICU and hospital stay, global mortality. Statistical analysis was based on: propensity analysis using Absolute Standarized Difference (ASD) <10-15%, logistic regression and Bonferroni correction for p-value (adjusted p< 0,0017 significant).
Results: The 2 groups were statistically matched for 20 defined criteria, and ASD was near 0 (0-0.79%).Comparison of postoperative LVEF between our two populations was not statistically different [51, 48% ± 9,3 (gr1) vs 52,50 ± 8,13 (gr2); p-value 0,294]. No statistical significance was recorded for all the secondary endpoints.
Conclusion: Under the conditions of our study, Propofol does not exert dose-dependent effect on left ventricular ejection function and the post-operative morbidities.

07AP04-4
Effect of remote ischemic preconditioning on myocardial injury after off-pump coronary artery bypass graft: Preliminary data.

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Background and Goal of Study: Remote ischemic preconditioning (RIP) on cardiac surgery, to obtain myocardial protection, has given variable results in different studies. However, the effect of the cardiopulmonary bypass as well as the partial understanding of the mechanism of action can hide the potential cardioprotective effect. We designed a randomized clinical trial to evaluate the effect of RIP on myocardial injury after OPCABG. We also studied clinical effects and the signaling molecules involved.
· Primary objective: To compare levels of Troponin 12 hours after surgery between both groups.
· Secondary objectives: To compare clinical events and protein quantification involved.
Materials and Methods: In the clinical trial we included 67 consecutive patients with indication to surgical elective off-pump myocardial revascularization surgery (OPCABG). 36 patients in the control group and 31 in RIP group. The exclusion criteria were: emergency surgery, concomitant surgical procedures, previous myocardial infarction, preoperative hemodynamic instability, need of inotropic drugs, liver dysfunction, renal failure and peripherical chronic ischemia. The RIP was performed with 3 cycles: 5 min ischemia, 5 min reperfusion and 5 min ischemia. Two tourniquets are placed simultaneously in an upper and a lower limb, using a tourniquet air cuff inflated to 200mmHg. We evaluated the troponin levels 6, 12 and 24 hours after surgery and at hospital discharge. The blood samples for proteins quantification were obtained: at the OR, before starting the surgical procedure, and at 6 and 24 hours in the postoperative period. The analysis of the plasma proteins was made with a Western Blot method. We also evaluated possible postoperative clinical events as renal failure and atrial fibrillation.
Results and Discussion: We did not find statistical significant differences in troponin levels between groups. In protein quantification we observed in the Western Blot test that the proteins we considered cardioprotective, were expressed more in the RIP blood samples. At 6 hours in the postoperative period we detected a peak concentration of RIP proteins in both groups.
Conclusions: • RIP before OPCABG has not demonstrated to reduce myocardial injury nor to have repercussion in the new onset of AF or acute renal failure.
• Cardioprotective proteins tend to be expressed more in RIP group, peak at 6h after surgery.

07AP04-5
A retrospective survey of factors related to renal function decline after coronary artery bypass grafting.

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Background and Goal of Study: Renal function decline after coronary artery bypass grafting (CABG) survery was not uncommon but few studies explored its relationship with anesthetics and their interaction with other risk factors simultaneously. This study aimed to retrospectively investigate factors associated with renal function deterioration after CABG with particular emphasis on anesthetics.
Materials and Methods: After the approval of institutional review board, this retrospective study was conducted in Mackay Memorial Hospital, Taipei, Taiwan. Patients receiving CABG were included in the analysis and deterioration of renal function was defined as postoperatively increased serum creatinine level. Logistic regression analysis was applied to evaluate the associations between collected variables and deterioration of renal function. Forward model selection strategy was used to select significant predictors of deterioration of renal function.
Results and Discussion: A total of 275 patients were included in the analysis. Among them, there were 105 patients (38.2%) with higher postoperative serum creatinine level than preoperative baseline value. Four independent predictors were identified to increase postoperative serum creatinine level, including lower body temperature (Odds ratio, OR = 2.29; 95% confidence interval, CI = 1.4 ~ 3.74), higher total dopamine dose (OR = 1.14; 95% CI = 1.02 ~1.26), longer cardiopulmonary bypass time (OR = 1.01; 95% CI = 1 ~ 1.02) and lower preoperative serum creatinine level (in binary logarithmic scale, OR = 2.91; 95% CI = 1.91 ~ 4.44). Other factors like anesthetics doses and comorbidities were not related to the decline of renal function after the adjustment of these 4 significant predictors.
Conclusions: This study identified independent predictors of deterioration of renal function after CABG and anesthetics were not significant risk factors. These findings provide valuable information for anesthetic management and patient care in clinical practice.

07AP04-7
Mechanisms of Milrinone-induced preconditioning

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Background and Goal of Study: Mitochondrial calcium-sensitive potassium (mKCa) channels and mitochondrial permeability transition pore (mPTP) are involved in preconditioning. It is unknown, whether mKCa-channels and mPTP play a crucial role in milrinone-induced precconditioning. The aim of this study was to investigate, whether (1) Milrinone-induced preconditioning is concentration-dependent and (2) which signaling pathway might be involved.
Materials and Methods: All experiments were conducted after approval of the animal care committee. Isolated hearts of male Wistar rats (each group n=7-8) were mounted on a Langendorff system and were perfused with Krebs-Henseleit buffer. Control (Con) animals were not further treated. Cardioprotection was investigated by administration of different concentrations of milrinone (Mil; 0.3-10µM) 10 min before ischaemia. In a second set of experiments, in addition to controls, animals were pretreated with the lowest protective concentration of milrinone (Mil1) either alone or combined with the mKCa-channel blocker paxilline (Pax+Mil1), or paxilline alone (Pax). In additional groups milrinone was administered with and without the radical scavenger MPG (MPG+Mil1, MPG) or the mPTP inhibitor Cyclosporine A (MPG+Mil1+CsA, CsA+Mil1) respectively. All animals underwent 33 minutes of global ischaemia followed by 60 minutes of reperfusion. Infarct sizes were determined by TTC staining. Statistical analysis: One-way ANOVA with Tukey post hoc test. Data are expressed as mean±SD.
Results and Discussion: Infarct sizes in the control groups of both series were comparable (63±8% and 57±6%). Mil1 was the lowest cardioprotective concentration (Mil1: 32±6%; P<0.05 vs. Con, Mil0.3; ns vs. Mil3, Mil10). Furthermore, the mKCa-channel inhibitor paxilline completely abolished the cardioprotective effect of Mil (Pax+Mil1: 54±5%; P<0.05 vs. Mil1), while paxilline itself had no effect on infarct size (Pax: 52±7%; P>0.05 vs. Con). Also MPG abrogated the infarct size limiting effect of Mil (MPG+Mil1: 59±7%; P<0.05 vs. Mil1) without any own effect on infarct size (MPG: 58±5%; P>0.05 vs. Con). The mPTP inhibitor CsA restored the cardioprotective effect of Mil (MPG+Mil1+CsA: 35±7%; P<0.05 vs. Con).
Conclusions: Milrinone concentration-dependently induces preconditioning. Cardio-protection is mediated by activation of mKCa-channels, release of free oxygen radicals and mPTP inhibition.

07AP04-8
Acute hypobaric hypoxia attenuates myocardial ischemia reperfusion injury in rats

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Background and Goal of Study: Ischemic heart diseases (IHDs) are one of the major causes of morbidity and mortality for patients all over the world. Diverse approaches have been conducted to reduce ischemic reperfusion injury (IRI). The discovery of preconditioning has arguably been the single most important development in the field of ischemic biology. Many studies showed that chronic intermittent hypobaric hypoxia (CIHH) preconditioning exert a cardioprotective effect. However, the effect of acute hypobaric hypoxia (AHH) preconditioning is still unclear. The aim of this study is to investigate the effect of AHH by exposing rats to simulated high altitude.
Materials and Methods: Male Wister rats (n=20) were randomly divided into two groups: the control group (n=10) and the AHH group (n=10). Rats in AHH group were exposed for 60 minutes to simulated high altitude at 60.8 kPa in a hypobaric chamber, whereas rats in control group remained at 101.3 kPa. After anesthetized and a left thoracotomy was performed, the left anterior descending (LAD) coronary artery was ligated and subjected to 30 minutes ischemia followed by 60 minutes reperfusion. Infarct size was assessed by 2% Evans Blue dyeing and TTC (1% 2,3,5-triphenyltetrazolium chloride) staining. Fractional shortening (FS) and fractional area change (FAC) were also measured by echocardiography.
Results and Discussion: Acute hypobaric hypoxia preconditioning significantly reduced %IS/AAR. The area at risk and cardiac function measured by echocardiography was not significantly different between two groups.

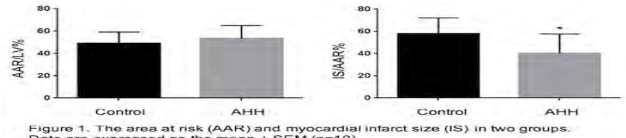

Figure 1. The area at risk (AAR) and myocardial infarct size (IS) in two groups.
Date are expressed as the mean ± SEM (n=10).
Abbreviations: AHH, acute hypobaric hypoxia
*p < 0.05 vs control

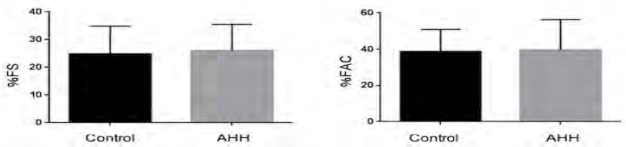

Figure 2. Cardiac function:%FS and %FAC
Date are expressed as the mean ± SEM (n=9).
Abbreviations: AHH; acute hypobaric hypoxia, FS; fractional shortening, FAC; fractional area change
No significant differences

Conclusions: The exposure of rats to simulated high can altitude for 1h might attenuate myocardial ischemia reperfusion injury.

07AP04-9
Long-term effect of esmolol on the function of coronary arteries

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Background and Goal of Study: The morbidity and mortality associated with hypertensive patients are related to coronary remodelling. At present, several drugs have been demonstrated to be useful in the regression of ventricular remodelling after chronic treatment. Our group previously demonstrated that short-term treatment (48 h) with esmolol produces early regression on vascular remodelling, although the long-term effect has not been studied yet (1). 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 randomized into 4 groups: two therapy groups with esmolol (300 µg/kg/min during 48h), one of them analyzed 7 days after treatment and the other after 1 month (SHRE-7d and SHRE-1m), and two placebo groups for each therapy group (SHR-7d and SHR-1m). 7 days and 1 month after treatment, segments of left anterior descending coronary arteries were dissected and mounted on a wire myograph. Vasodilator function was evaluated with increasing concentrations of acetylcholine (Ach 10-9 to 10-4 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 3x10-5 mol/L) to assess vasoconstrictor function. The area under the curve (AUC) was studied and the results were expressed as mean ± S.E.M. p< 0.05 was considered significant. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain.
Results and Discussion: Vasodilator function: both therapy groups (SHRE-7d and SHRE-1m) showed a greater AUC than SHR groups (P=0.017 y P=0.05, respectively). Vasoconstrictor function: SHRE showed a decrease of the AUC with respect to SHR group, but only after 7 days (P=0.005). However, there isn't any difference after 1 month.
Conclusion: The positive effect of esmolol on the fuction of coronary arteries remains in the long term. The next goal will be to know if this effect remains also in the arteries' structure.
References:
1. Quintana-Villamandos B et al. Early regression of coronary artery remodeling with esmolol and DDAH/ADMA pathway in hypertensive rats. Hypertens Res 2016;39:692-700.
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07AP05-1
Intraoperative bilateral tension pneumothorax during thracheostomy placement

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Background: Patients with head and neck cancer can develop inadequate airway patency due to tumor extension at any point during their disease. Awake tracheostomy is used occasionaly in their management.
Case Report: 68 years old male with multiple comorbidities and locally advanced squamous cell cancer of the glotis underwent chemotherapy and radiation therapy at our center. He was found to have severe laryngeal and subglottic stenosis and was taken to the operating room for awake tracheostomy. He received sedation with dexmedetomidine and oxygen supplementation via nasal cannula. Neck dissection appeared to be difficult with the tumor encasing the trachea. The surgical team identiffied an air space and a 6.0mm ETT was placed. The patient developped respiratory distress and hypotension shortly after ventilating the ETT. A fiberoptic examination of the ETT was consistent with placement in the intrathoracic cavity. The patient was intubated with difficulty fiberoptically without improvement in hemodynamics and respiratory mechanics. The left hemithorax was noted to be quiescent and overdistended. A chest tube was placed from the surgical field with instantaneous improvement. Dissection of the trachea continued but the patient developed recurrent severe hypotension. The right hemithorax was noted to be distended and quiescent with ultrasound imaging concerning for absence of the pleural line. A right chest tube was placed from the field with resolution of the hemodynamic instability. The trachea was ultimately dissected off the tumoral bed and a tracheostomy tube was placed.
Discussion: Tension pneumothorax is an uncommon complication of tracheostomy placement. Early identification and decompression is paramount for patient survival.
Learning points: Hemodynamic and respiratory instability during tracheostomy placement can be caused by tension pneumothorax. In cases with difficult neck dissection the tracheostomy tube may be malpositioned and ventilation may precipitate a tension pneumothorax or tissue emphysema. Confirming the tube postion is paramount in order to avoid severe complications. Last but not least, the same complication can occur twice during the same case.

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07AP05-2
Video-assisted thoracoscopic (VATS) for Cardiac Sympathetic Denervation (CSD) in patients with refractory sustained monomorphic ventricular tachycardia (SMVT).

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Background and Goal of Study: CSD has been used safely and effectively as a second-line treatment of ventricular arrhythmias that do not respond to pharmacotherapy and ablation. It consists of resection of the left sympathetic ganglia from T1 to T5, decreasing the noradrenergic influence on the heart. This report describes two cases of refractory ventricular tachycardia (RVT) successfully treated by CSD.
Materials and Methods: Patient 1 was an ASA IV with non-ischemic dilated cardiomyopathy. Patient 2 was an ASA IV with arrhythmogenic cardiomyopathy of the right ventricle. Both patients had SMVT that were previously pharmacological treated and ablated several times without success. In both cases balanced general anesthesia with sevoflurane was performed. Advanced monitoring, included external Implantable Cardioverter-Defibrillator (ICD) was setted up. Different airway management was performed to block left lung. Patient 1 was intubated with an orotracheal tube and a left bronchial blocker while Patient 2 was intubated with a left side double lumen tube. Patients were ventilated using a protective ventilation during one lung ventilation (OLV). Patient 1, who had ventricular dysfunction, needed a continuous dobutamine infusion while patient 2 needed amiodarone infusion. None of them showed intraoperative arrhythmias and tolerated OLV adequately. They were extubated at the operation room and admitted to the intensive care unit. During the early postoperative period, Patient 1 had hydropneumothorax, which satisfactorily resolved. No incidences were observed regarding to Patient 2; In both cases, the postoperative electrocardiographic controls show cessation of SMVT.
Results and Discussion: Before a patient who present SMVT is essential to know the base cardiopathy, keep the antiarrhythmic treatment until the surgery day and deactivate the anti-tachycardia mode of the ICD; During intervention, it is important to avoid any situation that may trigger arrhythmias (hypoxia, hypovolemia, anemia, hypotension, hypercarbia, etc.) Although left cardiac sympathetic denervation is well established in some cardiac diseases, its role in some arrhythmogenic cardiomyopathies is less clear. These reports suggest that autonomic modulation can play a crucial role in the management of patients with RVT, being a simple, safe and with low morbidity procedure.
Conclusion: In conclusion, CSD seems to be a safe and viable alternative for patients with RVT.

07AP05-3
Non-intubated thoracoscopic surgery under deep sedation

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Background and Goal of Study: Non-intubated thoracoscopic surgery can be done under general anesthesia or sedation. We compared the feasibility of sedation without intubation in thoracoscopic surgeries with that of conventional general anesthesia with double-lumen intubation with mechanical ventilation.
Materials and Methods: From November 2017 to August 2018, thoracoscopic surgeries were performed either under general anesthesia or under deep sedation without intubation according to surgeon and anesthesiologist's discretion. Deep sedation was performed with midazolam 2-3 mg, total intravenous anesthesia using propofol and remifentanil using target controlled infusion and intravenous dexmedetomidine infusion 0.5 mcg/kg/hr after 0.5 mcg/kg loading for 10 minutes (Figure 1). Airway was maintained by placing a filtting mask fixed with mask holder on the patient's face (Figure 2). The surgeon did local infiltration on incision site and 2nd to 7th intercostal nerve directly using thracoscopy. We compared the characteristics of patients, surgical parameters, and arterial blood gas level.
Results and Discussion: Total of 30 patients underwent thoracoscopic surgery. Patients in group DS (deep sedation) were younger than group GA (general anesthesia). There was no difference of height and weight between group GA and group DS. Both the surgical time and anesthetic time were shorter in group DS than group GA (Table 1). However, intraoperative PaCO2 was higher in group DS 10 minutes after one lung ventilation start.

	Group GA (N=14)	Group DS (N=16)	P value
Age (years)	67.3 ± 10.2	44.9 ± 19.2	<0.001
Height (cm)	162.4 ± 9.8	168.1 ± 9.8	0.126
Weight (kg)	65.7 ± 14.1	60.1 ± 10.1	0.267
Operation time (min)	125 ± 76.4	70.4 ± 48.3	0.026
Anesthesia time (min)	180.3 ± 76.0	107.4 ± 51.1	0.004
PaCO2 during OLV	45.1 ± 7.2	68.2 ± 6.3	<0.001

Conclusions: Non-intubated thoracoscopic surgery can performed under deep sedation. Both surgical time and anesthetic time were shorter than general anesthesia. However, hypercapnia is inevitable, so inclusion criteria should be carefully established.
Acknowledgements: none

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07AP05-4
Is perioperative inflammatory state related to the Clavien-Dindo classification of postoperative complications after lung resection surgery?

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Background and Goal of Study: The Clavien-Dindo (C-D) classification is a simple classification of postoperative complications, which has been widely adopted in clinical practice. This classification is useful to evaluate the impact of any perioperative management on the outcome. However, the relationship between this classification and the perioperative inflammatory state is not well known. The aim of our study was to relate complications to blood cytokines during/after thoracic surgery.
Materials and Methods: This retrospective study was a non-planned substudy from RCT "Postoperative pulmonary complications and pulmonary and systemic inflammatory response in lung resection surgery with prolonged one-lung ventilation using intravenous anaesthesia versus inhaled anaesthesia with halogenated agents" with NCT 02168751 and approved by a local ethics committee. 165 patients who underwent lung resection surgery were analysed. Blood was drawn at baseline (before one lung ventilation [OLV]), at the end of the OLV and 6 hours after the end of the surgery. Inflammatory biomarkers (IL6, IL7, IL8, IL10) were measured using Western blot. The correlation between pro- and anti-inflammatory markers was measured using the ratios IL6/IL10 and IL8/IL10. All postoperative complications that appeared during a follow up of 30 days after surgery were classified into minor complications (group 0, 1, 2) and major complications (group 3, 4, 5) according to the C-D classification. Mann-Whitney test and χ^2 test were used for the statistical analysis.

Results and Discussion: 25 patients out of 165 presented major complications. Figure 1 shows comparison of cytokine levels between both groups at 2 different moments. There were no significant differences between both groups at baseline or at the end of the OLV. Nevertheless, patients who developed major complications showed higher levels of proinflammatory cytokines 6 hours after the end of the surgery than those who developed minor complications.

		BASELINE			6H AFTER SURGERY		
		Median	IQR	p value	Median	IQR	p value
IL6	C-D (0,1,2)	2,98	[2,84; 3,12]	0,809	3,58	[2,97; 4,90]	0,015
	C-D (3,4,5)	3,05	[2,79; 3,14]		4,90	[3,66; 5,17]	
IL7	C-D (0,1,2)	2,77	[2,45; 3,09]	0,811	4,33	[3,93; 7,41]	0,047
	C-D (3,4,5)	2,80	[2,53; 3,08]		6,94	[4,51; 7,94]	
IL8	C-D (0,1,2)	0,95	[0,72; 1,22]	0,992	10,0	[7,2; 23,9]	0,039
	C-D (3,4,5)	0,94	[0,72; 1,20]		19,6	[8,9; 28,9]	
IL6/IL10	C-D (0,1,2)	34,5	[30,4; 39,7]	0,83	43,6	[31,9; 54,8]	0,026
	C-D (3,4,5)	34,9	[31,5; 38,8]		49,5	[42,9; 55,2]	
IL8/IL10	C-D (0,1,2)	10,55	[8,21; 14,03]	0,725	120	[79; 248]	0,022
	C-D (3,4,5)	10,73	[8,73; 14,44]		221	[99; 322]	

Figure 1: Comparison of cytokine levels between patients graded as Clavien-Dindo 0, I, II and the ones graded as C-D III, IV, V at baseline and 6 hours after the end of the surgery.

Conclusion: Our study suggest a relationship between the inflammatory state measured by plasma cytokine levels and the Clavien-Dindo classification in patients undergoing lung resection surgery.

07AP05-5
Preoperative oxygen challenge for toleration of single lung ventilation prior to lung resection

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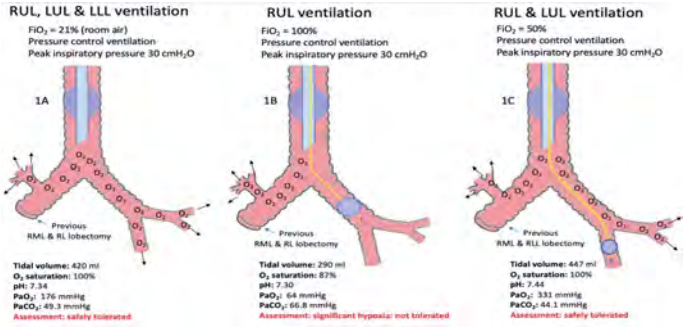
Background: An oxygen challenge test is an effective intervention to definitely assess safety and tolerance of anaesthesia of patients with limited lung function undergoing complex lung resection surgery
Case Report: A 70-year-old female presented with a left lower superior segment lesion of the lung. Three years prior she had undergone a right middle and lower lobectomy. Staging positron emission tomography confirmed an avid lesion confined to the upper lobe of the left lung with no extrapulmonary disease. Respiratory function tests revealed a FEV1 of 0.72L, and a carbon monoxide transfer factor of 7.8 ml/min/mmHg. A cardiopulmonary exercise test demonstrated significant arterial desaturation. Peak oxygen consumption was 16.7 ml/min/kg. The pulse for the duration of exercise appeared normal, but there was a substantial abnormality in VE/VO2 gradient, suggesting the predominate cause of exercise limitation was respiratory.
Discussion: Given the patient's respiratory dysfunction evident by the static and dynamic respiratory function tests, and abnormal ventilation/perfusion imaging suggested an attempt at lung isolation would not be successful. Conversely, a cardiopulmonary exercise test that was limited by ventilation, but had key parameters within acceptable thresholds. Therefore an elective definitive oxygen challenge assessment was undertaken for real-time assessment of toleration of single lung ventilation and planning and facilitation of lung separation techniques. The patient was intubated using a 8.0 mm single lumen endotracheal tube. An oxygen challenge test was perfomed with an Arndt brochial blocker to assess safety and tolerance of anaesthesia. Positioning of the bronchial blocker with corresponding arterial blood gas measurements are presented in Figure 1.



Learning points: 1. An oxygen challenge test is an effective intervention to definitely assess safety and tolerance of anaesthesia of patients with limited lung function undergoing complex lung resection surgery. 2. Intraoperative oxygen challenge can help facilitate the optimum device choice and position required for lung separation.

07AP05-6
Current practice of one-lung mechanical ventilation - a retrospective electronic medical records study in a large academic center

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Background and Goal of Study: Intraoperative mechanical ventilation of both lungs with physiological tidal volumes (TV) decreases postoperative pulmonary complications. Limiting TV may also be protective during one-lung ventilation (OLV), although recent data suggest that higher TV (8ml/kg of predicted body weight [PBW]) correlates with a lower incidence of postoperative complications. Independently of lower TV, lung recruitment maneuvers combined with targeted positive end expiratory pressure (PEEP) adjustment contribute to decreasing postoperative pulmonary complications. Given the uncertainty regarding optimal OLV mechanical ventilation settings, we aimed to explore variations in current practice in a large academic center.
Materials and Methods: We carried out a retrospective analysis of adult thoracic surgery cases with OLV from April 2016 to October 2018. Patient characteristics, ventilation settings and physiological data were extracted from the anesthesia information management system. Ventilation metrics for individual patients were summarized as median values. The averages and standard deviations (SD) for normally distributed median values, or the medians, first and third quartiles for non-normally distributed median values were calculated to characterize the entire dataset.
Results and Discussion: We identified 691 cases with available mechanical ventilation metrics. Patient and case characteristics are presented in Table 1. The mean (SD) of exhaled TV on OLV was 4.7 (1.0) mL/kg PBW. Only 19 (2.8%) and 1 (0.1%) of patients had median TV >7 and >10 mL/kg PBW. A PEEP=0 and >10 cm H20 was used in 26 (3.8%) and 3 (0.4%) of patients. Mean (SD) PEEP was 4.8 (1.6) cm H2O. Highest PEEP was 11 cm H2O. Mean (SD) end-tidal carbon dioxide (etCO2) and inspired fraction of oxygen (FiO2) were 42.7 (6.1) mm Hg and 71.9 (17.5)%, respectively.
Conclusions: In this single-center study, OLV TV and PEEP settings in thoracic surgical patients did not vary substantially. The average exhaled tidal volumes approached 5 mL/kg PBW; average PEEP was 5 cmH2O. However, high FiO2 was commonly used. These settings generally resulted in adequate oxygenation and ventilation as measured by SpO2 and etCO2. Future data relating these intraoperative variables to outcomes will for assessment of the clinically relevant effects of the utilized settings.
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07AP05-7
Anaesthetic management of a patient with a giant mediastinal tumor.

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Background: Patients with mediastinal masses are a complex challenge for the anaesthesiologist, for their risk of hemodynamic collapse and airway compression. Anaesthetic management must guarantee adequate ventilation, hemodynamic stability and appropriate surgical conditions. Surgical resection is tricky because of the size and compromise of vital organs, and there might be indication for CPB.
Case Report: A 35 year old male with a 6-month history of dyspnea, inability to tolerate supine position, and a 16.6cm diameter mediastinal mass displacing right mainstem bronchus, right atrium, right pulmonary artery, superior cava, innominate, and atelectasis of right inferior lobe. The tumor was embolizated and a stent was implanted in innominate vein. Preoperative blood tests were normal, echocardiogram showed right atrium-cava collapsed and HTP, spirometry showed CVF 41-VEF1 43-VEF1/CVF 103. He had surgical indication with CPB (not offered in our institution) but in imminent collapse was taken to emergency surgery. Femoral central venous access and arterial line were placed; induction with ketamine, dexmedetomidine and fentanyl, no muscle relaxant was used and surgeons were ready for sternotomy. Tranexamic acid, norepinephrine and vasopressin were tirtrated. During dissection patient had cardiac arrest for 1 minute. Massive transfusion protocol was activated (12 RBC, 16 FFP, 12 PLT). Tumor complete resection, superior and middle lobectomy were performed. In ICU patient was extubated after 48h without support
Discussion: Mediastinal masses can cause ventilatory or hemodynamic collapse because of compression on airway, heart, and great vessels. Goals during anesthesia include inducing in sitting position, keeping spontaneous ventilation, avoiding neuromuscular blocker, repositioning, and elevating the mass. Additional support include rigid bronchoscopy and CPB depending on the size and position of the mass
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Learning points: Patients with a mediastinal mass are a high risk population and need multidisciplinary approach. Preoperative evaluation must define anatomy and cardiopulmonary function for anticipating critical events and rational management of life threatening situations. Accomplishment of anesthetic goals impacts on mortality.

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07AP05-8
Protective Effect of Sevoflurane on Inflammatory and Apoptotic Response of Ischemia Reperfusion in A Lung Autotransplantation Model on Pigs

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Background and Goal of Study: Ischemia is part of the physiopathology of several events that happen regularly during surgical procedures. To avoid irreversible cell damage, early circulation reestablishment is essential, but it is during this bloodstream restoration when most injuries occur. This phenomenon is known as ischemia-reperfusion injury (IR). When it takes place in the lung, it is known as lung IR injury (LIRI).
Materials and Methods: The study was performed in a porcine lung autotransplantion IR model. The experiment was conducted in 16 Large White pigs, divided into three groups: control (CON,n=6), which underwent surgical protocol with propofol for maintenance of anesthesia throughout the procedure; preconditioning with sevoflurane (SEVO,n=6) undergoing the same surgical protocol, adding 3% sevoflurane until one-lung ventilation initiation; and sham (SHAM,n=4), the same anesthetic technique as in the control group, but performing only a thoracotomy. The surgical procedure ends 30 minutes after reperfusion of the reimplanted lung lobe, when biopsies are performed. Histological and immunohistochemical studies are performed with specific antibodies in order to identify the inflammatory activity through monocyte/macrophage (MM) infiltration (CD68) and MCP-1 expression and apoptotic activity through Caspase-9 and Bcl-2 expression.
Results and Discussion: LIRI increased the MM infiltration after reperfusion in the control group (CON vs SHAM,p=0.021), and it was lower in the preconditioned lungs (SEVO vs CON,p=0.014). The control group increased the CD68 expression compared to the sham group (CON vs SHAM,p=0.011), as with the sevoflurane group (SEVO vs SHAM,p=0.008). However, this increase was significantly lower in the sevoflurane group (CON vs SEVO,p=0.01). MCP-1 expression was increased in the control group compared to sham group (CON vs SHAM,p=0.013). This increase was significantly lower in the sevoflurane group (CON vs SEVO,p=0.028). Caspase-9 expression was increased in the control group (CON vs SHAM,p=0.005). This increase was lower in the sevoflurane group (SEVO vs CON,p=0.018). The quantitative analysis of immunohistochemical expression of Bcl-2 in the sevoflurane group showed an increase compared to the control group (CON vs SEVO,p=0.007), also observed in the sevoflurane group compared to the sham group (SEVO vs SHAM,p=0.018).
Conclusions: Sevoflurane could play a protective role against inflammation and apoptosis induced by lung IR.

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07AP05-9
High-flow apnoeic oxygenation delivered by LMA or tracheal tube for tracheal resection and reconstruction surgery

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Background and Goal of Study: Airway management for tracheal resection surgery is challenging. The presence of a tracheal tube in the operative field hinders surgery, and intermittent removal and reinsertion of the tube is required to complete the anastomosis. The interruption of ventilation puts the patient at risk of desaturation, may cause surgical delay and can compromise the integrity of the planned anastomosis. Laryngeal Endotracheal Flow or 'LET Flow', is a novel technique that uses a high-flow oxygen delivery device attached directly to a laryngeal mask or tracheal tube in patients with an open distal airway. This provides continuous safe apnoeic oxygenation and removes an airway device from the surgical field.
Methods: We report a case where a high-flow oxygen device, AIRVO™ 2 , was attached to a size three laryngeal mask airway and 100% oxygen at a flow-rate of 40 l.min–1 delivered across an open trachea. This permitted 42 minutes of uninterrupted surgery in an apnoeic female patient with subglottic tracheal stenosis. Oxygen saturations remained above 96% during the apnoeic period and arterial blood gas parameters within acceptable limits. To avoid possible barotrauma or volutrauma as complete tracheal closure approached, flow was reduced to 10 l.min–1 followed by laryngeal mask cuff deflation. Mechanical ventilation recommenced at tracheal closure. 'LET Flow' provided optimal surgical conditions by removing an airway device from the operative field. No urgent interruption of surgery or rescue mechanical ventilation was require
Results and Discussion: The procedure consisted of resecting two tracheal rings and the formation of an end-to-end anastomosis. Arterial blood gases were measured during the period of apnoeic oxygenation at 20 minutes (pH 7.21, PaO2 27.6 kPa, PaCO2 8.5 kPa) and 40 minutes (pH 7.16, PaO2 29.3 kPa, PaCO2 11.0 kPa).
Conclusions: This technique of airway management using high flow oxyen delivery via a LMA or tracheal tube offers major advantages over other techniques currently employed for tracheal resection surgery. These include optimal surgical conditions, continuous oxygenation and improved carbon dioxide clearance, no interruption to surgery to change airway management such as withdrawing or reinsertion of a tracheal tube. LMA use also avoids coughing which risks tearing the anastomosis

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07AP06-1
Circulatory management with monitored anesthesia care for transcatheter aortic valve implantation for low-flow/low-gradient severe aortic valve stenosis

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Background: Low-flow/low-gradient (LF/LG) aortic valve stenosis (AS) is categorized as distinctly severe AS with hemodynamically unstable status. Recently the advantages of monitored anesthesia care (MAC) for transcatheter aortic valve implantation (TAVI) over general anesthesia (GA) have been investigated. Some studies reported the MAC management was associated with smaller use of inotropic/vasopressor drugs. However, such benefits of MAC in patients with strict high risk, including LF/LG AS patients, are not investigated. This retrospective study was aimed to compare the advantage of MAC in normal severe AS patients with in LF/LG AS patients.
Methods: Patients undergoing transfemoral TAVI between May 2016 and October 2018 were recruited. These subjects were primary classified into two groups: patients undergoing GA (GA group) and those undergoing MAC (MAC group). Secondly, subjects in each group were classified into four subgroups: normal severe AS who had undergone GA (normal GA group), LF/LG AS who had undergone GA (LF/LG GA group), normal severe AS who had undergone MAC (normal MAC group) and LF/LG AS who had undergone MAC (LF/LG MAC group). Patient characteristics, preoperative cardiac function, intraoperative use of inotropic agents and fluid infusion, and time courses of procedures and anesthesia were retrospectively investigated. Statistical analysis was performed using a nonpaired t test and the Mann Whitney U test.
Results: Sixty-nine patients in the GA group and 34 in MAC were included. Seventeen patients (16.5%) were categorized as LF/LG-AS. There was no significant difference between the GA group and MAC group in patient characteristics and

preoperative echocardiographic indexes except the aortic valve area. The amounts of intraoperative total fluid infusion (832 ml vs. 687 ml, respectively, P<0.05), phenylephrine (97 mcg in GA vs. 16 mcg in MAC, P<0.05), and ephedrine (5.8 mg in GA vs. 1.8 mg in MAC, P<0.05) were significantly smaller in the MAC group. Although the total amount of intraoperative fluid infusion was significantly smaller in the normal MAC group than in the normal GA group, there was no significant difference between the LF/LG GA and LF/LG MAC group. There were also no significant difference in intraoperative inotropic agent dose between the LF/LG GA and the LF/LG MAC groups.
Conclusion: The results indicate that the advantages of MAC management in LF/LG AS patients are limited compared with those in normal severe AS patients.

07AP06-3
Fluid status optimization during autologous blood exfusion in reconstructive surgery of thoracic aorta

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Background and Goal of Study: Acute normovolemic hemodilution (ANH) is part of a conservation strategy to minimize use of blood products in cardiac surgery. It consists of intraoperative removal of blood from a patient with simultaneous replacement with intravenous (IV) fluids, and reinfusion after cardiopulmonary bypass. However, blood exfusion can cause significant hemodynamic disturbances with hypoperfusion of organs, including the brain. Maintaining isovolemia during ANH entails basic vital functions monitoring which does not precisely reflect the actual volemic status of a patient. Our study aimed to optimize ANH in patients, undergoing thoracic aorta surgery.
Materials and Methods: This prospective observational study included 38 patients, operated on thoracic aorta. Patients were divided into 2 groups: group 1 with advanced hemodynamic monitoring including plethysmography variability index (PVI), cerebral oximetry, stroke volume variability (SVV), cardiac index, stroke volume; group 2 with standard monitoring parameters (ECG, pulse oximetry, invasive blood pressure, CVP). All patients underwent fluid therapy with balanced crystalloid and colloid solutions. Group 1 was additionally subdivided into groups 1A and 1B with balanced crystalloid and colloid fluids infused respectively.
Results and Discussion: No significant differences were found between groups before ANH. Standard monitored values did not differ during ANH. More IV fluids were infused in group 1 than in group 2 (472±166 ml vs 251±52 ml, p<0.05). Cardiac index did not differ between groups before ANH, but was lower in group 2 at the end of exfusion (3.4±0.9 l/(min*m²) vs 2.5±0.8 l/(min*m²), p<0.05). Per baseline SVV, all patients were normovolemic (SCC<10%). At the end of exfusion, patients in group 2 demonstrated hypovolemia (7.2±3% vs 12.7± 5.2%, p<0.05); PVI showed no difference between groups at any stage of ANH. Cerebral oximetry values were lower in group 2 (77±3% vs 72.6±5.5%, p<0.05). On subgroup analysis of groups 1A and 1B, SVV differed at the beginning of ANH (7.9±1.36% vs 7±2.5%) and at the end of exfusion (6.44±1.42% vs 8.5±2.9%). Total administered IV fluid volume was higher in the crystalloid group 1A (520±80 ml vs 400 ±90 ml, p<0.05).
Conclusions: Advanced monitoring can increase the safety of ANH during thoracic aorta surgery. Colloid solutions maintained normovolaemia better than crystalloids during ANH.

07AP06-4
Endovascular Aortic Aneurysm Repair and renal function… is it still a clear picture?

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Background and Goal of Study: Abdominal Aortic Aneurysms are associated with significant morbidity and mortality. Treatment options comprise of amongst other, endovascular aneurysm repair (EVAR). EVAR has traditionally been offered to patients deemed unfit for an open repair, or atomically unsuitable for open procedure. Acute Kidney Injury (AKI) is a known complication of EVAR and is a predictor of poor outcome. The aim of this review was to ascertain the development of AKI following elective EVAR and identify significant risk factors.
Methods: A retrospective analysis was conducted from January 2009 until September 2018 at a tertiary vascular centre in the United Kingdom. All patients undergoing EVAR within this time period were included. Data was collected on demographics, pre-existing chronic kidney disease, risk factors for post-operative kidney injury, contrast load and creatinine levels at baseline, post-operatively at 24 and 48 hours; 1,6 and 12 months. AKI was defined as per the Kidney Disease Improving Global Outcomes (KDIGO) criteria.
Results: 414 patient notes were reviewed. There was no significant difference between creatinine levels pre-op and 24 hours post-operatively. However, at 48 hours there was a significant increase in creatinine levels from pre-op levels. At one month, the creatinine levels were significantly higher than at 48 hours, and at 6 and 12 months they continued to be significantly higher than the pre-op baseline.At 24 hours, 3.5% of patients had a stage 1 kidney injury or worse compared to 5.8% at 48 hours, 3.6% at 1 month and 16.7% at 12 months.
Conclusion: We identified a significant increase in creatinine levels in the immediate post-operative period that was sustained up to 1 year. This correlated with post-operative AKI, however in comparison to previous studies the incidence in our cohort was smaller. We did not find any risk factors to be significant in the development of AKI. Recent NICE guidance has cast a shadow on the future of EVAR repairs, however we propose that with appropriate patient selection and renal protection measures, deterioration in renal function can be minimized [2]
References:
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07AP06-5
Fast-track in endovascular aortic repair with Desflurane and Sevoflurane: a randomized controlled trial.

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Background and Goal of Study: Endovascular aortic repair has emerged as an alternative method of aortic diseases treatment. Currently, fast-tracking patients to early recovery is a growing tendency in order to reduce the complications, shorten the hospital stay, decrease the cost and increase patient circulation. The aim of this study is to clinically compare desflurane and sevoflurane on early recovery patients after endovascular aortic aneurysm repair surgery. No randomized controlled trial exists to evaluate this topic.
Materials and Methods: Forty patients (> 18 years) were randomly assigned to receive Desflurane (n=20) vs. Sevoflurane (n=20) for endovascular aortic aneurysm repair surgery with general anesthesia. The alveolar concentration of the volatile anesthetic was varied to maintain a Bispectral Index value of 40-50. Assessments included recovery times to eye opening, response to verbal commands, orientation and extubation time. This study is registered in ClinicalTrials.gov (Number 2016-003906-16). This study was approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain. All the patients were included after signing an informed consent
Results and Discussion: The two study groups had comparable demographic characteristics. There were no differences with desflurane and sevoflurane in anesthetic and surgical time, and volatile administration time. Recovery times to eye opening (P=0.02), response to verbal commands (P=0.04), orientation (P=0.04) and extubation time (P=0.02) were significantly shorter with desflurane with respect sevoflurane.
Conclusions: Desflurane was clinically superior to sevoflurane with respect early recovery time after endovascular aortic aneurysm repair surgery.
Acknowledgements: study financed by a grant Anestesia and Critical Care (Baxter).

07AP06-6
Importance of intraoperative neurophysiological monitoring (IONM) in assessing spinal cord ischemia (SCI) during thoracic endovascular aortic repair (TEVAR): a case report

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Background: Spinal cord ischemia (SCI) may arise as a result of several causes during thoracic endovascular aortic repair (TEVAR). The simultaneous closure of at least two independent arterial spinal cord supplying vascular territories (ASCSVTs), especially in combination with persistent intraoperative hypotension, is considered to be the most important risk factor [1]. Prolonged SCI (<3-4 hours) causes permanent neurologic injury which renders prompt diagnosis and treatment crucial. Due to the existing correlation between spinal cord perfusion and its neuronal electrical activity, the former can be assessed with the help of intraoperative neurophysiological monitoring (IONM) of somatosensory (SSEP) and motor evoked potentials (MEP) [2].
Case report: Sequential TEVAR was performed on a 73-year-old female with a complex aortic aneurysm. During stent graft deployment in the second procedure, the patient's MEPs and SSEPs began to progressively decrease in amplitude until critical levels were reached. Although arterial hypotension had not been present throughout the procedure, mean arterial pressure (MAP) was slightly increased, and cerebrospinal fluid pressure (CSFP) was decreased —following standard protocol— in order to maintain adequate spinal cord perfusion pressure (SCPP). In spite of these maneuvers, MEPs and SSEPs continued decreasing in amplitude and finally became undetectable. Only after the surgical team was urged to retract the endovascular large bore sheaths needed for graft deployment —thereby restoring sufficient blood flow to an important ASCSVT— did MEPs and SSEPs return to previous values after approximately 30 minutes.
Discussion: The importance of IONM during aortic repair surgery has been addressed by previous research [2]. In this patient, basic spinal cord protection measures (intravenous steroids, euthermia, adequate hemoglobin concentration, among others) and maintaining a seemingly high SCPP did not suffice to avoid intraoperative SCI. Where it not for the data provided by IONM, SCI could not have been diagnosed on time and decisive reversing action would not have been taken.
References:
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2. J Cardiothorac Vasc Anesth. 2013;27(6):1364–73.
Learning points: SCI may arise during TEVAR if SCPP is being compromised by occlusion of multiple ASCSVTs, even with reasonably high MAP and low CSFP.
- IONM is an essential tool to timely diagnose SCI during TEVAR and its use should therefore be further encouraged.

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07AP06-7
An anesthetic case of total arch replacement for right-sided aortic arch in a patient with Kommerell's diverticulum, associated with intra-operative aortic pseudocoarctation and airway obstruction.

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Background: The right-sided aortic arch with mirror image of branching arteries without congenital heart disease is a very rare anomaly and there are few anesthetic case reports focused on this anomaly.
Case Report: A 64-year-old female complained of throat stuffiness, caused by compression of the esophagus by Kommerell's diverticulum. She had a right-sided aortic arch with mirror-image branching(vessels in the following order: left innominate/right common carotid/right subclavian artery). Open total arch replacement combined with the stented elephant trunk procedure was performed via a median sternotomy under deep-hypothermic CPB with SCP. Immediately after separation from CPB, a significant pressure difference between the upper and lower extremities developed.TEE showed an intra-vascular flap-like structure from the distal aortic arch to the descending aorta.We planned a post-operative chest-CT examination and proceeded with surgery. After sternum closure, airway pressure abruptly increased and ventilation became difficult. Immediate broncho-fiberscopy showed tracheal stenosis and ventilation was improved by advancing the tracheal tube distally to the narrowed segment. Post-operative CT confirmed kinking of the open stent graft(aortic pseudo-coarctation) and tracheal compression by Kommerell's diverticulum. The patient was re-transferred to the operating room ,and thoracic endovascular stent-graft treatment was added to the graft-kink portion. Thereafter, the pressure difference between the upper and lower extremities disappeared. At POD4, extubation was done because of relieved airway stenosis.
Discussion: Kommerell's diverticulum with a right-sided aortic arch is a rare congenital anomaly.It can present with symptoms related to the compression of mediastinal structures. Aortic pseudocoarctation due to stent graft kinking is also infrequent complication which is common in severely angulated aortic arch patients1). Anesthesiologists should perform anesthesia for the patients with anatomical aortic arch variants with awareness of the possibility of aortic pseudocoarctation and airway obstruction.
References:
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Learning points: Right sided aortic arch is a rare congenital defect of the aorta. These anomaly has three major vessel branching type and associated anomalies. Anesthesiologists should know the features and possible perioperative complications associated with these anomalies.

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07AP06-8
Incidence and risk factors of myocardial injury after non-cardiac surgery among patients undergoing fenestred and/or branched endovascular aortic aneurysm repair

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Background and Goal of Study: Myocardial ischemia after noncardiac (MINS) surgery is a life-threatening complication whose incidence and risk factors have never been investigated in patients undergoing fenestrated/branched endovascular aortic repair (F/B-EVAR) procedures. These high-risk arteriosclerotic patients suffer intraoperative oxygen delivery and demand imbalance which is among the triggers of MINS. The recently introduced high-sensitivity troponin (hsTnT) may allow a more sensitive and rapid diagnosis of MINS in this population as compared to former troponin assays. Our objectives were to assess the incidence and risk factors of MINS in patients undergoing F/B-EVAR using hsTnT
Materials and Methods: Data from 220 adult patients who underwent F/B-EVAR were extracted from a data warehouse that collects data from our anaesthesia management system, biology and administrative systems. Troponin was assessed daily during the first two postoperative days. And MINS was defined according to VISION studies definition as hsTnT> 14 ng/L (MINS14) and hsTnT> 20 ng/L (MINS20).
Results and Discussion: Among the 220 patients included, 129 (59%) had a MINS14 and 89 (40.1%) had a MINS20. After multivariate logistic regression analysis, age, chronic kidney disease, and anaesthesia duration were independently associated with MINS. Occurrence of MINS were associated with prolonged hospital length of stay and/or a trend toward higher mortality.
Conclusions: After F/B-EVAR surgery the incidence of MINS appeared particularly high regardless of the definition used. The common risk factor identified in all types of MINS were age, chronic kidney disease, and anaesthesia duration. Occurrence of MINS was associated with the worst outcome.

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07AP06-9
Retrograde inferior vena caval perfusion for total aortic arch replacement surgery (RIVP-TARS): a pilot study

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Background and Goal of Study: Antegrade cerebral perfusion (ACP) with lower body circulatory arrest is commonly used for total aortic arch replacement surgery (TARS) of patients with acute type A aortic dissection, but with high mortality and morbidity. This study tests the hypothesis that combination of retrograde inferior vena caval perfusion (RIVP) with ACP improves outcomes by providing the lower body with oxygenated blood.
Materials and Methods: Adult patients (>18 years) scheduled for TARS were randomly divided into ACP or ACP+RIVP groups. The primary outcome was a composite of early mortality and major complications, including paraplegia, postoperative renal failure, severe liver dysfunction, postoperative prolonged intubation (>48 h), and gastrointestinal complications. The second and third outcomes were neurologic complications and resource utilization.
Results and Discussion: This pilot study included 76 patients (n=38 in each group). Primary outcome occurred 23 (60.5%) in ACP and 16 (42.1%) in ACP+RIVP group (P=0.108; RR, 0.69, 95% CI: 0.43, 1.10). Incidences of stroke were similar, but temporary neurologic deficits were lower in RIVP group than ACP group (26.3% vs. 57.9%, p=0.005; RR, 0.53; 95% CI, 0.34, 0.83). ACP+RIVP shortened length of intubation compared with ACP (24.7 hours vs 46.6 hours, p=0.022). Length of hospital stays were also shorter (13.0 days vs 15.5 days, p=0.129) and consumptions of allogeneic red cells [3.8 units vs 6.5 units, p=0.121], platelets [2.0 (2.0, 2.0) units vs. 2.0 (2.0, 3.0) units, p=0.09], and fresh frozen plasma [0.8 (0, 3.0) units vs. 2.0 (0, 4.7) units, p=0.394] were lower in ACP+RIVP group than in ACP group, but without statistical significance.
Conclusions: This pilot study showed that a trend of RIVP combined ACP reduced mortality, major complications and consumption of resources than ACP alone. Our results evoke a large sample, multi-center, randomized trials for ACP+RIVP in TARS.

07AP06-10
Use of clevidipine to facilitate ascending aortic stent placement by controlled hypotension

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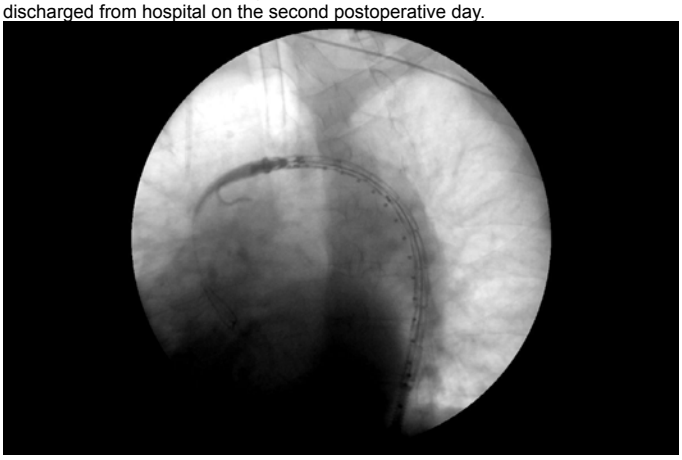
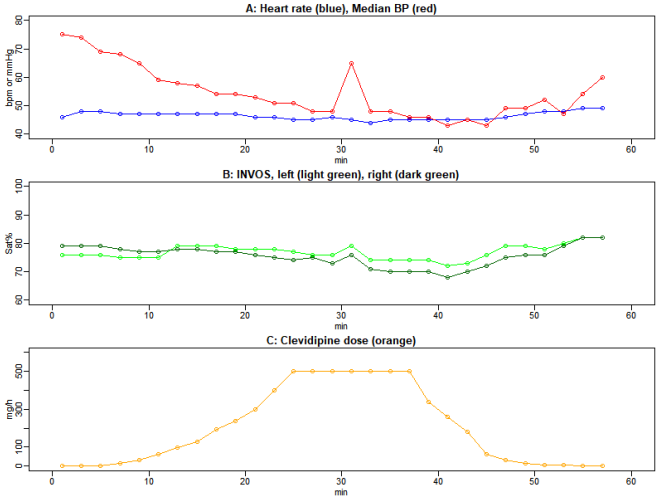
Background: Stent placement in the ascending aorta may be hampered by aortic blood pressure. Clevidipine is a calcium channel blocker type L of dihydropyridine, which reduces peripheral vascular resistance without affecting preload and its effect is easily titrated for its pharmacokinetic properties. We describe a case of aortic stent implantation using clevidipine for controlled intraoperative hypotension.
Case Report: 57-year-old male, ASA IV, with a history of hypertensive heart disease and heart failure NYHA III-IV, diagnosed with a penetrating descending thoracic aortic ulcer and scheduled for ascending aortic stent placement. After monitoring, insertion of subarachnoid drainage and anaesthetic induction, invasive blood pressure was lowered at the beginning of the surgery with progressive doses of clevidipine until reaching an average blood pressure of 50 mmHg and maintaining adequate cerebral oxygenation (INVOS left 76 right 75) and lumbar subarachnoid pressure (12 cmH2O). The maximum dose of clevidipine reached was 500 mg/h. After confirmation of correct stent placement , we progressively decreased the dose of clevidipine until the patient's baseline blood pressure was reached. The patient was extubated in the operating room, remained in critical care 24 hours and was discharged from hospital on the second postoperative day.





Discussion: All the surgery could be performed successfully maintaining the hemodynamic stability of the patient and without affecting the target organs. The clevidipine can confer advantages over the creation of tachyarrhythmias using endocavitary pacemakers.
Learning points: The Clevidipine can be a hypotensor of choice in this type of surgery, optimizing the surgical procedure and allowing the adaptation of the vasculature in the different target organs.

07AP07-1
Multiple neurocognitive testing: a necessity for evaluating the different domains of Postoperative Cognitive Dysfunction (POCD) after endo-CABG and cognitive decline after PCI.

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Background and Goal of Study: POCD is a decline in cognitive function that can last from 1 to 12 months, or even longer, after surgery. This decline may be expressed in a variety of neuropsychological domains including memory, executive functioning and speed of processing. Theoretically, different types of procedures and/or anesthesia may be associated with a different risk profile of decline of individual neurocognitive tests. Endo-CABG is a new minimally invasive endoscopic coronary artery bypass grafting (CABG) technique that requires general anesthesia and retrograde arterial perfusion. Percutaneous coronary intervention (PCI) is a non-surgical treatment for coronary disease and requires only local anesthesia. The aim of this study is to assess potential differences of individual neurocognitive tests results 3 months after endo-CABG versus PCI.
Materials and Methods: Sixty consecutive patients undergoing a endo-CABG as well as a comparative group of 60 patients undergoing PCI and 60 healthy volunteers, to control for learning effect, were enrolled. Six neurocognitive tests were assessed: Rey Auditory Verbal Learning Test (verbal memory), Trail making test A (Processing speed), Trail making test B (Executive functioning), WAIS-III Digit Span Forward (Working memory), WAIS-III Symbol Coding (Processing speed), Grooved pegboard (Motor function). Patients were tested at baseline and at 3-month follow-up. POCD is defined as a Reliable Change Index (RCI) ≤ −1.645 (significance level 5%), or Z-score ≤ −1.645 in at least two different tests.
Results and Discussion: Respectively 14 patients in the Endo-CABG-group, 16 in the PCI-group and 12 healthy controls were lost to follow-up. In the PCI group, patients with POCD showed the worst decline in the Trail making test B (34.5%), followed by WAIS-III Digit Span Forward (21.4%) and Trail making test A (18.0%). Patients with POCD after Endo-CABG group showed the worst decline in the Trail making test B (20.5%), the WAIS-III Digit Symbol Coding test (19.6%) and the Rey Auditory Verbal Learning Test (delayed recall score, 16.6%). (WAIS:Wechsler Adult Intelligence Scale)
Conclusion: Our results suggest that the risk of decline in executive functioning is highest in both groups whereas a decline in other neurocognitive domains is more variable. This shows the need for evaluating all different domains of neurocognitive functioning to diagnose POCD.

07AP07-2
Intraoperative unusual electroencephalogram patterns are associated with neurological outcome in adult patients undergoing cardiac surgery using cardiopulmonary bypass: a retrospective observational study

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Background and Goal of Study: Neurologic complications after cardiovascular surgery including ischemic stroke, delirium, and cognitive decline occur frequently. We have continuously monitored and evaluated simplified electroencephalogram (EEG)/amplitude-integrated electroencephalogram (aEEG) in adult cardiac surgery patients to investigate the evaluation of intraoperative EEG patterns and association to neurological outcome.
Materials and Methods: A retrospective observational study of patients with no history of neurological events, who underwent cardiac surgery using CPB. We implemented intraoperative routine continuous electroencephalographic monitoring for a 2-month period. The NicoletOne® monitor (IMI Corporation; Japan) was used to display the continuous raw EEG curves as well as a 4-electrode amplitude-integrated EEG (aEEG). We also compared the bilateral cerebral tissue oxygenation index (cTOI) data. The bilateral cTOI were measured simultaneously by near-infrared spectroscopy (NIRS, NIRO-200; Hamamatsu Photonics KK; Japan). Delirium was assessed with the Confusion Assessment Method (CAM) for ICU.
Results and Discussion: In total, 14 patients were included and monitoring of aEEG was successfully applied in all patients. aEEG monitoring detects RDA (Rhythmic Delta Activity□pattern in C3 (Case 7) and LPDs (Lateralized Periodic Discharge) pattern in C3 (Case 13) in a raw EEG immediately following aortic cross-clamp release in both cases. The cTOI measurements were also decreased at almost the same time in both cases. Two of the 14 patients (14.3%) had acute postoperative neurologic complications develop. Among the 2 patients with neurologic events, repeated transient myoclonus occurred in 1 adult (Case 13) and postoperative cerebral venous infarction (POCVI) occurred in 1 adult (Case 7) after surgery. Three of the 14 patients (21.4%) had postoperative delirium (POD). No unusual EEG patterns were detected in all the 3 patients with POD.
Conclusions: All patients with intraoperative unusual EEG pattern had neurological events correlate after cardiac surgery. Intraoperative unusual EEG pattern occurrence might be a possible marker of neurological events without POD.

07AP07-3
Cerebral oxygen saturation measured intraoperatively during paediatric congenital cardiac surgery is associated with postoperative outcome

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Background and Goal of Study: Noninvasive cerebral oxygen saturation (ScO_2) monitoring using near-infrared spectroscopy (NIRS) is an established method for guiding care in paediatric patients undergoing congenital cardiac surgery (CCS). Nevertheless, its association with postoperative outcome has not yet been determined.
Materials and Methods: After IRB approval, data were obtained retrospectively of all CCS procedures in our institution from Jan. 2010 until Dec. 2017. ScO_2 was monitored uni- or bilateral on the forehead using NIRS (INVOS® 5100, Medtronic, USA). Baseline ScO_2 was determined after tracheal intubation, before surgical incision (FiO2= 0.3-0.4). The mean of both values was used in case of bilateral ScO_2 monitoring. Subgroups were created based on cardiac pathology as defined previously[1], here summarized as cyanotic or non-cyanotic disease. Poor outcome was defined for length of stay (LOS) in ICU / hospital, and 30-day mortality and was defined when it exceeded the 3rd quartile of that outcome variable per subgroup. Additionally, total time below baseline (TBBL) and time weighted average (TWA; product of time and absolute deviation below baseline ScO2) throughout surgery were calculated.
Results and Discussion: A total of 565 CCS patients were analysed (table 1). Logistic regression reveals baseline ScO_2 to be associated with all investigated variables (Odds Ratios (OR): LOS in ICU = 0.95, LOS in hospital 0.93 ($p<0.001$) and 30-day mortality = 0.94 ($p=0.007$); subgroup was non-significant. TWA was only slightly associated with LOS ICU/hospital (OR=1.02,$p<0.001$); TBBL was non-significant.
Conclusions: In CCS patients, baseline ScO_2 – but not intraoperative ScO_2 decrements – is associated with postoperative outcome. Baseline ScO_2 may allow early identification of patients at increased perioperative risk.
Reference:
1. Fenton et al, Am J Surg 2005;190:260-3

	Non-cyanotic (n=369)	Cyanotic (n=196)
Sex (M/F)	197/172	117/79
Age (yr)	1.6 (4.5)	0.4 (1.0)
ScO2 baseline	68 (16)	60 (18)
LOS-ICU(days)	1 (3)	5 (10)
LOS-H (days)	9 (6)	19 (21)
30-day mortality (%)	2.4	5.6

07AP07-4
Selective antegrade cerebral perfusion during hypothermic circulatory arrest is associated with an increased incidence, magnitude and duration of left-sided cerebral oxygen desaturation

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Background and Goal of Study: Cerebral oxygen desaturation during conventional cardiac surgery has been associated with significant postoperative morbidity; however, less is known about the hemispheric cerebral desaturation asymmetry that occurs during procedures on the aortic arch where selective antegrade cerebral perfusion is used to maintain bilateral brain perfusion during hypothermic circulatory arrest. Thus, the objective of our study was to assess the incidence, magnitude and duration of cerebral oxygen saturation asymmetry during HCA during aortic arch surgery.
Materials and Methods: In this single-centre prospective observational study, we enrolled all consenting patients undergoing aortic arch surgery employing cardiopulmonary bypass and HCA between August 3, 2017 and April 5, 2018. The primary endpoint of the study was the incidence of regional oxygen saturation asymmetry (rSO2) between the left and right cerebral hemisphere, defined as a ≥10% relative reduction in oxygen saturation of the left hemisphere compared to the right. Secondary endpoints included the magnitude (area under the curve) and duration (time under the curve) of asymmetrical rSO2, as well as a composite of postoperative complications.
Results and Discussion: 8 patients (7 men) with a mean ±SD age of 59 ±16.7 years at the time of surgery, were enrolled in our study. The incidence of asymmetrical cerebral desaturation was 62.5%. The median [interquartile range] magnitude and duration of rSO2 asymmetry was 5 [0-19] %·min, and 9 [2-17] min respectively, with the left hemisphere experiencing more prolonged and severe desaturation events.
Conclusions: In summary, our study lends evidence to support that cerebral desaturation occurs during the period of HCA in aortic-arch surgeries, despite concomitant SACP. It also suggests patients may experience asymmetrical blood flow to the brain, with larger decreases in left-sided cerebral perfusion. Our preliminary findings support the rationale to repeat a similar study with a larger study population.

07AP07-5
Postoperative cognitive dysfunction and thoracic surgery

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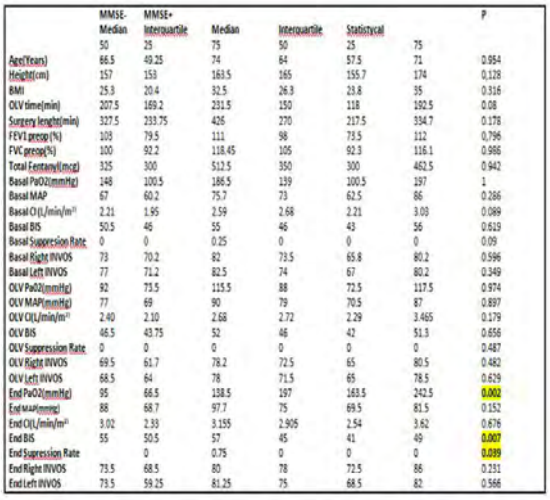
Background and Goal of Study: Previous studies have evidenced that postoperative cognitive dysfunction (POCD) is a common phenomenon after surgery. Hypoxemia is a potential event during one-lung ventilation (OLV) and probably may predispose to POCD. This pilot study investigated the effects of lung surgery with periods of OLV on postoperative cognitive function and its associated factors.
Materials and Methods: After the approval by the local ethics committee, a total of 52 patients who underwent lung resection surgery with periods of OLV were included in a prospective study. All of them were managed with the same anesthetic protocol. Arterial blood was drawn for measurement of respiratory and hemodynamics parameters. In all of them two mini-mental score Examination (MMSE) were performed at 24h before surgery and 3 days after respectively. A drop greater than 3 points in the MMSE (MMSE+) was considered as a positive POCD. The rest of the patients were considered as the MMSE- group. We assessed the following perioperative variables: ASA classification, age, gender, BMI, respiratory functional tests, length of surgery and OLV periods, desaturation events, PaO2, PaCO2 and FiO2, as well as BIS and INVOS® values. Statistical analysis was performed using Mann-Whitney test.
Results and Discussion: Demographic data were similar in both groups. Six of the 52 patients included in the study (11,5%) had a drop greater than 3 points in 3 day after surgery MMSE. No one of them showed symptoms of delirium. Patients in the MMSE+ had lower PaO2 values and a higher BIS suppression rate. In addition to that, this group showed higher BIS values in the last determination during surgery.
Conclusions: We found a lower POCD incidence compared to previous similar studies. The maintenance of an optimal oxygenation and the prevention of BIS suppression periods during the surgery could be related whit this reduction in the incidence founded in our study. Thus, it seems reasonable to increase the sampling size so that we can verify this finding.



	MMSE- Median	MMSE+ Interquartile	Median	Interquartile	Statistycal		P
	50	25	75	50	25	75	
Age(Years)	66.5	49.25	74	64	57.5	71	0.954
Height(cm)	157	153	163.5	165	155.7	174	0,128
BMI	25.3	20.4	32.5	26.3	23.8	35	0.316
OLV time(min)	207.5	169.2	231.5	150	118	192.5	0.08
Surgery lenght(min)	327.5	233.75	426	270	217.5	334.7	0.178
FEV1 precop(%)	109	79.5	111	98	73.5	112	0,796
FVC precop(%)	100	92.2	118.45	105	92.3	116.1	0.986
Total Fentanyl(mcg)	325	300	512.5	350	300	462.5	0.942
Basal PaO2(mmHg)	148	100.5	186.5	139	100.5	197	1
Basal MAP	67	60.2	75.7	73	62.5	86	0.286
Basal CI (l/min/m²)	2.21	1.95	2.59	2.68	2.21	3.03	0.089
Basal BIS	50.5	46	55	46	43	56	0.619
Basal Suppression Rate	0	0	0.25	0	0	0	0.09
Basal Right INVOS	73	70.2	82	73.5	65.8	80.2	0.596
Basal Left INVOS	77	71.2	82.5	74	67	80.2	0.349
OLV PaO2(mmHg)	92	73.5	115.5	88	72.5	117.5	0.974
OLV MAP(mmHg)	77	69	90	79	70.5	87	0.897
OLV CI(L/min/m²)	2.40	2.10	2.68	2.72	2.29	3.465	0.179
OLV BIS	46.5	43.75	52	46	42	51.3	0.656
OLV Suppression Rate	0	0	0	0	0	0	0.487
OLV Right INVOS	69.5	61.7	78.2	72.5	65	80.5	0.482
OLV Left INVOS	68.5	64	78	71.5	65	78.5	0.629
End PaO2(mmHg)	95	66.5	138.5	197	163.5	242.5	0.002
End MAP(mmHg)	88	68.7	97.7	75	69.5	81.5	0.152
End CI(l/min/m²)	3.02	2.33	3.155	2.905	2.54	3.62	0.676
End BIS	55	50.5	57	45	41	49	0.007
End Supression Rate		0	0.75	0	0	0	0.039
End Right INVOS	73.5	68.5	80	78	72.5	86	0.231
End Left INVOS	73.5	59.25	81.25	75	68.5	82	0.566

07AP07-7
Incidence and risk factor of convulsive seizure following thoracic aortic surgery with intraoperative tranexiamic acid

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Background and Goal of study: Perioperative use of tranexamic acid (TXA) is associated with an increased incidence of postoperative convulsive seizures. Thoracic aortic surgery is also known as the risk factor of seizures. However the clinical impact and risk factors of seizures following thoracic aortic surgery with intraoperative tranexiamic acid has not been fully explored.
Material and Methods: After obtaining institutional review board approval, we collected the anaesthesia records, perfusion service records, and data from the intensive care unit (ICU) database of adult patients who underwent thoracic aortic surgery at our hospital from January 2016 to September 2018. Patient characteristics, perioperative data, and the incidence of seizures were collected. A detailed review of patients with seizures was undertaken to identify associated risk factors (e.g., perioperative stroke, preoperative seizures, and perioperative medications), the characteristics of the seizure, and the in-hospital treatment. Logistic regression analysis was utilized to investigate independent effects of perioperative variables on the risk of developing seizures. Previously described risk factors of seizures following cardiovascular surgery (age, gender, and cardiopulmonary bypass time) and factors related to an increase in the cerebral TXA concentration (preoperative serum creatinine, TXA dose) were used for the logistic regression analysis.
Results and Discussion: Fifty adult patients underwent thoracic aortic surgery in surveillance period. In all cases, TXA was administered at 10 mg/kg/h from immediately after the induction of anaesthesia until the end of the surgery. Fifteen patients (30%) developed postoperative seizures. Patient characteristics and perioperative variables were comparable between the seizure group and the non-seizure group except for preoperative serum creatinine. Logistic regression analysis revealed that preoperative serum creatinine (OR 7.48, 95% CI 1.27–44.1, P<0.05) was an independent factor for developing seizures. Seizures did not delay extubation or increase the ICU length of stay. Patients who developed seizures were discharged without any neurological symptoms or newly prescribed anticonvulsants except for one patient.
Conclusion: In current study, the incidence of the seizure following thoracic aortic surgery with intraoperative tranexiamic acid is more frequent than previously recognized. Pre-existing kidney disease is a risk factor.

07AP07-8
Monitoring burst suppression as brain perfusion complementary evaluation in endovascular thoracoabdominal aortic aneurism treatment

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Background: The 30-day mortality increases four times when medium arterial pressure (MAP) is lower than 75 mmHg, bispectral index (BIS) < 45 and minimal alveolar concentration (MAC) < 0.7, called triple low. In elderly patient , male, high ASA score , low BMI (body mass index) and comorbidities (diabetes, systemic arterial hypertension, vascular disease), rate mortality between 30 and 90 days increases by 10% for every 15 minutes of triple low cumulative[1]. Burst suppression (BS) in electroencephalogram patterns is associated to delirium and when it comes with low systemic blood pressure is a mortality predictor.
Case Report: 82 years old, BMI 21,5 , hypertensive and diabetic. CT scan showed a buffered thoracoabdominal aortic aneurysm . Endovascular treatment was indicated. After standard monitoring, observed MAP:96 mmHg, heart rate(HR):53 bpm with sinus bradycardia, BIS:97, BS:0. Preoperative hematocrit: 35%. Sedation with sevoflurane and oxygen inhalation associated with intravenous remifentanil infusion 0,2 µg/kg/min allowed comfortably right deep jugular vein cateter insertion and right radial artery punction. Minimally invasive monitoring with FlotracÆ sensor was used. Induction of anesthesia was performed with etomidate, propofol, and rocuronium. Following endotracheal intubation, monitors showed MAP=74mmHg, HR=45 bpm, BIS 32, BS 21, Systolic Volume (SV)=46, Cardiac Output(CO)=2,2L/min and systolic volume variation (SVV)=29%. Noradrenalin and dobutamin were infused. Small changes on MAP and HR were observed after 10 minutes, CO increases was related to BS fall. Noradrenalin and dobutamin infusion rate were dynamically adjusted during the 8-hour procedure to maintain hemodynamic parameters compatible with BIS= 45, BS=0.
Discussion: BS different from zero occurs on deep anaesthesia, systemic arterial hypotension and hypothermia. It increases delirium and mortality rates when associated to systemic arterial hypotension. MAP = 87 mmHg was not sufficient to provide optimum cardiac output to maintain BS=0. On high risk patients, CO minimally invasive monitoring is important to optimize cerebral monitoring .
References:
1. Willingham MD, Karren E, Shanks AM et al -Concurrence of intraoperative hypotension, low minimum alveolar concentration and low bispectral índex is associated with postoperative death Anesthesiol.2015,123(4):775–785
Learning points: compare minimally invasive monitoring with BS at BIS monitor.

07AP07-9
Defect size and method of repair affect cerebral oxygenation in patients with atrial septal defects.

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Background and goal of the study: Despite being a minor heart defect, neuropsychological impairment has been demonstrated after repair of atrial septal defects (ASD).[1] The underlying etiology is unclear, but increased preoperative cerebral vulnerability or acute cerebral alterations during repair have been suggested. Therefore, the aim of this study is to assess cerebral oxygen saturation (S_cO_2) in order to determine if ASD patients have preoperatively low S_cO_2, or if major changes in S_cO_2 occur during repair.
Materials and methods: After approval by the local ethics committee and written informed consent, patients scheduled for surgical or transcatheter repair of ASD or persistent foramen ovale (PFO) were recruited prospectively. Haemodynamic data and S_cO_2 measured with near-infrared spectroscopy (NIRS) (NIRO 200-NX) were recorded throughout the procedure. Data was compared with analysis of variance and posthoc Tukey test for pairwise comparisons. Correlation analysis was performed by Pearson ρ testing. Statistical significance was accepted at p< 0.05.
Results and discussion: Sixteen patients were included: 7 undergoing surgical ASD repair, 5 transcatheter ASD repair and 4 transcatheter PFO repair. Mean age was 6±4, 22±23 and 52±15 years respectively, (p=0.001). Defect sizes did not differ between groups (17±4, 17±7 and 13±2 mm respectively, (p=0.273)). No differences in preoperative haemodynamic parameters and baseline S_cO_2 were found between groups. The S_cO_2 values were significantly lower during closure in the surgical group compared to the transcatheter groups (49±10% vs 72±4% and 72±7% for transcatheter ASD and PFO respectively, p<0.001). A strong correlation was observed between defect size and baseline S_cO_2 (r=0.79, p=0.036 and r=0.78, p=0.04, for left and right respectively). We do not regard the lower S_cO_2 values during surgical repair as clinically relevant, as it has been demonstrated that the method of treatment does not affect neuropsychological outcome.[1] More interestingly, our finding that larger defect sizes were correlated with lower baseline S_cO_2 suggests that further studies are warranted to determine if the risk of neuropsychological impairment is associated with defect size.
Conclusion: Lower S_cO_2 values were observed during surgical repair of an ASD compared to a transcatheter approach. Larger defect sizes were correlated with lower baseline S_cO_2.
Reference:
1. Sarrechia et al. J Pediatr 2015; 166(1):31-8

07AP07-10
Features of cerebral blood flow dynamics in patients with arterial hypertension during cardiac surgery

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Background: Cognitive dysfunctions (CD) is the most common postoperative neurological complication in cardiac surgery, which is detected in 30%-65% of patients within 1 month after myocardial revascularization and 20%-40% of the examined, during the next five postoperative months. This problem is especially relevant for patients with arterial hypertension (AH).
Goal: To study of the correlation relationship between the mean arterial pressure (MAP) and the velocity of blood flow in the middle cerebral artery (MCA) in patients with AH during coronary artery bypass grafting (CABG) with cardiopulmonary bypass (CPB).
Materials and Methods: The study included 128 patients with coronary artery disease, which was performed by the CABG with CPB. The average age – 62.1 ± 4.8 years. All subjects were divided into 2 groups: 1-st group – 83 patients with AH (II-III degree); 2-nd group – 45 patients without AH. Patients were operated under sevoflurane-based endotracheal anesthesia. Registration of cerebral blood flow was carried out by the method of transcranial doplerography. For neuropsychological testing MMSE-test, FAB-test, clock drawing test and SAGE-test were used.
Results and Discussion: Reduced blood flow in the MCA in patients of both groups was observed at the following stages: induction into anesthesia (by 46.7 ± 2.5% relative to the initial value, p = 0.0139), the onset of hypothermia during CPB (64.2 ± 3, 9% of the initial value, p = 0.0024). There was no significant difference in the levels of the average blood flow velocity in the MCA during the non-pulsative and pulsative CPB modes (p = 0.758). Correlation analysis of the association between MAP and average velocity of cerebral blood flow in MCA in patients with AH revealed a significant correlation weak strength (r = 0.099, p = 0.004). According to the results of the neuropsychological tests, on the 6-th day after the operation, in patients of 1-st group, there was a significant decrease in the results of the MMSE test (p = 0.046) and the SAGE test (p = 0.041) compared to the baseline values. Patients in 2-nd group had no significant difference in the results of all four tests.
Conclusions: Determination of the level of MAP does not allow to fully and properly evaluate the cerebral blood flow. In view of this, we recommend intraoperative monitoring of cerebral blood flow to prevent the development of CD for all patients with AH.

07AP08-1
Anesthetic management for a patient with bronchobiliary fistula after pancreaticoduodenectomy

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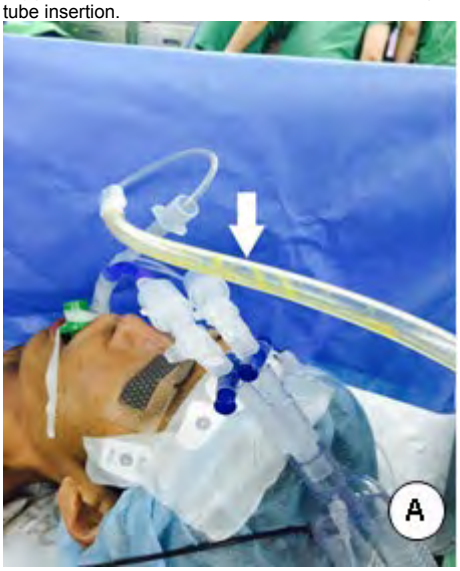
Background: Bronchobiliary fistula (BBF) is a rare disorder characterized by pathological communication between the biliary tract and bronchial tree. Optimal management of BBF remains controversial, depending on the disease severity and extent. Perioperative management of patients with BBF is an anesthetic challenge because they typically exhibit poor lung function preoperatively, require absolute lung isolation intraoperatively and need postoperative respiratory support.
Case Report: A 44-year-old man was referred to thoracic department due to bronchobiliary fistula with pneumonia unresponsive to percutaneous biliary drainage and antibiotic treatment. Anesthesia was maintained with target-controlled infusion of propofol and remifentanil after rapid sequence induction. His oxygenation was improved after repeated suctioning immediately after double-lune tube insertion.



He underwent resection of BBF and right bilobectomy under one-lung ventilation.
Discussion: BBF is a potentially serious disorder with significant morbidity and mortality. The major anesthetic considerations for patients with BBF are avoidance of positive-pressure ventilation before lung isolation and prompt establishment of the lung isolation of the affected lung to protect the uninvolved lung from contamination as well as ventilation during surgery. It is also vital to continue chest physiotherapy, bronchodilators, incentive spirometry, postural drainage and antibiotic treatment in the preoperative and postoperative period to improve respiratory outcome.
References:

1. Liao GQ, Wang H, Zhu GY, Zhu KB, Lv FX, Tai S. Management of acquired bronchobiliary fistula: A systematic literature review of 68 cases published in 30 years. World J Gastroenterol 2011; 17: 3842-9.
2. Mitra S, Bhatia N, Dey N, Dalal U. Bronchobiliary fistula: an anesthetic challenge! J Clin Anesth 2009; 21: 360-2.

Learning points: Anesthesia for patients with BBF should be focused to improve pulmonary function using meticulous lung isolation to prevent flooding of biliary spillage from affected lung to the healthy lung.

07AP08-2
Oxygenation following CO_2 insufflation of the ipsilateral hemithorax during video-assisted thoracoscopic surgery (VATS): A prospective observational study

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Background: VATS is increasingly being used to treat intrathoracic pathologies. VATS requires one-lung-ventilation (OLV), which results in increased shunt fraction and hypoxaemia [1]. An accepted technique to improve surgical condition is by CO_2 insufflation of the ipsilateral hemithorax [2]. We hypothesize that this CO_2 insufflation may also help improve oxygenation during OLV.
Method: Prospective observational study (IRB approved) of patients undergoing VATS with lung isolation for wedge-resection or lobectomy. Arterial cannula was inserted into radial artery prior to anaesthesia induction. Blood gases were analyzed at the following times: baseline (before induction, on room air), 10 minutes after OLV, 5 minutes after CO_2 insufflation by the surgeons and at surgery end (on FiO_2 100%). Haemodynamic parameters were noted concurrently. In the lateral decubitus position, an incision port was used to insufflate the hemithorax using 12cmH_2O of CO_2. The primary outcome of the study was the change in arterial oxygenation from pre-CO_2 insufflation to 5 min following insufflation.
Results: Twenty five patients consented and were analyzed. Patient demographics and perioperative data are presented in tables 1 and 2. Primary outcome: during OLV (FiO_2 100%), CO_2 insufflation significantly increased oxygenation (pO_2) [mean (SD)] from 154 (142) mmHg to 218 (124) mmHg, p=0.004. In parallel, arterial pCO_2 (mmHg) increased significantly from 50 (9) to 56 (13), p=0.019. There were no significant changes in systolic blood pressure before and after OLV and insufflation [114 (23) vs. 126 (27), respectively; p=0.085].
Conclusion: CO_2 insufflation during OLV improves oxygenation, thus offering an additional technique to improve oxygenation in patients with limited reserves without haemodynamic compromise.
References:

1. Slinger P et al. Can. J. Anaesth. 39:1030–5, 1992 [2] Gallego-Poveda J et al. J. Thorac. Dis. 9:903–6, 2017

Table 1 (n=25)

Age mean (SD)	68 (10)
Male n (%)	16 (52)
Smoker n (%)	16 (64)
ASA Score median (range)	2 (1-4)
BMI (kg/m2) mean (SD)	27.2 (7.3)

Table 2 (n=25)

Right side operated n (%)	15 (60)
Lobectomy n (%)	18 (72)
Anesthesia Time (mins) mean (SD)	256 (83)
OLV Time (mins) mean (SD)	144 (58)
Surgery Time (mins) mean (SD)	143 (60)
Bronchial blocker n (%)	17 (68)
Conversion to open n (%)	3 (12)
LOS (days) median (range)	8 (3-19)

07AP08-3
Angulation of the left main bronchus after left upper lobectomy and after lingula-sparing left upper lobectomy - A retrospective comparative study

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Background and Goal of Study: Angulation of the left main bronchus inevitably develops after a left upper lobectomy (LUL) for lung cancer due to upward shift of the remaining lower lobe. When patients after LUL undergo additional right lung cancer surgery using a standard left-sided double-lumen tube (DLT), ventilation failure can frequently occur in those with remarkable bronchial angulation that hampers the appropriate placement of the bronchial port of the tube [Kawagoe I, et al. J Cartiothorac Vasc Anesth. 2016; 30: 961-6]. Recently, a lingula-sparing left upper lobectomy (LSLUL) can be selected for early-stage lung cancer located well within the apical tri-segments. No study has been conducted to evaluate extents of bronchial angulation after LSLUL. We conducted a retrospective study to evaluate extents of bronchial angulation after LSLIL and to compare the extents with those after LUL.
Materials and Methods: We studied 6 patients after LSLUL, who subsequently underwent right lung cancer surgery between 2010 and 2017 at our institution. We evaluated extents of bronchial angulation in these 6 patients, and compared the extents with those in 18 patients after LUL, who were the subjects of the above-cited previous study. Data are shown as median (quartiles) or numbers. Statistical analyses were performed with Mann-Whitney U test, chi-square test, and Spearman's rank-correlation coefficient, as appropriate. P < 0.05 was considered significant.
Results and Discussion: Data related to patients' demography, surgery, airway management, and bronchial anatomy are shown in Table. An angle between proximal and distal portions of the left main bronchus (PL-DL angle) was wider in patients after LSLUL than LUL (p = 0.033, by Mann-Whitney U test), although other variables did not differ between these patients.
Conclusions: Data related to patients' demography, surgery, airway management, and bronchial anatomy are shown in Table. An angle between proximal and distal portions of the left main bronchus (PL-DL angle) was wider in patients after LSLUL than LUL (117vs 100 p = 0.033, by Mann-Whitney U test), although other variables did not differ between these patients.

Table

	LSLUL(n=6)	LUL(n=18)	P
Age	65.5 (56-80)	69(60-77)	0.483
Gender(M:F)	5/3	8/10	0.871
Height (cm)	160.85(150.6-170.6)	158(144.2-174.3)	0.436
Weight (kg)	46.75 (44.7-68)	51.55(38.8-73)	0.445
Present surgery	RUL2/ RLL1/ RPL2/ RA-RUL1	RUL4 /RML1 /RLL1/ RUS6/ RLS 2/ RPR 1	
Devices for lung isolation	L-DLT 5/ SB-L- DLT 1	L-DLT 12/ RDLT 3/ L-DLT+BB 1/ SLT+BB 2	
T-MB angle (°)	138(124-146)	144 (114-153)	0.346
PL-DL angle (°)	117 (104-132)	100.5(81-129)	0.033*
Distance (cm)	3.6 (3.2-5.2)	3.3 (2.2-6.2)	0.34
Remarkable angulation	Yes: No = 0: 6	Yes: No = 7:11	0.177

* P<0.05

Abbreviations: LUL, left upper lobectomy; LUSL, left upper sleeve lobectomy; LSLUL, lingual-soaring left upper lobectomy; RLL, right lower lobectomy; RML, right middle lobectomy; RUL, right upper lobectomy; RLS, right lower lobe segmentectomy; RUS, right upper lobe segmentectomy; RPR, right lung partial resection; RA-RUL, robot-assisted right upper lobectomy; L-DLT, left-sided double-lumen tube; R-DLT, right-sided double-lumen tube; BB, bronchial blocker; SLT, single-lumen tube; SB-L-DLT, Silbroncho® left-sided double-lumen tube; T-MB angle, angle between the trachea and the left main bronchus; PL-DL angle, angle between proximal and distal portions of the left main bronchus; Distance, distance from the trachea to the angulation point

07AP08-4
Serratus Intercostal Plane (SIP) Block in Video-Assisted Thoracic Surgery (VATS).

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Background and Goal of Study: The objective of this study is to evaluate the efficacy and opioid sparing effect of a SIP block in postoperative pain relief after VATS.
Materials and Methods: This randomized, single center, double blinded study included 20 patients scheduled for VATS. Patients were divided into two groups: the intervention group (n=10) received an echo guided injection with a 60 mL mixture of ropivacaïn 3 mg/kg, dexmedetomidine 1 µg/kg and NaCl 0.9%. The control group (n=9) received an injection with 60 mL of NaCl 0,9%. Maintenance was achieved with Sevoflurane and 5-10 µg sufentanil if required based on the hemodynamic evaluation by the attending anesthesiologist. After surgery, all patients received a PCIA pump with sufentanil and dehydrobenzoperidol. The primary endpoint was the opioid use during the first 24 hours after start of surgery. Secondary endpoints were the NRS (Numeric Rating Scale) on day 0 and day 1 after surgery, and the prevalence of postoperative nausea and vomiting (PONV).
Results and Discussion: There was no difference in the total dose of opioids used intra operative (control 15 +/- 3,33 vs SIP 17 +/- 3,5) (p=0,497, Mann-Whitney test) and in the first 24h after surgery between both groups (control 129+/- 48 vs SIP 154 +/- 36) (p=0,905; Mann-Whitney test). On day 0 after surgery, NRS in the SIP group (5,8 +/- 1,7) was not different from NRS in the control group (6,7 +/- 1,5) (p=0,549; Mann-Whitney test). No patient in the SIP group showed PONV on the first day after surgery, and 2 patients in the control group had PONV on day 0 (p=1,115; Mann-Whitney test).
Conclusions: It was not possible to show a difference in opioid use for the first 24h after surgery between the two study groups. Limitations of this study include the small sample size and the heterogeneity of the two study groups (from all demographic parameters we found difference in weight (control group 68,27 +/- 8,3 vs SIP group 85,6 +/- 11,4) (p=0,003, Mann-Whitney test)). It might be possible that SIP block was not correct positioned or that surgery incision was out of the blocked region. But even then the systemic absorbed high dose of dexmedetomidine should have made a difference in the required anesthetic doses. The free use of opioids intra operative might have blinded it. Future research will be necessary to confirm these data because initial clinical data were promising and given previous studies with documented efficiency of SIP blocks.

07AP08-5
Acute kidney injury after minimally invasive lung lobectomy: a retrospective analysis

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Background and Goal of Study: Acute kidney injury (AKI) is a rare but significant complication after major lung resection. The aim of this study was to investigate the incidence of postoperative AKI after minimally invasive lung lobectomy (MIS) along with any intraoperative factors that may affect it.
Materials and Methods: After IRB approval, we reviewed 200 medical records of patients who underwent MIS. Every patient had general anesthesia with fluid restrictive management and was extubated in the operating room. Patients were divided in two groups: AKI and non-AKI using the Acute Kidney Injury Network (AKIN) definition. For each patient demographic characteristics and perioperative data were queried.
Results and Discussion: The 22 patients who met the criteria for postoperative AKI were slightly older, with hypertension, diabetes mellitus and coronary artery disease. Nephrotoxic chemotherapy treatment, non-steroidal anti-inflammatory drugs and angiotensin-converting enzyme (ACE) inhibitors were used more commonly. There was no significant difference in surgical duration, intraoperative fluid replacement and vasopressor requirements between the two groups. However, there was a trend in more episodes of intraoperative hypotension in the AKI group. There was no correlation between intraoperative urine output (cc/kg/hr) and fluid administered (cc/kg/hr), or dose of vasopressors. Fourteen of the 200 patients analyzed had preoperative renal dysfunction which worsened in the postoperative period, accounting for 23% of the AKI patients. Length of stay in PACU and in the hospital were not significant between the two groups.
Conclusions: Our preliminary data show an 11 % incidence of postoperative AKI after MIS lung lobectomy. Hypertension, diabetes, ACE inhibitors and maybe intraoperative hypotension seem to be contributing factors. Stricter blood pressure control may be beneficial to prevent this complication.

07AP08-6
An infusion of harm? The use of remifentanil for thoracic surgery.

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Background and Goal of Study: Advances in technology have allowed minimally invasive approaches for thoracic surgery. Lobectomy can be performed through open thoracotomy, video assisted thoracoscopy (VATS) or robot assisted (RATS). This has encouraged 'fast track' anaesthetic approaches to improve recovery time e.g. short acting analgesics such as remifentanil. However, the use of remifentanil may also cause harm in the form of hyperalgesia and therefore paradoxically increase pain[1].
Materials and Methods: We conducted a prospective observational study of pain outcomes following all thoracic surgery over a five week period at Barts Heart Centre in London, collecting the following outcomes at 24, 48 and 72 postoperative hours: Numerical rating scale (NRS; 0-10) of pain, at rest and following movement, as well as analgesic requirement. We used a multivariate regression model to assess independence of predictive power for putative risk factors.
Results and Discussion: Data from 80 patients revealed that the use of remifentanil significantly increased the NRS in recovery and at 24hrs after the surgery, both at rest (5±2.4 vs. 7±2.5 p-value=0.004) and with movement (5±2.4 vs. 7±2.5 p=0.019) but with no difference in mean postoperative opiate requirement (7.8±8,4 vs. 6.3±5.9 mg p-value=0.51). This effect failed to persist beyond 24hrs after the surgery. Other putative risk factors failed to predict NRS at any time point: Age, gender, patient weight, chronic pain, duration of surgery, surgical technique and use of regional anaesthesia. Remifentanil use also increased length of stay (5±3.3 vs. 10±7.7 days p-value<0.001.) This effect disappears during multivariate analysis when including other predictive risk factors: surgical incision, patients weight, postoperative opioid requirement and use of regional anaesthesia- with only patient weight remaining an independent predictor. Remifentanil's unique pharmacodynamics make it a popular choice for intraoperative anaesthetic use but it may also lead to increase postoperative pain and length of stay. Although this study included only 80 patients, we were able to demonstrate significant effect in patients recovery.
Conclusion: The use of remifentanil in thoracic surgeries can adversely affect postoperative pain and may be linked to increased length of stay.
1. Yu, E. H., Tran, D. H., Lam, S. W. and Irwin, M. G. (2016), Remifentanil tolerance and hyperalgesia: short-term gain, long-term pain?. Anaesthesia, 71: 1347-1362

07AP08-7
Correlation between intraoperative infusion with postoperative development of acute respiratory insufficiency in thoracic patients

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Background and Goal of Study: find correlation between rate and volume of operative infusion and development of postoperative acute respiratory insufficiency (ARI) in thoracic patients.
Materials and Methods: we performed retrospective analysis of 416 clinical records with open pulmonary surgery. Patients were divided into 2 groups: with postoperative ARI (n-53) and without ARI (n-363). We administered for anaesthetic management sevoflurane, rocuronium bromide, fentanyl and constant epidural infusion of 0,2 ropivocaine solution and protective one-lung ventilation. According to intraoperative infusion rate of solutio Ringer all patients were divided into subgroups: 2ml/kg*h (n 52); 3 ml/kg*h (n 111); 4 ml/kg*h (n 145); 5 ml/kg*h (n 12); 6 ml/kg*h (n 48); 7 ml/kg*h (n 22) and 8 ml/kg*h (n 26). We analysed fluid balance during the first day, PaO2/FiO2 ratio, SvO2, x-Ray findings and developed postoperative complications. Statistical results were processed by Student criterion, $\chi 2$ test and Mann Whitney U test.
Results and Discussion: In 53 cases we observed postoperative ARI manifested as a lowered index of oxygenation and pulmonary infiltration. Infusion in patients with ARI was 6 ml/kg*h (n 16); 7 ml/kg*h (n 17); 8 ml/kg*h (n 20). Patients with ARI demonstrated positive daily fluid balance as well. Six patients died of pneumonia and sepsis, two of bronchial stump insufficiency, empyema and sepsis. We defined direct correlation (r 0,915697) between infusion rate and postoperative ARI frequency. Thus, infusion rate > 5 ml/kg*h and «positive» fluid balance after the operation were significant predictors for decreased PaO2/FiO2 and development of postoperative ARI. Besides, intraoperative SvO2 was authentically lower in patients with developed postoperative ARI.
Conclusion: Correlation between intraoperative infusion rate and frequency of postoperative ARI is direct and high (r 0,915697). With intraoperative infusion 5 ml/kg*h rates of postoperative ARI and length of hospital stay are decreased and mortality rate decreases from 11,3 % to 0.
Conclusions: So, infusion rate > 5 ml/kg*h, positive fluid balance, postoperative decrease of SvO2 and PaO2/FiO2 are risk factors and predictors of ARI development after the operation.

07AP08-8
Optimal positive end-expiratory pressure register during one-lung ventilation in thoracic surgery, in a Spanish hospital

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Background and Goal of Study: The use of positive end-expiratory pressure (PEEP) and alveolar recruitment maneuvers (ARM) reduces the incidence of postoperative pulmonary complications. There is no consensus between the use of a standardized or individualized level of PEEP during one-lung ventilation (OLV). The aim of this study was to get a record of the optimal PEEP (PEEPo) after the ARM during OLV performance according to usual anesthetic practice and to assess if there is a relationship between the PEEPo level and physical, ventilatory and gasometric characteristics.
Materials and Methods: This was a descriptive, observational, prospective and unicenter study. After approval of ethics committee, 129 patients undergoing thoracic surgery under general anesthesia with OLV, ARM and adjustment of PEEPo were enrolled. Preoperative arterial blood samples, preoperative lung mechanics and intraoperative data were recorded. General patient characteristics, ARISCAT index, pulmonary history, surgery conditions, mechanical ventilation management, perioperative values of dynamic Compliance (Crs) and Driving Pressure (DP) were recorded. Heterogeneity of PEEPo was evaluated. Descriptive statistical analysis, Kolmogorov-Smirnoff, Chi-square and Mann-Whitney U tests and Spearman correlation were performed with IBM SPSS Statistics software. P<0.05 was considered statistically significant.
Results and Discussion: A total of 129 patients with a median age 67, weight 74, BMI 26 and ARISCAT index 50, were included. A PEEPo of 10±2 cmH2O (Median±IQR) was observed. PEEPo values were not normally distributed (p<0.001). PEEPo correlated in a significantly and directly proportional way with Real weight (kg) (ρ=0.324, p<0.001), BMI (kg/m2) (ρ=0.303 and p=0.001) and improvement of Crs (cmH2O) (ρ=0.237 and p=0.008). It correlated in a significantly and inversely proportional way with PaO2 (mmHg) (ρ=-0.443 and p=0.03). Significant differences were observed between the levels of Crs and DP, basal and after ARM (p<0.001). Before the intraoperative pulmonary management, 125 patients (96.9%) had a low Crs and 33 (51.56%) have a low DP. After this, an increase of Crs (p<0.001) and a decline of DP (p<0.001) were observed. 85 patients (65.9%) achieved a normal Crs and 109 (89.3%) had a low DP.
Conclusions: During OLV, PEEPo is patient dependent and significant superior to PEEP basal established. After the MRA and adjustment of PEEPo, significant higher Crs and lower DP values were observed.

07AP08-9
Half-lung ventilation in a lobectomized, coronary patient.

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A 78- year old male diabetic, coronary patient is diagnosed with sarcoma with pulmonary metastatic lesions and is taken for lower right lobectomy 6 months after a medicated coronary stent. Two weeks later on a new CT scan two 1 cm nodules are found in the contralateral lung. The patient is then scheduled for wedge resection of the nodules. On pre-anesthetic assessment the patient shows no dispnea, preserved LV-EF, normal EKG, fair renal function, and a predicted Postop. FEV1 >40%.
Anesthesia was given with TCI-propofol/remifentanyl TIVA with rocuronium and low-dose noradrenaline to maintain median arterial pressure above 65 mmHg. The patient is then intubated with a left double-lumen tube, positioned on right lateral decubitus, and left lung is isolated for surgery. At first, monopulmonary ventilation with 5 ml/kg tidal volume on VCV-AF provoques Pplat >30 cmH2O; therefore considering the previous lobectomy on this patient, VT is reduced to 4ml/kg with reduction of Pplat to 23 cmH2O. Procedure is finished without inconvenients, the patient is reclutated and an US-guided ESP block is made. Extubation is carried out without complications and the patient is taken to the PACU, then general ward. No cardiac nor respiratory complications were present. The patient is discharged from the hospital on Pop day 1 and seen a week later in satisfactory conditions.
Monopulmonary ventilation is usually performed with the same tidal volume as regular mechanical ventilation. Nevertheless in this patient, low tidal ventilation of 5-6 ml/kg as recommended (1) could be excessive for "half-lung" (being ventilated only on right superior and medium lobes), with due excessive afterload on the right ventricle of an ischaemic heart and risk of volutrauma and baro-trauma of the remaining lung (2) . On this case adequate ventilation and oxygenation was achieved with tidal volume of 4ml/kg and minute volume of 6.4L without excessive pressure of the airway and no postoperative morbidity so-far.
1. Miller's Anesthesia. 8-ed Elsevier; 2014
2. Tobin M. Principles And Practice of Mechanical Ventilation. 3-ed. McGraw-Hill; 2012

The importance of this case is consideration of extraordinary circumstances in extraordinary patients. By-the-book ventilation on this patient could have caused lung injury or cardiovascular collapse. An anaesthesiologist must be able to think outside the box to achieve optimal ventilation for the patient, while maintaining oxygenation without cardiopulmonary injury

07AP08-10
Opioid-free anaesthesia. A challenge in Thoracic Surgery. Case report.

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Background: Opioid-free anaesthesia (OFA) benefits might be, the reduction of chronic postsurgical pain development and the prevention of cancer recurrence. Thoracic surgery is known to be one of the most painful surgeries in the postoperative period.
Case Report: Male adult, aged 27-year-old, diagnosed with Ewing's sarcoma in the clavicle (rare primary site) scheduled for clavicle and first rib resection. We initially carry out an ultrasound-guided interscalene Brachial Plexus Block, combined with superficial cervical plexusblock, ropivacaine 0,375% + mepivacaine 1% (15 ml). We then performed a balanced general anaesthesia with sevoflurane and intubation with double lumen tube. Then, we performed an ultrasound-guided Paravertebral Block T3 level and we placed a catheter. We administered ropivacaine 0,375%(20 ml). As multimodal analgesia we added a bolus of Ketamine 0,5 mg/kg (25 mg), NSAID and paracetamol. The patient had haemodynamic stability during all the procedure. The first VNRS in the recovery room was 0. No consumption of opioids during the first 24 hours was reported, neither during all the hospital stay, with VNRS 0. The pain was managed with NSAIDs, paracetamol and continuous paravertebral catheter with ropivacaine 0,2% in a rate of 6 ml/h during 4 days.
Discussion: We decided that a combination of interscalene and paravetebral blocks plus multimodal analgesia, to approach pain during and after the surgery avoided opioids in an oncologic patient. Chronic postsurgical pain is currently considered a major concern and its prevention is an indicator of healthcare's quality. The preventive role of OFA deserves some attention. In addition, the role of opioids in cancer recurrences after oncologic surgery is still debated. OFA may help to avoid opioids for postoperative pain control. However, there is currently a lack of accurate monitoring to measure intraoperative nociception to evaluate OFA.
Learning points: OFA stands as a new paradigm, which questions anaesthesiology practice and might help to rationalize perioperative opioid use. Studies are needed to establish new guidelines.

07AP09-1
Intraoperative oesophageal doppler monitoring in paediatric cardiac surgical patients: Analysis of a pilot study

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Background and Goal of study: Cardiac output (CO) monitoring in paediatric cardiac surgical patients is essential and deserves special consideration. Oesophageal doppler monitor(ODM) is a minimally invasive CO assessment device that has been earlier used in paediatric patients. We intended to observe the intraoperative CO trends in cyanotic and acyanotic paediatric cardiac surgical patients who undergo corrective open heart surgery.
Materials and Methods: After obtaining institutional ethics committee approval and written informed consent from the parents of the selected paediatric patients, we recorded intraoperative ODM based CO measurement using Cardio QP™ CO monitor device in 19 paediatric patients (8-Cyanotic;11-Acyanotic) having congenital heart disease (CHD) undergoing open heart corrective surgery. In all patients demographic data, procedural data, clinical based data (heart rate, blood pressure, SpO_2, temperature, SaO_2, $ScvO_2$), ODM based data (stroke volume index, peak velocity, flow time corrected, minute distance-MD, CO) and derived data (cardiac index-CI, SVRi, DO2i, VO2i, inotrope score) in 4 time frames (T1- after anaesthesia induction; T2-Before initiating CPB; T3-after weaning off CPB; T4-At the end of the surgery prior to ICU transfer) were noted.
Results and Discussion: Both the cyanotic and acyanotic CHD patients were comparable with respect to age and BSA. In cyanotic CHD patients CI and MD were lower in T2,T3,T4; DO2i and PV was lower in T2,T4; SVRi was higher in T2,T4 in comparision to the acyanotic CHD patients. There was no difference in the clinical based data except for SpO_2,SaO_2 that were lower in T1,T2 in the cyanotic patients. VO_2i, inotrope score were also no different between the two groups. The cyanotic group of patients had increased CPB, aortic cross clamp time and longer ICU stay. Statistical analysis was performed using SPSS version 17.0. A two-way repeated measure of ANOVA was used to compare cyanotic and acyanotic groups. $P \leq 0.05$ was considered statistically significant for all the tests.
Conclusions: ODM can be a useful CO trend monitor device in paediatric cardiac surgical patients. Patients with cyanotic CHD have significant lower cardiac index intraoperatively in contrast to acyanotic patients. Increased systemic vascular resistance may contribute significantly to this state. We suggest further studies that involve continuation of the ODM based CO monitoring into the postoperative period in cyanotic CHD patients.

07AP09-2
Dual-sensor heat flux thermometer in off-pump cardiac surgery: method-comparison observational study

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Background and Goal of Study: Intraoperative hypothermia remains one of the most widespread complications of anesthesia. The cornerstone of temperature management is its continuous monitoring. Current methods of core temperature measuring are either invasive or inaccurate. Lack of widely available, reliable, non-invasive thermometers inspired us to compare a new dual-sensor heat flux thermometer (DST) with other commonly used methods of core temperature monitoring during general anesthesia in cardiac surgery patients.
Materials and Methods: This prospective observational study included 30 patients, who underwent off-pump coronary artery bypass surgery. The temperatures obtained using the double-sensor heat flux thermometer (Tcore™, Drägerwerk AG & Co, Lubeck, Germany) were compared with those from the forehead surface, external auditory canal, urinary bladder, rectum and the nasopharynx. Patients had balanced multicomponent general anesthesia. Forced-air warming was used. All temperatures were recorded at 15 minutes intervals. Agreement was assessed using the Bland-Altman random effects method for repeated measures data and correlation analysis.
Results and Discussion: Subjects were monitored from admission to the operating room until transfer to the ICU. The average temperature measured by the DST was 36.24 ± 0.46 °C. The DST showed the strongest correlation with the nasopharynx ($r=0.908$, $p<0.05$) and external auditory canal ($r=0.826$; $p<0.05$); but bladder - DST ($r=0.774$, $p<0.05$), rectum - DST ($r=0.655$, $p<0.05$) and the surface of the forehead - DST ($r=0.521$, $p<0.05$) coefficients were relatively lower. The mean bias between the DST and other methods of measurement: bladder (-0.31 ± 0.61 °C); rectum (-0.41 ± 0.43 °C); nasopharynx (-0.12 ± 0.44 °C); forehead skin-surface (1.25 ± 0.87 °C); external auditory canal (-0.09 ± 0.51°C). According to observed agreement between the DST and such precise methods of temperature measurement as nasopharyngeal and external auditory canal probes, we conclude that the level of accuracy of the DST is suitable for intraoperative clinical use.
Conclusions: The double-sensor heat flux thermometer is noninvasive alternative to other established core temperature monitoring methods. It demonstrates high informativity and accuracy during general anesthesia in patients, undergoing off-pump cardiac surgery.

07AP09-3
Failure of Ea_{dyn} to predict the pressure response after fluid challenges during cardiac surgery

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Background and Goal of Study: Dynamic arterial elastance (Ea_{dyn}) is the ratio between pulse pressure variation (PPV) and stroke volume variation (SVV) (1). Ea_{dyn} has been proposed to predict the response in mean arterial pressure (MAP) after a fluid challenge (FC) (1). In the present study, we hypothesised that Ea_{dyn} was correlated to the MAP response after fluid challenge during two phases of off-pump coronary artery bypass graft (OPCAB) surgery.
Materials and Methods: This study was a post hoc analysis of another study (2). Two study windows during OPCAB surgery were defined, 1: after anaesthesia induction until surgical incision, 2: during left internal mammarian artery surgical preparation. Each window consisted of a 10-15 min observation period after which a FC was performed (5 mL kg^{-1}). Ea_{dyn}, obtained by FloTrac/EV1000® (Edwards Lifesciences, Irvine, US), was extracted before each FC and related to the MAP response, defined as the relative change in MAP from before FC to after FC. Spearman's rank correlation between MAP response and Ea_{dyn} was reported for the entire group for each study window and stratified for the two subgroups by stroke volume (SV) response after the FC. SV responders were defined as a SV increase of 10% or more after the FC.
Results and Discussion: 61 patients were included in the original study (2). Baseline Ea_{dyn} was obtainable in 34 patients before the first FC and in 50 patients before the second FC. 21 (62%) were SV responders to the first FC and 22 (44%) SV responders to the second FC. The relation between baseline Ea_{dyn} and MAP

response is illustrated in Figure 1. Baseline Ea_{dyn} was not correlated to the MAP change in any of the study windows. Stratifying a positive/absent SV response to the FC did not improve the correlation to the MAP response.
Conclusion: Ea_{dyn} failed to predict the pressure response after fluid challenge in cardiac surgical patients, both under closed and open chest conditions.
References:
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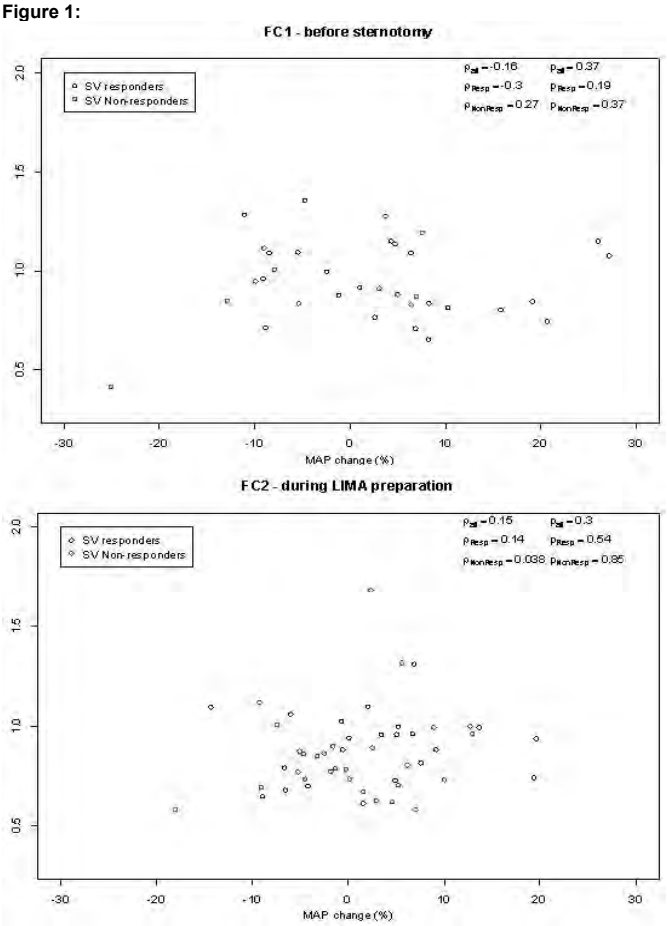
Figure 1:



07AP09-4
Ephedrine and phenylephrine exert different effects on paraspinal oxygen saturation, measured with near-infrared spectroscopy

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Background and Goal of Study: Ischaemic spinal cord injury (SCI) is a devastating complication following surgical repair of aortic aneurysms and dissections. Strategies involving minimizing the risk of ischaemic spinal cord injury (SCI) during surgical repair of aortic aneurysm/dissection are aimed at augmenting spinal cord perfusion. Since according to the Collateral Network Concept, the paraspinous vasculature is involved in the spinal cord blood supply, near-infrared spectroscopy (NIRS) monitoring of the paraspinal musculature is a potential monitoring technique for SCI (1). No clinical trials have investigated the effect of different vasopressors on regional paraspinal oxygen saturation ($rS_{ps}O_2$). The aim of our study was to assess the effect of a bolus administration of ephedrine (E) or phenylephrine (PE) on $rS_{ps}O_2$ in patients not at risk for SCI.
Materials and Methods: We conducted a single centre, non-blinded, randomized controlled trial in 28 patients, scheduled for percutaneous transluminal angioplasty of the lower limb. Six NIRS sensors (INVOS 5100C; Medtronic, MN, USA) were applied paraspinal at T_3-T_4, T_9-T_{10} and L_1-L_2. Patients were randomized into four different treatment protocols (E-PE-E, PE-E-PE, PE-PE-PE, E-E-E). When MAP decreased more than 20% from baseline, blood pressure was increased to baseline values with incremental doses of E or PE, according to the randomization. The concomitant changes in $rS_{ps}O_2$ and haemodynamics were recorded.
Results and Discussion: There was no crossover effect between drugs. The mean administered dose of E was 17.9±20.2 mg. The mean administered dose of PE was 88.1±66.1 µg. With E, $rS_{T3\text{-}T4}O_2$, $rS_{T9\text{-}T10}O_2$ and $rS_{L1\text{-}L2}O_2$ significantly decreased compared to PE, with a difference of resp. -1.4% (p=0.006; CI -2.4; -0.4), -2.0% (p<0.001; CI -2.8; -1.1) and -1.5% (p<0.001; CI -2.3; -0.8). The mean estimated effect for E and PE was resp. -0.7% (CI -1.6; 0.1) and 0.7% (CI -0.2; 1.5) for $rS_{T3\text{-}T4}O_2$, -1.3% (CI -2.4; -0.2) and 0.7% (CI -0.4; 1.8) for $rS_{T9\text{-}T10}O_2$, and -1.5% (CI -2.2; -0.7) and 0.0% (CI -0.7; 0.8) for $rS_{L1\text{-}L2}O_2$.
Conclusion: Since E decreased $rS_{ps}O_2$ compared to PE, PE might offer a better protection against SCI.
References:
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07AP09-5
Coronary sinus of the heart: a vein with pressure waveform of a ventricle. Pressure tracings after catheterisation of the coronary sinus for the administration of retrograde cardioplegia.

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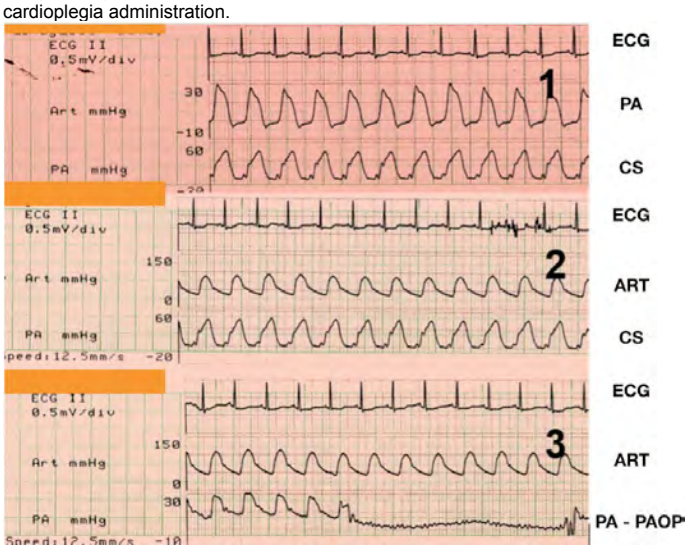
Background: Retrograde cardioplegia administration, through a catheter in the coronary sinus (CS), offers protection during cardiac surgery. Correct positioning is verified by TEE or by recognition of the pressure waveform. This case report aims to describe the waveforms observed during catheterisation of the CS and the underlying physiology.
Case Report: A 65yr old male undergoes CABG surgery with extracorporeal circulation. After cannulation, a catheter for retrograde cardioplegia is inserted in the right atrium. The CS pressure and the rest invasive pressure waveforms are recorded. CS waveform resembles that of a ventricle and presents early and late systolic peak (M shape), and a diastolic phase, according to the cardiac cycle. The pressure is recorded even after introduction to extracorporeal circulation, but gradually decreases until aorta cross clamp. The waveform disappears after cardioplegia administration.



Discussion: Data on CS waveform are scarce and do not describe underlying physiology. Knowledge of morphology is necessary to confirm correct positioning of the catheter. When it is introduced in the CS without occluding it, CS pressure morphology is similar to CVP, due to the effect of atrial systole and diastole. Advancing the catheter results in a higher systolic wave (Peripheral Coronary Venous Pressure), timed to the LV systole. Further advancement to wedge position produces the Coronary Sinus Occlusion Pressure waveform. CSOP changes during the cardiac cycle parallel changes in coronary venous flow. Coronary vessels form a transmural blood pool, which acts as muscle pump. This “third ventricle” is filled during diastole and empties during systole, diverting flow towards coronary veins. There is correlation of the CSOP waveform to the LV pressure waveform and between their end-diastolic values. CSOP gradually decreases until aorta cross clamp, due to reduction of blood flow in the coronary circulation. After cardioplegia administration the waveform disappears.
Learning points: Data on CS pressure waveform are scarce. Knowledge of morphology of CS tracing is necessary to verify correct positioning of the catheter for retrograde cardioplegia.

07AP09-6
Multivariate analysis of factors associated with transit-time flow measurement during coronary artery bypass graft surgery

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Background and Goal of Study: Transit-time flow measurement (TTFM) is a commonly used intraoperative method for intraoperative quality control during coronary artery bypass grafting (CABG). Several studies have evaluated TTFMs' ability to demonstrate graft failure intraoperatively. However, the perioperative factors affecting TTFM during CABG surgery is poorly reported.
Materials and Methods: We enrolled 60 patients underwent CABG surgery (52 patients by off-pump and 8 patients by on-pump). We prospectively collected patients' demographic data (age, sex, height, weight), past medical history (hypertension, diabetes mellitus, chronic renal failure, history of percutaneous coronary intervention, history of statin medication), Euroscore, preoperative blood laboratory data and intraoperative data (intraoperative fluid amount, operative time, vital record). At the beginning of study, we assume that the blood viscosity is associated with TTFM. So, TTFM and blood viscosity were measured with hemodynamic data and arterial blood gas analysis both right after left internal mammary artery (LIMA) to left descending artery (LAD) anastomosis and before skin closure. Transit time flow measurements were analyzed for mean flow (ml/min) and pulsatility index (PI). We performed multiple linear regression analysis with TTFM as dependent variables.
Results and Discussion: The amount of intraoperative transfusion was significantly associated with TTFM (p = 0.002). TTFM was significantly related to the following explanatory variables: sex, body mass index (BMI), preoperative ejection fraction (EF), intraoperative total blood volume, systemic blood pressure and mean blood pressure. But the viscosity and Hemoglobin of blood sampled when TTFM was measured and diastolic blood pressure were not significant.
Conclusions: The viscosity of blood sampled when TTFM was measured were not associated with TTFM differently than expected. So, blood viscosity does not affect TTFM. But intraoperative blood volume is important factor affecting TTFM. Also, systolic and mean blood pressure are associated with TTFM. We suggest that intraoperative hypotension and volume depletion can reduce success rate of CABG.

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07AP09-7
Postoperative Monitoring for New Onset Atrial Fibrillation after Cardiac Surgery with a wireless Holter-like Device Does Not Show Obvious Clinical Benefit

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Background: The peak incidence of new onset atrial fibrillation NOAF is from postoperative day (POD) 1-4 but can occur beyond that. Continuous ECG monitoring for NOAF after discharge from the ICU or high dependency (HD) is impractical. We investigated if using a wireless Holter-like device to monitor for NOAF after ICU/HD discharge would be practical and useful.
Methods: With IRB approval, 107 adult patients undergoing elective coronary artery bypass grafting (CABG) were recruited. Patients with a history of AF or who had AF on preoperative ECG were excluded. Anaesthesia and surgical techniques were left to the discretion of the attending physicians. Postoperatively patients were monitored with continuous ECG in the ICU/HD and upon discharge to the general ward, had a lightweight wireless ECG device (Spyder) attached to left side of the chest using adhesive electrodes. This was paired to a dedicated smartphone which allowed continuous ECG to be transmitted to a cloud server and read offline by a cardiologist. Patients were asked to wear the Spyder up to 2 weeks. Demographic, anaesthetic, surgical, acceptability and outcomes data were collected. Patients were followed-up at 6 months for atrial fibrillation, stroke, heart failure, anti-platelet therapy, and anti-coagulant therapy.
Results: The patients were 60.7 ± 8.3 years old; 82% male, 76% were hypertensive and 45% were diabetic. Patients wore the Spyder a mean of 4 days postoperatively, but 23% of the patients wore it for less than a day because of itch and rashes caused by the adhesive electrodes. 27 of 107 patients (25.2%) developed NOAF. Of these, 19 developed NOAF in the ICU/HD and 6 were detected in the general ward on POD 3-4 both clinically and by the Spyder device. Two patients had NOAF at home on POD 5 & 13. Both patients were asymptomatic and were referred to their cardiologists but no additional investigations or interventions were done. Three patients died including 2 who had NOAF; one of whom had a stroke. At 6 months follow-up, none of the patients with NOAF were still in AF.
Conclusions: Beyond standard care, the Spyder was able to diagnose asymptomatic NOAF in patients after hospital discharge but did not alter their management. Almost a quarter of the patients developed significant itch and rashes during monitoring. We conclude that while use of the Spyder was able to detect more patients with NOAF, the clinical significance was unclear, and patient discomfort was high.

07AP09-8
Validation of continuous thermodilution cardiac output on left ventricular assist device (Biomedicus centrifuga pump) in pigs.

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Background and Goal of Study: The pulmonary artery catheter (PAC) allows the measurement of cardiac output (CO) in patients with ventricular assist device (VAD). However we have not found studies that show the effectiveness of the pulmonary artery catheter measuring continuous cardiac output (CCO) in patients with continuous VAD. The aim of this study was to analyse the correlation between cardiac output and continuous cardiac output measured by PAC in patients with VAD.
Materials and Methods: The study was conducted with four healthy minipigs with 45 ± 10 kg. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support. The output cannula of the left VAD was anastomosed to the ascending aorta, and the input cannula was placed through the apex of the left ventricle. Pigs were monitored with echocardiography and excluded from analysis if aortic regurgitation was found. Cardiac output flow measurements were made simultaneously from Swan-Ganz CCOmbo catheter (CCO) and manual mode (CO) at the following time points: after 15 minutes of ventricular assistance, after a model of hypervolemia, after 15 minutes of a hypervolemia model and finally, after a model of hemorrhagic shock. The results were expressed by mean ± SEM. The Pearson correlation coefficient was used to analyse the data. Statistically significant results were considered when P≤0.05. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain.
Results and Discussion: Regression analysis (Pearson's) showed acceptable correlation (r = 0.72, p < 0.002) between CO and CCO in a model porcine of VAD measured via PAC. Cardiac output (CO) was 5.46 ± 1 l/min and continuous cardiac output (CCO) was 2.66 ± 0.26 l/min.
Conclusions: This pilot study that we have carried out shows that CCO measured via PAC could underestimate the real value of CO in patients with continuous VAD.

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07AP09-9
Single-beat estimation of ventricular contractility: a systematic review

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Background and Goal of Study: Pressure-volume (PV) loops and the slope (E_{max}) of the end-systolic pressure-volume relationship (ESPVR) are important measures of biventricular function. To overcome the need for invasive preload reduction, methods using only a single PV loop have been suggested. There is however no consensus on what single-beat estimation (SBE) method gives the best approximation. In this systematic review we collected, categorized and analysed all currently available SBE methods, providing a framework for further research.
Materials and Methods: Two independent raters performed a systematic review of literature, searching the databases of MEDLINE, ISI Web of Science, Cochrane Library, SCOPUS and EMBASE through 31/01/2018. All papers describing a new SBE method in left or right ventricle were selected. Cohen's kappa coefficient was 0.89.
Results and Discussion: 6075 papers were screened and 22 were included. 15 studies were animal experiments and 7 studied humans. Only 3 papers examined the right ventricle. In a 1st category, 12 studies used SBE methods based on the P_{iso} principle. This model combines one measured E_{max}-point and one estimated point which is constructed using the end-diastolic volume and the mathematically estimated pressure of an isovolumic contraction (i.e. P_{iso}). These methods are based on the study of Sunagawa et al.(1) who first approximated the pressure curve of an isovolumic beat as a sine function. We were able to identify differences between studies in terminology, required input parameters, selection of the isovolumic portions and the equation used to fit the sine function. The 2nd category (6 papers) used time-varying elastance to mathematically calculate ESPVR by defining two elastance curves of the left ventricle. These methods inherently assume ESPVR linearity and a constant volume-intercept. All but one modify the method first described by Senzaki et al (2). Four remaining studies worked on the principle of myocardial stiffness, an elastic-resistive model or studied preload recruitable stroke work (2 papers).
Conclusions: While ESPVR is considered the gold standard for quantification of load-independent myocardial contractility, the present findings indicate a need for validation of the numerous existing SBE-techniques and development of a methodological standard to assess ESPVR.
References:
(1)Sunagawa et al. IEEE Trans Biomed Eng. 1980;27(6):299-305
(2)Senzaki et al. Circulation. 1996;94(10):2497-506

07AP10-1
High thoracic epidural anesthesia in cardiac surgery as a sole anesthetic technique; Series of 12 interventions.

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Background and Goal of Study: Epidural anesthesia has been used widely as a combination to general anesthesia in cardiac surgery since early seventies. The addition of this technique to general anesthesia may have beneficial effects on clinical outcome. Somehow neuroaxial blockade manages to attenuate the response to surgical stress and improve perioperative analgesia. HTEA made it possible to avoid the drawbacks of mechanical ventilation and general anesthesia in selected patients.Several studies have shown the high satisfaction rate of pain control in patients operated under high thoracic epidural anesthesia. Also the fact that on-pump surgery is done in normothermictemperatures, appears to give a more physiological approach to perioperative management of the patients.
Materials and Methods: Between august 2014 and September 2018, HTEA was applied to 12 patients as a sole anesthetic technique. The catheter was inserted 24 hours prior to surgery at T1-T2 level. Sensory block was tested with 2 ml of lidocaine 2%. Epidural anesthesia was chosen because the patients had relative contraindications to general anesthesia and mechanical ventilation. The most important and common characteristic of these patients was the poor pulmonary function test. FEV1 ranged from 49-53%. Epidural bupivacaine was used.
Results and Discussion: No hematomas or neurological complication were observed.

VARIABLES	No of patients
Off pump	1 pt
On pump	11 pt
CABG	7 pt
VR	5 pt
EF 20-30 %	3 pt
One day in ICU	10 pt
COPD with FEV1 from 40-53%	8 pt
Mobilization 4 hours postop	11 pt
Transfer to ward immediately postop	1 pt
Long term stay in ICU	11

Conclusions: Epidural anesthesia seems to be effective in patients with contraindications to general anesthesia and mechanical ventilation. The postoperative management of these patients is easier due to the low incidence of complications and the early mobilization.

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07AP10-2
Continuous local anaesthetic infusion in surgical wound reduces surgical site infection after cardiac surgery

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Background and Goal of Study: Surgical site infection is an uncommon but devastating complication of cardiac surgery. Our previous study demonstrated local anaesthetics infused in a subcutaneous layer of thoracotomy or sternotomy after cardiac surgery significantly decreased postoperative pain[1]. In addition, we conducted a surgical wound infection mice model and found continuous infusion of lidocaine inhibited bacterial growth[2]. The aim of this study was to examine whether infusion of local anaesthetics in surgical wounds could reduce surgical site infection in cardiac surgical patients.
Materials and Methods: We retrospectively analyzed the data from 1197 patients who underwent cardiac surgery between July 2015 and August 2018. The incidence of surgical site infection was compared between patients receiving local anaesthetic infusion for pain control or not.
Results and Discussion: Of the 1197 patients investigated, 733 patients received local anaesthetic infusion combined with intravenous patient-controlled analgesia, 88 patients received only patient-controlled analgesia, and 376 patients received none of the above-mentioned analgesic method. The surgical site infection rates were 0.27%, 1.14%, and 3.19% respectively (P = 0.001). The decreased rate of surgical site infection may be ascribed to the antimicrobial effect of local anaesthetics and better analgesia may also contribute to this effect.
Conclusions: Our data suggest that continuous infusion of local anaesthetics in surgical wound not only provides better analgesia but reduces surgical site infection post cardiac surgery.
References:
1. Chiu KM, Wu CC, Wang MJ, Lu CW, Shieh JS, Lin TY, Chu SH: Local infusion of bupivacaine combined with intravenous patient-controlled analgesia provides better pain relief than intravenous patient-controlled analgesia alone in patients undergoing minimally invasive cardiac surgery. J Thorac Cardiovasc Surg 2008; 135: 1348-52
2. Lu CW, Lin TY, Shieh JS, Wang MJ, Chiu KM: Antimicrobial effect of continuous lidocaine infusion in a Staphylococcus aureus-induced wound infection in a mouse model. Ann Plast Surg 2014; 73: 598-601

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07AP10-3
Does LOW dose DEXmedetomidine after cardiopulmonary bypass separation decrease the incidence of DELirium? A double-blind, randomized, placebo-controlled study (LOWDEXDEL Study)

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Background and Goal of Study: Postoperative delirium(POD) is a common complication. Studies have shown beneficial effects of high dose Dexmedetomidine(DEX) in reducing POD. We hypothesized that a low dose DEX through the simple stimulation of α2 receptors is neuroprotective and therefore sufficient in preventing POD while reducing side effects.
Materials and Methods: This is a double-blind, placebo-controlled trial including all patients ≥60 y undergoing cardiac surgery with CPB(NCT:03388541).Type and conduction of anesthesia are standardized. At the closure of chest patients either receive a continuous infusion of placebo (PL)or DEX at a concentration of 0.4µg/kg/h. The study medication is administered at 5mL/h during 10 h in all patients (5mL/h=0.4µg/kg/h DEX).At the end of surgery patients are transferred to the ICU with a continuous infusion of propofol. Primary endpoint is the incidence of POD during the entire hospital stay evaluated by Confusion Assessment Method(CAM/CAM-ICU)and the chart review method. A total of 420 patients will be included. Mann-Whitney&Chi-squre tests are performed to respectively compare quantitative & qualitative variables.Data are expressed as P50(P25-P75) and numbers(%).A $p<0.05$ is considered significant.
Results and Discussion: 130 patients were included. Six(4:DEX;2:PL)patients were excluded for various reasons. Table 1 shows the data of both groups.

	DEX(n=62)	PL(n=62)	P
Age(y)	71(67-75)	69(66-76)	0.654
EuroSCOREII	1.61(1.0-3.3)	2.01(1.10-4.50)	0.398
POD	10(16)	13(21)	0.488
Duration POD(d;min-max)	0-6	0-4	0.587
Postop Morphine(mg)	39(27-51)	36(25-61)	0.741
Postop Norepinephrine(mL;1mL=100µg)	30(17-57)	8(1-29)	0.001
Postop pacing	41(66)	34(55)	0.062
ICU stay(d)	2(2-3)	2(2-3)	0.836
Hospital stay(d)	8(7-9)	7(7-10)	0.239

Conclusions: From these preliminary results it seems that low dose DEX in association with propofol does not reduce POD in elderly patients undergoing cardiac surgery as compared to sedation with propofol alone.

07AP10-4
Sugammadex shortens the extubation time and hospital stay in patients undergoing minimally invasive cardiac surgery

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Background and Goal of Study: Prolonged intubation after surgery may develop undesired outcomes including ventilator-associated pneumonia, prolonged ICU stay, infection...etc. Sugammadex has been shown to reverse neuromuscular blockade by rocuronium and facilitate early extubation in noncardiac surgery. While minimally invasive cardiac surgery, with less operative trauma, may result in better postoperative recovery. The aim of this study was to investigate whether sugammadex can further enhance early extubation and recovery in minimally invasive cardiac surgery.
Materials and Methods: We reviewed the admission records of 191 patients who underwent cardiac surgery between January to June 2018. Those who had emergency surgery, or traditional surgery approach (sternotomy) were excluded. Sixty-one patients who underwent elective minimally invasive cardiac surgery (thoracotomy, para-sternotomy) with the use of rocuronium were retrospectively investigated and were allocated according to the use of sugammadex (n = 12)or not (n = 49). Primary outcome was extubation time. Secondary outcomes were length of ICU stay, length of post-operative hospital stay, and postoperative complications including readmission to ICU and 3 month mortality.
Results and Discussion: Patients who received sugammadex after minimally invasive cardiac surgery had significant shorter extubation time (425.3 ± 79 mins vs. 688.5 ± 626.3 mins, p = 0.03) , total admission interval (10 ± 2.4 days vs. 12.9 ± 6 days, p = 0.01), and post-operative hospital stay (7.3 ± 1.3 days vs. 9.8 ± 5.3 days, p < 0.01) than those who did not . While there were no significant differences in length of ICU stay, incidence of reintubation, readmission to ICU and 3 month mortality between the two groups.
Conclusions: Sugammadex could further enhance early extubation and discharge without increasing complications in patients receiving elective minimally invasive cardiac surgery.

07AP10-5
The effectiveness of thoracic epidural anesthesia for minimally invasive cardiac surgery□MICS)

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Background: A combination of general anesthesia (GA) with thoracic epidural anesthesia (TEA) may have an additional beneficial effect on outcomes after cardiac surgery 1). Since MICS is performed with lateral thoracotomy, patients suffer pain that is more severe than in median sternotomy. TEA has a potential effect on reducing pain and suppressing activities of the sympathetic nerve, which may improve postoperative conditions. On the other hand, systemic heparinization during cardiopulmonary bypass increases the risk of epidural hematoma, therefore the use of TEA is controversial in cardiac surgery. There are no reports focused on TEA in MICS. We elucidated the efficacy of TEA focused on acute pain in patients undergoing MICS.
Patients and Methods: We performed a single center retrospective analysis of 64 patients who underwent MICS with lateral thoracotomy managed by GA along with TEA from October 1 2014 to November 30 2018.The epidural catheter was placed the day before the surgery. Baseline patients' characteristic, intraoperative and postoperative data including Numerical Rating Scale (NRS) and complications were investigated. The primary outcome was NRS and nonsteroidal anti-inflammatory agents (NSAIDS) consumption, and the secondary outcome was postoperative data and complications.
Results and discussion: The patients mean age was 64.4 years, with standard deviation of 10.8 and 39% of the patients was female. The primary outcome is shown in Table 1. The median NRS during TEA was 3 in highest and 0 in lowest. The secondary outcome is shown in Table 2. The incidence of atrial fibrillation was reduced compared with prior MICS study managed only with GA 2). The result suggested that TEA was effective for postoperative pain. Furthermore, it may prevent postoperative atrial fibrillation. Insertion epidural catheters the day before surgery may lower the risk of epidural hematoma.

Table1. NRS and NSAIDs consumption during TEA

Analgesia	Median[Q1,Q3]
NRS during TEA	
maximum	3[0,5]
minimum	0[0,0]
NRS on discharge day	0[0,0.5]
NSAIDs consumption	0[0,1.25]

Table2. The postoperataive data and incidence of complications

Postoperative data	median [Q1,Q3]
Intubation time (hr)	14 [12,17.8]
Ambulation (POD)	2[1,2]
ICU stay (days)	4[3,6]
Hospital discharge (POD)	16[12,22]
Complications	**n (%)**
Respiratory complication	10 (15.6%)
Re-expansion pulmonary edema	1 (0.015%)
Atrial fibrillation	5 (10.4%)[a]
Epidural hematoma	0 (0%)

Abbreviation:POD,postoperative days
[a] 16 patients had chronic atrial fibrillation which was excluded from the current sample.

Conclusions: This study showed that TEA in patients undergoing MICS reduced acute pain and postoperative atrial fibrillation without any severe complications.
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1. Anesthesiology 2011;114: 271-282□
2. Annals of thoracic surgery 2014;97:356-64

07AP10-7
Comparison of remifentanil and fentanyl for postoperative recovery profile in patients undergoing minimally invasive cardiac surgery

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Background and Goal of Study: The concept of enhanced recovery after surgery (ERAS) is flourishing in multiple specialties, including cardiac surgery. Short acting anesthetic agent is one of the major components of ERAS programs. Minimally invasive cardiac surgery (MICS) has been proven to have a shorter recovery time than conventional approach. The purpose of this study was to investigate whether remifentanil, the shortest acting opioid, can further achieve faster recovery in patients receiving MICS.
Materials and Methods: This study was a retrospective, chart reviewing study. Patients between 18 to 80 years of age undergoing elective MICS from May to August 2018 were included. Patients in fentanyl group (group F) received 5μg/kg of fentanyl for induction and bolus doses of 1-2μg/kg as needed during operation. The remifentanil group patients (group R) received induction dose of 0.5-1.0μg/kg remifentanil and maintenance infusion between 1-5μg/kg/h according to surgical stimuli till the end of surgery. All patients were given intravenous patient-controlled analgesia (PCA) for postoperative pain control and extubated at ICU guided by weaning protocol. PCA team recorded morphine consumption, pain score and side effects for 5 days after operation. The primary outcome of this study was the extubation time after surgery and morphine consumption in postoperative day 1, 2, 3 and 5. Secondary outcomes were hospital stay, postoperative ICU stay, pain scores when resting and exercising in postoperative day 1, 2, 3 and 5 and in hospital complication.
Results and Discussion: Fifty-three patients were enrolled in this study, 33 of them were in remifentanil group (group R) and 20 were in fentanyl group (group F). The extubation times were 11.26 hours in group F and 14.96 hours in group R (p = 0.51). Average hospital stay were 11.8 days and 12.4 days (p = 0.69) meanwhile postoperative ICU stay were 2.44 days and 2.84 days (p = 0.36) in group F and group R, respectively. In hospital complication rate were 30% in group F and 21.2% in group R (p = 0.34). Through the 5-day period morphine consumption was not significantly different between groups. Pain scores were also similar in both groups whether in resting or exercising.
Conclusions: Our study showed remifentanil can be safely used in MICS and provides similar recovery profile as low dose fentanyl.

07AP10-8
Residual Neuromuscular Blockade in post-operative Cardiac surgical Patient - Is it a problem?

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Background and Goal of Study: Neuromuscular blockade (NMB) is a routine part of the peri-operative course for patients undergoing cardiac surgery. However, patients with uncomplicated recovery are usually warmed and woken up within 2-3 hours of arrival to the ICU without monitoring and reversal of NMB, despite there being evidence that residual NMB may still remain many hours after the end of surgery. Residual NMB (defined as a TOF ratio <0.9), can potentially increase the risk of postoperative respiratory complications and length of ICU stay. We aim to evaluate the degree of post-operative residual NMB in post-cardiac surgical patients at a major UK tertiary hospital.
Materials and Methods: Over the course of 3 months, 21 post-operative patients were included. Inclusion criteria were cardiac surgery, use of neuromuscular blockers and a post-operative admission to the ICU. Patients had hourly train of four (TOF) testing with a quantitative NMB blockade monitor, which also produced a TOF ratio. Measurements were carried out at hourly intervals, from arrival to ICU whilst patients were sedated. The test was stopped should the patient wake up or have TOF >0.9. The audit was registered with the Clinical Effectiveness Unit.
Results and Discussion: 21 patients in total were screened. 18 were male and 3 females. They underwent a range of cardiovascular surgeries. Rocuronium (13) was the most popular neuromuscular blocker, followed by pancuronium (7) and vecuronium (1). Assessment of TOF ratio at 2-3 hours following ICU arrival showed 9 patients with no residual block (7 males, 2 females) and 12 patients with residual block (11 males, 1 female). Out of the 11 patients who had been administered Pancuronium, 6 received neuromuscular reversal agent (54.5%), while 2 patients who received Rocuronium required reversal (10%). The patient who received Vecuronium didn't require reversal. Our data demonstrates that many patients who return to ICU following cardiovascular surgery continue to experience a degree of NMB (TOF ratio<0.9) 2-3 hours post arrival, and are often extubated prior to the return of TOF ratio >0.9 leaving them vulnerable to potential complications.
Conclusions: This work makes the case for the routine monitoring of residual NMB in such patients and suggests common use of reversal agents, thus potentially reducing harm and improving outcomes. Further feasibility assessment work is planned.

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07AP10-9
Evaluation of Enhanced Recovery After Surgery (ERAS) program on postoperative results of patients undergoing open heart surgery

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Background and Goal of Study: The ERAS protocol, also known as evidence based "fast-track surgery" (FTS), is an evidence based combination of findings regarding suggestions for patient care on various levels of the perioperative period, which work in synergy for accelerating the postoperative recovery period. It has been used successfully for many surgical disciplines, primarily colorectal surgery, since it was first reported in 1997. However, there is a significant insufficiency of this patient oriented rehabilitation program regarding cardiovascular surgeries. The aim of this study is to compare the postoperative follow up periods of patients with ERAS protocol and patients with standard protocol who were both operated for cardiac surgery.
Materials and Methods: Following approval of the local ethics committee, 101 patients who were operated for elective cardiac surgery in one year's period were enrolled in this prospective randomized clinical trial. The patients who were not applied the ERAS protocol were evaluated in the control group (n=51). The findings regarding the patients under ERAS protocol were evaluated based on evidence (n=50). Our primary aim was to compare the duration of stay in the intensive care unit and in hospital; our secondary aim was to compare the incidence of complications. The demographic data, surgical measurements, complication rates, the amounts of perioperative bleeding and drainage and the duration of stay in the intensive care unit and hospital were recorded.
Results and Discussion: There were no significant differences between the groups in terms of demographic variables, operation durations, cross clamp and cardiopulmonary bypass times. In the ERAS group, there was a shorter stay in the intensive care unit and in hospital and a shorter period of time to postoperative re-exploration, but a higher amount of perioperative bleeding. There was not any statistically significant differences between the groups regarding the incidences of complication and re-exploration.
Conclusions: Our study revealed as a result that, the ERAS protocol reduced the duration of stay in the intensive care unit and in hospital without increasing the frequency of complications.

07AP10-10
Propofol, Dexmedetomidine or their Combination For Patients After Cardiac Surgery?

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Background and Goal of Study: Find an ideal sedation strategy for patients after cardiac surgery
Materials and Methods: It is prospective observational study. Patients undergoing CABG procedure were included. All patients were divided into 3 groups according to sedation strategy:1 group got propofol(2.0-2.5mg/kg/h),2 gr-dexmedetomidine(0.5mckg/kg/h) and 3 group was a combination(propofol 0.5-1.0mg/kg/h and dexmedetomidine 0.2-0.7mcg/kg/h). The following criteria were evaluated: sedation level(RSS),agitation level, hemodynamic stability, heart rate, rhythm before surgery and 72h hafter surgery, duration of mechanical ventilation. Group1-30 patients, age 45-78 years, propofol based sedation, doses 2.0-2.5mg/kg/h.Group2-31 patients, age 45-78 years, dexmedetomidine-based sedation, doses 0.5-0.7mcg/kg/h,Group3-31 patients, age 45-78 years, combination propofol 0.5-1.0mg/kg/h+dexmedetomidine 0.2-0.7 mcg/kg/h.
Results and Discussion: The most adequate sedation level has been achieved in the 3rd group(combination).8,3 % patients in the 3rd group had level 2 according to RSS,.21,7 % had level3. In the 1st group, more than 85% had level3 before stopping sedation. And in the second group, more than 65% of the patients had level1 with rapidly awakening and agitation. Length of sleeping after surgery also was dependent on the duration of the cardiopulmonary bypass using, hypothermia level. The most "light" awake has been seen in patients in 3rd gr. In all 3g r extubation extubated during the first six hours. Only 3 patients had prolonged (more than 10h) mechanical ventilation because of surgical postop complications. The hemodynamic status was involved more in a group with propofol sedation. In the3 rd group(combination) there were significant adverse effects on hemodynamics. The hemodynamic status of the patients was more dependent on the periop EF and decreased vascular tone after cardiopulmonary bypass.
Conclusions: The use of the combination gives more controlled sedation, more high level of patient satisfaction and good cooperation with the patient. This combination doesn't have respiratory depression effects and can be used in all patients.

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07AP11-1
Comparison of Nociception Level and Analgesia Nociception Index in opioid-free anesthesia protocols for vascular surgery

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Background and Goal of Study: Monitoring intraoperative nociception has gained in popularity in the recent decade. Several devices are proposed to monitor the analgesia nociception balance. The Analgesia Nociception Index (ANI) is calculated from spectral analysus of the ECG variations. It has demonstrated its ability to guide intraoperative analgesia in vascular surgery. Recently, a new multiparameter, named Nociception Level (NoL) has been proposed to monitor intraoperative nociception and has demonstrated a better discrimination of nociception than clinical signs. However, no studies have compared both devices in patients under opioid-free analgesic protocols.
Materials and Methods: In this prospective study, we compared the ANI and the NoL (both ranging between 0 and 100) in patients undergoing scheduled vascular surgery. During the surgery, the analgesic protocol was modulated according to the ANI. Data were collected at the end of surgery and compared every three-minute periods according to the presence or absence of nociception they indicated. ANI values < 50 and NoL values > 25 indicate insufficient analgesia. Comparison was done using the kappa coefficient.
Results and Discussion: At total, 365 three-minutes periods were compared. Both devices indicated nociception in one period, and absence of nociception in 345 periods. The ANI alone indicated nociception in 7 periods, and the NoL alone in 2 periods. Kappa coefficient was 0.17 [-0,14 - 0.48], corresponding to a poor agreement between the 2 devices. However, discordance occured in less than 3% of the total operative time.
Conclusions: This study showed a poor agreement between the NoL and the ANI in a opioid-free protocol. However, discordance occurred in less than 3% of the total operative time which seems not to be clinically significant. Further studies are needed in different clinical steeings.

07AP11-2
Carotid endarterectomy under regional anesthesia: mean arterial pressure management and neurological complications: a retrospective cohort study

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Background: The management of mean arterial pressure (MAP) during carotid cross-clamping is still debated. It is suggested to maintain MAP≥ 20% above baseline to optimize collateral cerebral blood flow. Besides, there seems to be a relationship between the degree of contralateral stenosis and cross-clamping intolerance. We investigated the risk of neurological complications depending on different levels of MAP during carotid cross-clamping under regional anesthesia (RA).
Methods: Patients submitted to carotid endarterectomy (CEA) under RA were included, after institutional committee approval (Jan. 2010 to Oct. 2017). They were allocated to 4 groups based on the median values of MAP during cross-clamping (MAPc) compared to baseline MAP (MAPb). G1: MAPc < MAPb; G2: MAPb ≤ MAPc < MAPb+10%; G3: MAPb+10% ≤ MAPc < MAPb+20%; G4: MAPc ≥ MAPb+20%. CEA was realised under intermediate cervical plexus ultrasound-guided RA. Indication of shunting was considered immediately upon the occurrence of a neurological event. The primary endpoint was the occurrence of minor (confusion, delirium, agitation) and major (TIA/stroke) neurological complications, identified in the early post-operative period. The secondary endpoint was to assess the correlation between the degree of contralateral stenosis and cross-clamping intolerance. Statistical analysis was realised by ANOVA, Kruskall-Wallis, Konietschke and chi-square test. Patients characteristics were calculated as mean (SD), median (25th to 75th percentile), or frequency (%) as appropriate, and p-value < 0,05 was considered significant.
Results: 96 patients were included (56 males/40 females). Demographics and surgical data were comparable between groups. Minor neurological complications were observed in 10,41% of all patients, belonging mainly to G1 (50%) and G2 (30%), compared to G3 (10%) and G4 (10%). Although, no statistically significant differences were observed between the groups compared to routine practice (G4-G1 p=0,998, G4-G2 p=0,642, G4-G3 p=0,975). One patient in G1 experienced TIA/stroke. Cross-clamping intolerance requiring shunting was observed in 15 patients, belonging mainly to G1 (53,3%). Logistic regression analysis did not reveal any relation between the degree of contralateral stenosis and the need of a shunt in our cohort.
Conclusion: Our results suggest that the common management of MAP during carotid cross-clamping, MAP≥ 20% above baseline, does not protect against neurological complications under RA.

07AP11-3
Base deficit vs. lactate levels in prediction of short-term mortality in patients with acute aortic thrombosis

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Background and Goal of Study: Due to its severity, even with prompt and optimal surgical intervention, acute aortic thrombosis (AAT) carries high mortality risk. The aim of the study was to determine the role of lactate and base deficit (BD) levels, on admission and postoperatively, in prediction of short-term mortality in patients with AAT.
Materials and Methods: Basic demographic characteristics and data regarding comorbidities and perioperative clinical course of patients surgically treated due to AAT at our Institution, from 2013 to 2018, were retrospectively analyzed. Lactate and BD levels were observed on admission, at the end of surgery, two hours and six hours following surgery. The main outcome was short-term (30-day) mortality. Statistical analysis included Student's t-test, Chi-square test and multivariate regression analysis.
Results and Discussion: During the study period, a total of 25 patients, mean age 66.6 ± 9.6 years (range 47-79), predominantly males (64%) were surgically treated due to AAT. All patients were treated within 25 hours of symptoms onset and in majority of patients (56%), aortobifemoral bypass was performed. Particularly high rates of prior hypertension (96%) and chronic obstructive pulmonary disease (40%) were present. Paraplegia was present on admission in 13 patients (52%). Postoperative complications were observed in 17 patients (68%) and 6 patients (24%) were reoperated. Overall 30-day mortality was 48%. The average admission levels of BD and lactate were -5.82±5.69 and 4.03±2.81, respectively. The mean first postoperative levels of BD and lactate were -2.98±5.36 and 6.51±5.09, respectively. Multivariate regression analysis showed that independent predictors for 30-day mortality are preoperative atrial fibrillation (p=0.036), admission paraplegia (p=0.033) and BD more negative than -5.82 (p=0.047) preoperatively, as well as the first postoperative lactate levels > 6.51 (p=0.048) and the presence of postoperative anuria/oliguria (p=0.003).
Conclusions: AAT represents a rare, but life-threatening condition. Based on our results preoperative BD, but postoperative lactate levels represent independent predictors for 30-day mortality in patients with AAT. Also, special attention should be paid on patients with atrial fibrillation, admission paraplegia, as well as those with postoperative oliguria/anuria, since they have the highest mortality risk.

07AP11-5
Neurocognitive function and psyco-emotional disorders in patients operated on internal carotid arteries pathological kniking in the early and distant postoperative periods

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Background and Goal of Study: The urgency of postoperative cognitive dysfunction(POCD)prevention and correction problem is caused by its high frequency, and long-term consequences that worsen the quality of life. The goal was to study POCD and anxiety incidence in patients operated on the pathological kinking(PK) of the internal carotid arteries(ICA) in the early and distant postoperative periods.
Materials and Methods: The study included 60 patients with ICA PK, divided into 2 groups - 20 people who received surgical treatment (the main group) and 40 patients (the control group) who were supervised. Cognitive function was assessed preoperatively, 7th day and 5 years after surgery using the Mini Mental State Examination(MMSE), Frontal assessment battery (FAB), Montreal Cognitive Assessment scale(MoCA). Covi Anxiety Scale (CAS) was used to evaluate anxiety, considering anxiety if the score was≥6.Atherosclerotic ICA lesion was the study exclusion criterion.
Results and Discussion: The mean age was 41.2±7.1 and 42.5±8.4 in the study and control group, respectively. Prior to the surgery cognitive tests of patients were within normal limits (MMSE 28.9±3.3,p<0.01, FAB 15.3±3.8,p<0.03,MoCA 28.4±3.4, p<0.01 in main group and MMSE 29.1±4.1,p<0.01, FAB 14.3±2.8,p<0.03,MoCA 28.1±4.2, p<0.01 in control group).CAS score was 5.6±2.4, p<0.05 in main group and 4.9±3.6 p<0.05 in control group. On the 7th day and 5 years after surgery no significant differences were found in the studied groups. (MMSE 29.1±3.9,p<0.01,FAB 15.1±3.4,p<0.03,MoCA 27.8±3.1, p<0.01 in main group and MMSE 28.2±3.7, p<0.01, FAB 14.1±2.8,p<0.03,MoCA 27.3±4.3, p<0.01 in control group).In the control group, higher scores were found on the CAS scale (6.4 ± 2.4, p<0.03 in the control and 3.5 ± 1.6, p<0.03 in the main, respectively)
Conclusions: POCD was not detected in the early and late postoperative periods in patients operated on PK of ICA. Psycho-emotional disorders were more distinct in non-operated patients.

07AP11-6
Preoperative anaemia is associated with prolonged wound healing and longer hospital stay in major open vascular surgery

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Background and Goal of Study: Preoperative anaemia might be associated with higher morbidity and mortality rates in surgical patients. The aim was to determine whether preoperative anaemia affects wound healing and duration of hospital stay in patients undergoing major open vascular surgery.
Materials and Methods: We have performed a retrospective chart review of patients who have undergone surgical treatment due to abdominal aortic aneurysm and Leriche syndrome during a six months period at our Institution. Demographics, comorbidities, preoperative and intraoperative relevant data, as well as postoperative course were reviewed. Preoperative anaemia was defined as hemoglobin level less than 130 g/L in men and less than 120 g/L in women. Statistical analysis included Student's t-test, Chi-square test, univariate and multivariate regression analysis.
Results and Discussion: We have included 137 patients who have undergone major elective aortic surgery. Mean age of patients was 65±6.6 years and 88.3% belonged to male gender. Preoperative anaemia was present in 28 patients (20.4%). Majority of patients were smokers (60.6%), scored as ASA 3 (89.9%) and had hypertension (94.2%). According to univariate regression analysis, preoperative aneamia is a risk factor for prolonged wound healing (OR 0.962, CI 0.926-0.99, p=0.044). Multivariate regression analysis showed that preoperative anaemia represents independent predictor for prolonged hospital stay (OR 0.962, CI 0.932-0.994, p=0.021).
Conclusions: Patients with preoperative anaemia are at greater risk for the development of prolonged wound healing and prolonged hospital stay in major vascular surgery. In order to decrease incidence of these complications, preoperative anaemia should be corrected before surgery.

07AP11-7
Surgical pulmonary embolectomy after failed treatment with recombinant tissue plasminogen activator in acute pulmonary embolism: a case report.

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Background: The early resolution of pulmonary obstruction leads to a reduction in pulmonary artery pressure and resistance, with an improvement in right ventricle function. The early surgical embolectomy for high-risk pulmonary embolism (PE), particularly if thrombolysis has failed, can be a strategy of choice[1].
Case Report: A 57-year old male was admitted to the intensive care unit (ICU) within 2 hours after hip joint replacement. Pulmonary embolism was diagnosed from clinical signs of dyspnea and cardiogenic shock, increased D-dimer, S1wave, right heart overload on ECG, echocardiography, and venous ultrasonography, with further confirmation by pulmonary angiography. After multidisciplinary discussion, the decision to administer thrombolytic therapy with recombinant tissue plasminogen activator was done. However, this method did not result in clinical improvement so, surgical embolectomy using cardiopulmonary bypass was performed. Early postoperative period was complicated by severe bleeding, which required resternotomy and complex hemostatic therapy, followed by clinical stabilization. The duration of ICU stay was 7 days. The patient was discharged from hospital at Day 30 in a good condition.
Discussion: There is a wide spectrum of predisposing factors for PE, including orthopedic procedures like in this case. The diagnostic approach to suspect PE may vary, depending on the availability of specific tests in different clinical settings.1Thrombolysis can decrease mortality in severe PE but is often accompanied by major bleeding complications2. However, despite increased risk of bleeding, it is not an absolute contraindication to surgical embolectomy in case of life-threatening PE refractory to conservative therapy.
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Learning points: Surgical embolectomy can be a life-saving procedure in case of severe pulmonary embolism.

07AP11-8
Feel the Fear and Do It Anyway: Anaphylaxis in hydatid cyst

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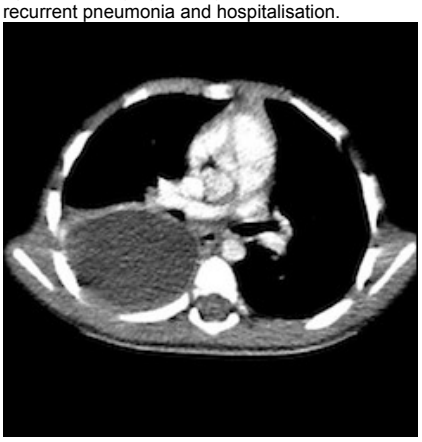
Background: Hydatid cyst is a common parasitic disease caused by Echinococcus granulosus that is more frequently diagnosed in adulthood. The most affected organs are liver and lungs. Rupture of cyst may cause anaphylaxis. We present a case of anaphylactic shock during surgery of pulmonary hydatid cyst in a 3-year-old girl, the youngest patient suffering hydatid cyst related anaphylaxis ever reported.
Case report: A 3-year-old female patient, weight 12kg, diagnosed with complicated right pulmonary hydatid cyst was proposed for open surgery. She had a history of recurrent pneumonia and hospitalisation.



Intravenous induction (fentanyl-propofol-rocuronium) was uneventful. On surgeon request two-lung-ventilation was archived through single lumen tube. A radial arterial catheter and a wide bore intravenous catheter were placed. Epidural and paravertebral analgesia were avoided due to infective concerns. Monitoring was with pulse oximetry, EKG and invasive-pressure. General anesthesia based on sevoflurane-remifentanil-rocuronium was uneventful until 10cc 20% NaCl were instilled into the cyst and sudden severe bronchospasm, hypotension and tachycardia developed. Mechanical ventilation became almost impossible until repeated aspiration of the endotracheal tube and intravenous 15mcg adrenaline bolus were administered. A second iv adrenaline bolus and infusion (0,05-0,1mcg/kg/min) were needed. Methylprednisolone and dexchlorpheniramine were also administered. Bronchospasm was severe for the rest of the surgery and the patient was transferred to ICU intubated and on adrenaline, it was stopped 6h after admission and she was extubated 2h latter. The patient was discharged home on postoperative day 8.
Learning points: One-lung-ventilation may be challenging in children under 20kg though some surgeons may prefer to go on double lung ventilation to avoid time consuming bronchial blockers placement. Lung isolation may have attenuated allergen exposure and bronchospasm severity[1].
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07AP11-9
Extracorporeal membrane oxygenation outcome review in Latvia

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Background and Goal of Study: Extracorporeal membrane oxygenation (ECMO) life support systems use is expanding, despite limited outcome data defining appropriate use, so worldwide and up to date outcome review's are needed. Goal of this study is to review the outcome of patients who underwent ECMO therapy for heart/lung and lung support after cardiac surgery and acute respiratory failure.
Materials and Methods: Retrospective, unicenter, study includes patients who underwent ECMO support for refractory cardiogenic shock after cardiac surgery or acute respiratory failure (ARF) treatment in Pauls Stradins Clinical university hospital, Riga, Latvia, from 2008 until 2018. Refractory cardiogenic shock was defined using echocardiography, hemodynamic and metabolic criteria, but ARF due to severe influenza pneumonia. Analized outcomes were – in hospital mortality rate, length of ICU stay and lenght of hospital stay. We compared baseline demographics and outcomes over two time periods - 2008 to 2013 and 2013 to 2018.
Results and Discussion: ECMO utilization increased from 6 cases in 2008 until 19 cases in 2018 in overall using ECMO in 88 cases over 10 years of practise. 77 veno - arterial and 11 veno-venous ECMO supports therapies were conducted. Overall mortality rate reached 77% with average patients age of 59 ±15.3. Overall length of ICU stay from 1 to 51 days with median of 8 days and overall hospital stay was from 1 to 53 days with median of 14 days. In the first period (2008 to 2013) mortality reached 96% with average age of 60y., which means that 1 of 29 patients survived and was discharged from hospital. In the second period (2013 to 2018) mortality reched 71% with average age of 59y. Study show numerous of perioperative factors affecting outcome of patients undergoing ECMO support.
Conclusions: Between 2008 and 2018 the use of ECMO for circulatory and respiratory failure has increased significantly with a concomitant modest improvement in patient survival. As this technology and use of it is growing, clinical triggers for ECMO implantation and ECMO explantation has improved since first ECMO case.

07AP12-1
Preoperative liraglutide improves glycaemic control during cardiac surgery - a multicentre, blinded, randomised controlled trial

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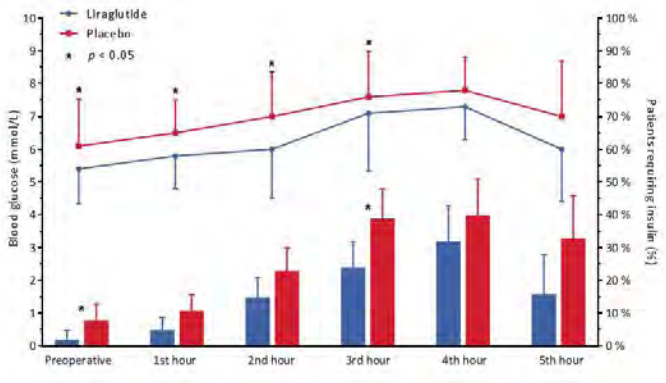
Background and Goal of Study: Most cardiac surgery patients develop perioperative hyperglycaemia requiring intravenous insulin therapy. This is labour-intensive and carries a risk of hypoglycaemia. We hypothesised that preoperative administration of the glucagon-like peptide 1 receptor agonist liraglutide would reduce the number of patients requiring insulin for glycaemic control during cardiac surgery.
Materials and Methods: In this multicentre, blinded, placebo-controlled, parallel-group, balanced (1:1), superiority, randomised clinical trial, adult patients undergoing cardiac surgery in four Dutch tertiary hospitals received 0.6 mg subcutaneous liraglutide or matching placebo on the evening before surgery and 1.2 mg after induction of anaesthesia. Blood glucose was measured hourly and controlled using an insulin-bolus-algorithm. The primary outcome was any insulin administration for a blood glucose above 8 mmol/L while in the operating theatre. Research pharmacists used centralised, computer-generated, stratified, variable-block, randomisation software. Patients, care providers, and study personnel were blinded to treatment allocation.
Results and Discussion: Between June 2017 and August 2018, 278 patients were randomised to liraglutide (139) or placebo (139). All patients receiving at least one study drug injection were included in the intention-to-treat analyses (liraglutide: 129, placebo: 132). In the liraglutide group, 55 patients (43%) required additional insulin, compared to 80 patients (61%) in the placebo group; absolute difference 18% (95% CI: 5.9–30.0, p=0.003). Mean (±SD) hourly blood glucose (lines) and percentage of patients requiring insulin (bars) are drawn in figure 1. The intraoperative dose and number of insulin injections, as well as the mean blood glucose concentrations, were all significantly lower in the liraglutide group. We observed no difference in hypoglycaemia, nausea and vomiting, mortality, or postoperative complications.
Conclusions: Preoperative liraglutide, compared to placebo, reduces insulin requirements while improving peri-operative glycaemic control in cardiac surgery.



07AP12-2
Limb remote ischemic preconditioning protects against cardiac ischemia and reperfusion injury via modulation of the secretion of desacyl ghrelin in rats.

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Background: Limb remote ischemic preconditioning (LRIP) cardioprotection is the non-pharmacologic intervention against ischemic reperfusion (I/R) injury. However, the detailed mechanism underlying LRIP cardioprotection is still unclear. Ghrelin is a growth hormone releasing peptide from stomach and exists in circulation as acylated and desacyl types. Previous studies have shown that ghrelin can protect organs against I/R injury. On the other hand, few studies have focused on the effects of LRIP on the release of ghrelin. The aim of this study is to elucidate whether LRIP procedure can protect against cardiac I/R injury via modulation of ghrelin.
Methods: Male Wistar rats (n = 16) were anesthetized and randomly allocated to subjects with the LRIP procedure (LRIP group, n=8) and without the procedure (control group, n=8). In the LRIP group, the anterior and hind limbs were encircled with blood pressure cuffs inflated to 200 mmHg to achieve ischemia of the limbs. LRIP was performed by three cycles of 5 min ischemia and 5 min reperfusion at the beginning of left anterior descending (LAD) coronary artery ligation. After left thoracotomy had been performed, the LAD coronary artery was ligated and subjected to 30 minutes of ischemia followed by 120 minutes of reperfusion. Blood sampling was performed before and after LRIP procedure for the measurement of both acylated and desacyl ghrelin by the enzyme linked immunosorbent assay method. Infarct size was assessed by Evans Blue dyeing and TTC (1% 2, 3, 5-triphenyltetrazolium chloride) staining.
Results: The area at risk was not significantly different in the two groups, but the reduction of infarct size in the LRIP group was significant compared to the control group (Figure 1). Before I/R injury, the serum level of desacyl ghrelin in the LRIP group was significantly higher than that in the control group (Figure 2 and 3).
Conclusion: In summary, this study demonstrated that LRIP increased desacyl ghrelin but not acylated ghrelin before I/R injury. Desacyl ghrelin might be involved in LRIP cardioprotection.

07AP12-3
Oxy-score: a new global index to improve evaluation of oxidative stress in patients with 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, however a specific biomarker does not provide information on global oxidative status (1). Our research group investigates new therapies in the early regression of LVH that act on biomarkers of oxidative stress. The aim of this study is to design and calculate a global indicator of oxidative stress (OXY-SCORE) that allows us to diagnose patients with LVH with only a blood test, and to serve as a therapeutic target in the search for new treatments in future studies.
Materials and Methods: We performed an observational, prospective, non-randomized, comparative study of 2 groups of patients: LVH Group (n = 35) and Control Group (without LVH, n = 35). Plasmatic biomarkers related to antioxidant defense systems (total thiols, reduced glutathione, total antioxidant capacity, dismutase superoxide and catalase) and oxidative damage (malondialdehyde and protein carbonyls) were assessed. We analyzed the normality of the oxidative stress biomarkers using the Kolmogorov-Smirnov test, standardized the parameters and calculated the partial indexes for oxidative damage and antioxidant defense systems, as well as the OXY-SCORE according to a previously described methodology (2). The data were expressed as mean ± SEM.
Results and Discussion: The OXY-SCORE was negative in LVH Group (-2,43769382 ± 0,57), suggesting an enhanced oxidative status; however, in Control Group, the OXY-SCORE was positive (0,05586649 ± 0,6), suggesting enhanced antioxidant defense. Statistically significant differences were found in the OXY-SCORE between both study groups (p = 0.005).
Conclusion: This results suggest a global index to improve diagnosis of patients with left ventricular hypertrophy, because a good correlation has been reported between plasma concentrations of these biomarkers and their levels in heart tissue.
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Acknowledgements: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

07AP12-4
Improvement of thiol-specific oxidative stress and inhibition of the ERK/NFATc4 pathway after treatment with an antiarrhythmic agent in an experimental model of ventricular hypertrophy.

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Background and Goal Study: Our group previously demonstrated that dronedarone, a multichannel blocker, has the potential to reverse the left ventricular hypertrophy (LVH) induced by arterial hypertension in an experimental study(1). The aim of the present study aims to analyse some of the possible mechanisms which are responsible for this effect.
Materials and Methods: adult male spontaneously hypertensive (SHR) rats were randomly divided into therapy group with dronedarone (SHR-D, n=6) and placebo group (SHR, n=6). Wistar Kyoto rats were used as normotensive controls (WKY, n=6). After 14 days of treatment left ventricles were bisected and processed for Western Blot analysis. We analysed Total (T-) and phosphorylated (p-) levels of NFATc4, AKT, ERK and NF-kB in ventricular homogenates. Groups 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: p-NFATc4 and ERK1/2 levels in hypertensive controls were significantly higher than in normotensive controls. Dronedarone produced a decrease in both compared to SHR (p<0,05). Interestingly, p-NFATc4 and ERK1/2 levels in SHR-D were similar to those found in normotensive controls. No differences were observed in AKT and NF-kB levels in SHR-D compared to SHR.
Conclusion: Dronedarone may produce an early reversal of LVH by inhibition of ERK/NFATc4 pathway.
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07AP12-5
The role of Symmetric dimethylarginine (SDMA) in regression of aortic remodeling mediated by dronedarone

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Background and Goal of Study: Dronedarone is a new multichannel-blocking antiarrhythmic indicated for the treatment of patients with atrial fibrillation. Symmetric dimethylarginine (SDMA) is a biomarker associated with cardiovascular events and increased vascular wall thickness. Our study group has previously demonstrated that dronedarone produces early regression in left ventricular hypertrophy (1), however the impact of short-term treatment with this drug on the remodeling of large arteries has not been studied yet, Therefore, in this present study we hypothesize that even a short, two-day administration of dronedarone, is capable to aortic remodeling in spontaneously hypertensive rat (SHR).
Materials and Methods: Ten-month-old male SHRs were treated with vehicle (SHR, n=6) or dronedarone (SHR-D, n=6). Age-matched vehicle-treated male Wistar-Kyoto rats (WKY, n=6) served as controls. After two weeks of therapy, the structure of thoracic aorta (including thickness of both tunica media and tunica adventitia) was studied by confocal microscopy. Determination of aortic SDMA concentrations was also conducted. The analysis between groups was performed with a single factor ANOVA, as well as a post-hoc correction with Bonferroni. Results were expressed as media ± S.E.M, and P< 0.05 was considered significant. All procedures were approved by the Ethics Committee of General University Hospital Gregorio Marañón of Madrid, Spain.
Results and Discussion: Dronedarone significantly attenuated abnormal aortic wall thickness of media layer in SHR (284 ± 37,83µm vs. 166,86 ± 7,92 µm; p<0.01), showing no significant differences in this parameter between SHR-D and WKY. There were no significant changes in the adventitia layer between SHR and SHR-D groups. Aortic SDMA levels were also significantly drecreased after dronedarone treatment (9,88 ± 0,85 nmol/g protein vs. 4,27 ± 0,65 nmol/g protein; p<0.01), equating those observed in WKY.
Conclusions: Short-term therapy with dronedarone attenuates thoracic aortic remodeling in hypertensive rats through a reduction in aortic SDMA levels, as one of the potential mechanisms involved in these vascular changes.
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07AP12-6
Fat mass but not body mass index is associated with mortality after adult cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: The attempts to confirm the protective effect of obesity defined according to body mass index (BMI), the so-called obesity paradox, are conflicting in adult cardiac surgery setting . Body composition (Fat mass (FM), lean body weight (LBW)) which has proven impact on outcome in several clinical settings may modulate the association of obesity and outcomes resulting in these inconstant results. The objective of our study was to compare the prognostic value of body composition variables to BMI after cardiac surgery with cardiopulmonary bypass.
Materials and Methods: We performed a monocentric retrospective observational study that included 3373 patients who underwent elective cardiac surgery with cardiopulmonary bypass from January 2013 until December 2016. The anthropometric variables used in the characterization of body composition and the other analyzed co-variables were extracted from our data warehouse which gathered clinical, biological, and administrative data. LBW and FM were calculated using Janmahasatian et al. equation and BMI defined according to the World Health Organisation definition. The independent association between body composition variables and the primary endpoint (30-day mortality) was investigated by multivariate analyses based on a logistic regression model. Secondary endpoint was a prolonged intensive care unit (ICU) length of stay(LOS) (defined as > third quartile of ICU LOS).
Results and Discussion: The primary outcome, 30-days mortality, occurred in 2.1% of patients and was significantly different among BMI, FM LBW categories. Unlike BMI, LBW and FM categories were independently associated with mortality. This association was particularly important for the LBW lower or equal to the first quartile and FM higher or equal to the last quartile (respectively OR 2.8 CI 95% [1.4 - 6.0], p <0.001, and OR = 4.1 CI 95% [1.9 - 9.9] p <0.001). However, BMI remained independently associated with a prolonged ICU length of stay, similarly to the first and the last quartile of lean body weight and fat body mass respectively. The lower the LBW or the higher the FM and BMI were, the longer the ICU LOS.
Conclusions: Body composition variables, FM and LBW were more relevant than BMI as predictors of mortality in this adult cardiac surgery population. BMI remains a predictive factor of prolonged ICU LOS.

07AP12-7
Influence of intraoperative creatinine clearance on acute kidney injury after cardiac surgery

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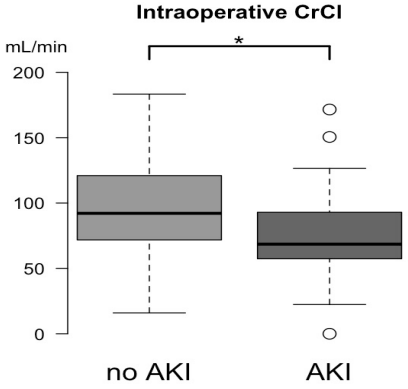
Background and Goal of Study: Acute kidney injury (AKI) is a common complication after cardiac surgery and increases mortality (1). The diagnosis of AKI relies on changes in serum creatinine (SCr) from a baseline or decreases in urine output (2). We want to investigate if intraoperative creatinine clearance ($CrCl_{intraop}$) can identify patients suffering from postoperative AKI.
Materials and Methods: In this preliminary analysis of a prospective cohort study, we analysed 97 elective patients undergoing cardiac surgery with cardiopulmonary bypass at the Medical University of Vienna. Urine samples were collected intraoperatively; amount and time interval were recorded. $CrCl_{intraop}$ was calculated using following formula: $CrCl_{intraop}$= ($Creatinine_{Urinary}$/ $Creatinine_{Plasma}$) * ($Volume_{Urine}$/$Time_{Procedure}$). For analysis, patients were split into two groups, AKI and noAKI, defined by kidney disease – improving global outcome (KDIGO) criteria (2). Differences between groups were analysed using the Student's *t*-test.
Results and Discussion: We report 97 patients (34 female), with a mean age of 67.3 ± 11.2 years. In 16.5% (n=16) CABG, in 55.7% (n=54) a valve and in 27.8% (n=27) a combined procedure was performed. AKI was found in 30% (n=29), one patient needed postoperative renal replacement therapy. Median $CrCl_{intraop}$ in patients without AKI was 92.15 mL/min (IQR, 72.42–120.52), whereas median $CrCl_{intraop}$ in patients with AKI was 68.53 mL/min (IQR, 57.41–92.98; *P* = 0.0052). Intraoperative urine collecting time was comparable for patients without AKI and patients with AKI (354 ± 91 min, 381 ± 116 min, respectively; *P* = 0.2985). Also, amount of intraoperative urinary output was comparable for patients without AKI and patients with AKI (701 ± 503 mL, 601 ± 370 mL, respectively; *P* = 0.4434).



Conclusion: A mild reduced $CrCl_{intraop}$ may indicate AKI after cardiac surgery.
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07AP12-8
The dynamics of thyroid hormone level changes in heart transplant patients and their correlation with outcome

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Background and Goal of Study: It has long been known that low thyroid hormone levels in critically ill patients influence outcome. The non-thyroidal illness syndrome has two phases: an acute phase which thought to be an adaptive response to fasting, and a chronic phase. In this study we aimed to investigate the postoperative thyroid hormone (T4, T3) and TSH changes in different subpopulations with different complications i.e. primer graft failure (PGF); renal failure; infection; vasoplegia; mortality; need of prolonged ventilatory support, mechanical circulatory support (MCS) and reoperation, longer intensive care unit (ICU) stay of our heart transplant population. We also wanted to demonstrate that late decrease in thyroid hormone levels accompany worse outcome.
Materials and Methods: After Institutional Review Board Approval we conducted our retrospective study on a population of 184 patients who underwent heart transplantation between 2015.01.01. and 2018.07.21. in Semmelweis University Heart and Vascular Center. We measured weekly the patients T4, T3 and TSH levels until the sixth postoperative week. We also monitored the occurent complications, ICU stay, mortality and the Inotrope Scores (IS) and Vasoactive-Inotropic Scores (VIS). We used Mann-Whitney U test to compare T4, T3 and TSH levels in the different samples and Spearman correlation for correlation studies.
Results: The IS and VIS negatively correlated with the T3 levels measured on the 2., 4. and 5. weeks. The ICU stay also negatively correlated with the T3 levels measured on the 2.-6. weeks (correlation coefficients were -0,249; -0,426; -0,699; -0,731; -0,512 respectively, p<0,05) We also found that the early (average of first 3 weeks) T3 levels were significantly lower in patients with one of the following complications: PGF, renal failure, vasoplegia, death and need of dialysis or MCS or reoperation. The late (average of last 3 weeks) TSH levels were significantly higher in patients with one of the following complications: PGF renal failure, need of dialysis or MCS.
Conclusions: These results suggest that T3 levels have a strong correlation with certain complications after heart transplantation thus the changes in T3 levels through the first postoperative weeks might serve as a good predictive factor of the morbitity and mortality of these patients. The marked elevation of TSH levels late after transplantation occurring in patients with certain complications needs more investigation.

07AP12-9
Blood glucose risk index (BGRI) is a better measure for glycemic variability than coefficient of variation (CV) in predicting adverse outcomes among patients following cardiac surgery

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Background and Goal of Study: Fluctuating blood glucose levels termed as glycemic variability increases the risk of postoperative adverse outcomes. However, evidence regarding their ability to predict adverse outcomes remains uncertain. We aimed to compare two measures of glycemic variability; coefficient of variation (CV) and blood glucose risk index (BGRI) towards their ability to predict adverse outcomes following cardiac surgery.
Materials and Methods: This prospective, observational cohort study was done in adult patients undergoing cardiac surgery. Postoperative blood glucose levels were measured hourly for initial 24 hours and averaged every 4 hours (4, 8, 12, 16, 20 and 24 hours). CV was measured as SD divided by mean and BGRI as the sum of low and high blood glucose index (LGBI & HBGI).[1] The primary outcome was a composite of in-hospital complications. Confounder controlled models were used to evaluate the association between exposure and outcome. The strength of associations was compared using C statistics.
Results: We included 1963 patients in our final analysis. 170 patients (8.6%) had adverse outcomes. CV was found nonlinear, so quartiles were used. Only fourth quartile of CV was significantly associated with the risk for adverse outcomes (OR 1.82; 95% CI 1.13-3.0; p=0.01). BGRI measured as a continuous variable was significantly associated with adverse outcomes (1.19; 1.08-1.31; p=0.0005). Both the exposures showed good discriminative ability by measuring AUC (C statistic: CV 0.71, BGRI 0.72). Moreover, the discriminative ability was increased when adding CV and BGRI to standard risk index (STS). Only STS: C statistic 0.68, CV with STS: C statistic 0.70 (p=0.012) and BGRI with STS: C statistic 0.70 (p=0.012)
Conclusion: Despite the association with outcomes, we found CV as a nonlinear measure and is predictive only in its fourth quartile. BGRI being more of a continuous variable is a preferred measure for glycemic variability and can predict adverse outcomes following cardiac surgeries.

Model	OR (95% CI)	P value	Univariate	Outcome +	Outcome -	P value
CV (4th Q)	1.82 (1.13, 3)	0.0160	CV (mean, SD)	0.22 (0.07)	0.20 (0.06)	0.0002
BGRI	1.19 (1.08, 1.31)	0.0005	BGRI (median, IQR)	2.07 (1.24, 3.30)	1.55 (1.00, 2.36)	<0.0001

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07AP12-10
Hypoxia induced chemotaxis of human naïve monocytes is associated with an attenuation of cytokine release in-vitro

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Background and Goal of Study: Monocytes only survive for a few days in circulation but are able to migrate into various tissues where they differentiate into other cell types such as macrophages and dendritic cells. Several tissue derived factors such as cytokines, complement components, products of tissue matrix degradation and also hypoxia have been postulated to be responsible for the directed migration of monocytes. The aim of this study was to evaluate whether (i) a defined hypoxic gradient alone is able to induce directed migration of naïve human monocytes and (ii) characterize the cytokine secretome of monocytes under normoxia and hypoxia.
Materials and Methods: Human naïve monocytes were isolated from PBMC using a standard protocol1. Monocytes were transferred into IBIDI chemotaxis chambers (Figure 1A and B) and subjected to a gradient of enzymatically induced hypoxia2. Oxygen tension at both sides of the middle cell reservoir was evaluated with a lycox probe, showing 10mmHg and 80mmHg respectively (Figure 1C and D). Cell migration was recorded for 5h using a live cell analyzer (JuliBr) and cell movements were statistically analyzed employing the chemotaxis tool from the IBIDI software. Secretome analyses were performed with supernatants of normoxic and hypoxic (5h) human monocytes using proteome profiling chemokine arrays (R&D systems).
Results and Discussion: Cell migration recordings revealed an active migration of human monocytes towards the source of hypoxia (P<0.0001, Rayleigh test; Figure 2A), while under normoxic conditions, cells showed an erratical and non-directed movement (P>0.05; Figure 2B). Analysis of monocytes supernatants using chemokine proteome profiling arrays demonstrated a hypoxia mediated down regulation of 70% of the analyzed chemokines (N=27) while 30% were not regulated. The most regulated chemokines were ß chemokines (CCL chemokines): 1. Eotaxin-3 (-98%), 2. Fraktaline (-95%), 3. I-309 (-95%), 4. TARC (-85%) and 5. Lymphotactin (-83%).
Conclusion: Hypoxia results in an attenuation of cytokine release and induces directed migration of human monocytes in-vitro.
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07AP13-2
Unexpected discovery of quadricuspid aortic valve in cardiac surgery

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Background: Quadricuspid aortic valve is a rare congenital cardiac defect. They are often missed even by the transthoracic echocardiogram. In this case we describe the lesion was detected by intraoperative transesophageal echocardiography.
Case Report: This 59-year-old man with a history of hypertension and diabetes mellitus came to our ED due to deteriorating dyspnea for months. The transthoracic echocardiography showed bicuspid aortic valve and moderate aortic regurgitation. Aortic valve replacement surgery was therefore suggested by the cardiac surgeon. Induction with thiamylal 250 mg, fentanyl 60 ug, lidocaine 60 mg and cisatracurium 10 mg. 7.5 Fr endotracheal tube was placed. Ultrasound-assisted application of right radial artery catheter and 8.5 Fr PreSep oximetry over right internal jugular vein. Hypnosis was maintained with sevoflurene to reach MAC 0.7 and infusion of remifentanyl 0.08 mcg/kg/min. Intraoperative TEE unexpectedly showed a quadricuspid aortic valve with severe aortic regurgitation, mild mitral regurgitation, and a left ventricular ejection fraction of 54.3 %. The operating finding confirmed the quadricuspid aortic valve with an enlarged left atrium and left ventricle. After the end of cardiopulmonary bypass, dopamine 4.15 mcg/kg/min and nitroglycerin 0.5 mcg/kg/min were infused to the surgical intensive care unit. On the same day, the patient was successfully extubated and transferred to the general ward on the next day of surgery.
Discussion: The incidence of quadricuspid aortic valve is 0.006%, which is higher in male proportion. It is common diagnosed in fifties. The Hurwitz & Roberts divided the lesion into A to G types according to the size of the extra leaflet. The case is the most common type B (three equal-sized and an additional smaller leaflet). Long-term unequal shear forces eventually lead to aortic valve insufficiency. Nearly 30% of quadricuspid aortic valve is associated with other congenital anomalies such as coronary abnormalities, atrial or ventricular septal defects, Tetralogy of Fallot, and mitral regurgitation. Therefore, a complete cardiac assessment such as cardiac catheterization, cardiac MRI or transesophageal echocardiography should be considered.
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Open Journal of Anesthesiology, 2018, 8, 172-182.
Circulation.2016;133:312-319
Learning points: Quadricuspid aortic valve is a rare cardiac defect and the transesophageal echocardiography is a tool for the accurate detection of the valve anatomy.

07AP13-3
The effect of different positions and positive end-expiratory pressure levels on the right internal jugular vein cross-sectional area in patients undergoing cardiac surgery

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Background and Goal of Study: Increasing the cross-sectional area (CSA) of the right internal jugular vein (RIJV) facilitates cannulation and decreases complications. Trendelenburg position is a common maneuver used by practitioners to increase the vein size. The purpose of this study was to determine 1)the effects of passive leg elevation and Trendelenburg position on the CSA of the RIJV in awake patients 2) the effects of these 2 postitions and the different positive end-expiratory pressure (PEEP) levels on the CSA of the RIJV in anesthetized patients with controlled ventilation.
Materials and Methods: The CSA of the right internal jugular vein was assessed in 51 patients undergoing cardiac surgery using 2-dimensional ultrasound. Before induction, the baseline CSA was obtained in supine position and compared with 45° passive leg elevation and 20° Trendelenburg position in random order. After induction of anesthesia, the CSA was measured at supine postion with no PEEP (control condition, S0) and compared with 8 different maneuvers, that is, a PEEP of 5 and 10 cm H_2O in a supine position(S5, S10) and of 0,5,10 cm H_2O in 20° Trendelenburg (T0, T5,T10) and of 0,5,10 cm H_2O in 45° passive leg elevation (LE0, LE5, LE10).
Results and Discussion: In awake patients, passive leg elevation and Trendelenburg position increased the CSA of the right internal jugular vein compared with supine position (P<0.001)by 14.2% and 33.5% respectively. In anesthetized patients, all maneuvers increased the CSA of the right IJV with respect to the control condition (S0) (all P<0.05). S5 increased the CSA on average by 11.0%, S10 by 21.1%, T0 by 39.1%, T5 by 53.4%, T10 by 54.9%, LE0 by 15.2%, LE5 by 28.1% and LE10 by 50.2%. There was no significant CSA change when comparing the Trendelenburg position in combination with a PEEP of 5 to that with a PEEP of 10 (P=0.989).
Conclusions: The passive leg elevation ,Trendelenburg positions and the application of PEEP increase the CSA of the RIJV. The passive leg elevation with a PEEP of 5-10 cm H_2O may be used to facilitate central venous catheterization in patients undergoing cardiac surgery.

07AP13-5
Intraoperative 3-D TEE guiding the surgical repair of anomalous origin of the Right Coronary Artery.

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Background: Sudden cardiac death may be the initial presentation of an anomalous coronary artery (ACA) origin. Coursing between the aortic root and main pulmonary artery (MPA), the anomalous coronary may be squeezed during systole especially when stroke volume increases during exercise. Concomitant intramural course through the wall of the ascending aorta, increases the potential for ischemic compression. We present a surgical case in which intraoperative 3-D echo was useful in delineating the intramural course and guiding the surgical repair of an anomalous RCA (AoRCA).
Case Report: A 16 year-old male aspiring athelete, presented with chest pain and palpitations while playing football. He was found by TTE and CTA to have an AoRCA originating from the left sinus of Valsalva, a slit -like RCA ostium and an interarterial course between MPA and aortic root. After induction of general anesthesia, 3-D TEE, confirmed the course of the AoRCA and revealed an intramural proximal segment buried in the aortic wall. The intramural portion was unroofed by incising the aortic intima, creating a wide communication between the proximal RCA and aortic lumen. Great caution was undertaken to avoid injury to the nearby commissure and leaflet cusps. The MPA was laterally translocated to provide a wider V-shaped space between the aortic root & MPA relieving RCA compression. The patient was weaned easily from CPB & had an uneventful postop course. Echo 2-months later showed normal LV function & patent large RCA ostium. SPECT scan confirmed the absence of myocardial ischemia and normal EF.
Discussion: The risk of myocardial ischemia and SCD varies according to the anatomic variant. Our patient's high risk features were:a slit-like RCA ostium, acute angulation, coursing between the aortic root and MPA.The intramural proximal portion embedded in the aortic wall added to systolic compression risk especially during hyperdynamic states. Surgical repair-by mobilization and re-implantation at the proper sinus,bypass grafting or MPA translocation-is indicated for high-risk & symptomatic anomalies.Unroofing an intramural portion creates an enlarged neo-ostium augmenting blood inflow. Pre-CPB 3D-TEE was useful to delineate the intramural & interarterial course of the RCA. Post-CPB TEE confirmed the integrity and competence of the aortic valve and absence of RWMA. Successful surgical results should be confirmed by stress testing, echo & CTA before return to atheletic activities.

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07AP13-6
Esophagueal perforation by transesophagueal ecocardiography during cardiac surgery. Our experience in 2 cases.

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Background: Transesophageal ecocardiography (TEE) is a safe technique with serious and rare complications. It is recommended in cardiac surgery to assessing adequacy of a valvular repair. The incidence of iatrogenic esophageal perforation by TEE is 0.03–0.09% [1]. Thoracic esophagus is most commonly affected. Some risk factors are aterosclerosis, abnormalities of the esophagus, steroids, cardiopulmonary bypass, prolonged surgery or antegrade probe flexion.
Case Report: We had 2 cases lately, after years of experience. Case 1: 72-year-old female scheduled for elective mitral valve replacement. Surgery takes place without incidents. In the postoperative period, patient develops right empiema, mediastinitis and respiratory failure. He was reintubated. Drainage appearance change through the chest tube with increased amylase. Computary tomography (CT) diagnoses esophageal perforation. It was treated by placement of endoscopic esophageal prostheses. The patient continues in the ICU with prolonged weaning and associated infectious complications for several months. Case 2: 73-year-old male programmed for elective aortic valve replacement and coronary bypass surgery without incidents. Postoperatively, patient developed empyema with increased amylase. Methylene blue test was positive in the mediastinal drainage. The CT showed no perforation. It was seen in a gastroscopy. He was placed an esophageal prosthesis. He developed hemorrhagic shock after stent´s replacement treated by clips and embolization of left gastric artery branches. In the ICU he was complicated by prolonged weaning and renal replacement therapy.
Discussion: Prolonged continuous pressure, heat or ultrasound energy produced by the TEE probe may contribute to esophageal injury. The mortality of gastrointestinal perforation ranges from 10% to 56%. Early detection and treatment of an esophageal perforation may decrease the morbility. Today endoscopic repair to surgery is preferred.
References:
1. Sainathan S, Andaz S. A systematic review of transesophageal echocardiography-induced esophageal perforation. Echocardiography. 2013; 30:977–83.
Learning points: This complication has a **low incidence and high mortality**. A **quick diagnosis** is essential for an effective treatment. When a patient develops a hemodynamic disorder and inflammatory makers increase **we should consider this possibility**.**The anaesthesia and cardiac surgery societies recommend their monitoring**, as long as, there are no contraindications.

07AP13-7
Indexes of diagnostic validity of a new biomarker for left ventricular hypertrophy

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Background and Goal of Study: Certain pharmacological treatments produce regression of left ventricular hypertrophy (LVH) and decrease the incidence of cardiovascular adverse events and mortality. Therefore, early diagnosis and initiation of appropriate treatment are essential. Our research group investigates new therapies in the early regression of cardiovascular remodeling that act on biomarkers of oxidative stress. The protein thiolation index (PTI) is a new biomarker of oxidative stress, however it has not been related with LVH. This study explored the potential use of PTI as a biomarker of oxidative stress in patients with LVH.
Materials and Methods: We performed an 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. We analyzed PTI in the plasma of both groups. The area under the curve for PTI, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were studied. We used the sensitivity and specificity of the cut-off to calculate the positive likelihood ratio (LR+) and negative likelihood ratio (LR-). The biomarker was compared in both groups using student independent t-test. The data were expressed as mean ± SEM and P<0.05 was considered significant. The local ethics committee approved the study, and all participants gave their written informed consent to undergo the procedures.
Results and Discussion: We detected an increase in the PTI (p<0.001) in the LVH 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). At a cut-off value of 0.012, the 70.6% sensitivity and 68.6% specificity suggested that PTI could be used to screen for LVH. PTI showed a positive predictive value of 68.6% and a negative predictive value of 70.6% for this cut-off. We used the sensitivity and specificity of the cut-off to calculate the positive likelihood ratio (2.25) and negative likelihood ratio (0.43).
Conclusion: Indexes of diagnostic validity suggest that PTI could be a specific biomarker of oxidative stress in patients with LVH.
Acknowledgements: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

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07AP13-8
Maintenance of left ventricular hypertrophy regression after treatment with esmolol in rats with structural heart disease.

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Background and Goal of Study: Our group has demonstrated the regression of left ventricular hypertrophy (LVH) after 48h of treatment with esmolol (1); however, it has not been reported whether or not this effect stays along time. The aim of the study was to assess the continuity of the effect of short-term esmolol therapy in an experimental model of primary arterial hypertension and LVH (SHR, spontaneously hypertensive rat).
Materials and Methods: For the study, fourteen-month-old male SHRs (n=10) have been tested. They were treated with 300 µg/kg/min i.v. esmolol for 48h. At the end of the treatment, a week and a month after the administration, systolic arterial pressure, heart rate and left ventricle mass were assessed using transthoracic echocardiography (M mode). The study variables were expressed as mean±SEM. We used repeated measures t-Test. 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 produces decreasing in blood pressure, heart rate and left ventricular mass index (LVMI) in SHR-E (P<0,05) after 48h of treatment; the effect on LVMI remains one week and one month after esmolol administration.

	SHR	SHR-E 48h	SHR-E 1 week	SHR-E 1 month
LVMI (mg/g)	6.13 ± 0.21	5.54 ± 0.20*	5.35 ± 0.2*	5.59 ± 0.32*

*P<0.05 vs. SHR. SHR-E, SHR treated with esmolol. LVMI, left ventricular mass index.
Conclusions: the positive effect of esmolol on LVH regression in SHR rats stays along time. Further studies are needed (histological and myocardial metabolism studies) to confirm these results.
References :
1. Quintana-Villamandos B et al. Early regression of left ventricular hypertrophy after treatment with esmolol in an experimental rat model of primary hypertension. Hypertens Res 2013; 36(5):408-13.
Acknowledgements: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

07AP13-9
Assessment of Left Ventricle Diastolic Function in High Risk Patients Undergoing Major Vascular Surgery as an Early Indicator of Cardiac Failure. Pilot Study

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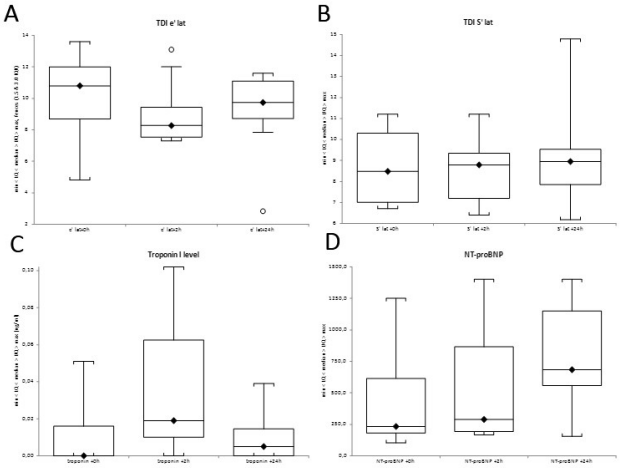
Background and Goal of Study: The prognostic value of diastolic dysfunction (DD) is well-established. Levels of DD correlate with postoperative mortality. It remains unknown how diastolic function changes after major surgery and how it correlates with cardiac biomarkers. This study evaluates changes in diastolic function in postoperative phase.
Materials and Methods: 15 patients scheduled for Thoracic Endovascular Aneurysm Repair (TEVAR) were evaluated with repeated echocardiography, troponin I and NT-proBNP before surgery and 2h and 24h after surgery. Diastolic function was assessed based on current recommendations including Tissue Doppler Imaging (TDI). Patients with heart rhythm disturbances were excluded. Repeated measure data were analysed with the ANOVA test with appropriate post-hoc evaluation.
Results and Discussion: There was a higher occurrence of DD among patients with thoracic aneurysm than in the general population (42% vs. 11.1-34.7% respectively). Analysis of TDI revealed a deterioration of diastolic function 24h after the surgery e'lat+0h=10,5±2,6[m/s] vs. e'lat+2h=8,9±2,1[m/s] vs. e'lat+24h=9,3±2,7[m/s] ANOVA test for e' lateral p-value=0.048 (Fig.1A). The changes in diastolic function did not correspond with systolic function on TDI (Fig.1B). There was a trend in average E/e' ratio with the highest value at 2h after the surgery which did not reach statistical significance. The changes in diastolic function were consistent with an increase in cardiac biomarker levels. There was a significant increase in troponin I 2h post-surgery compared with the baseline: t+0h=0.011±0.017 vs. t+2h=0.041±0.037 p=0.025(Figs.1C&D). An increase in NT-proBNP level at t+24h. was noted.



Although our pilot study included only 15 patients we were able to prove that DD worsens after TEVAR surgery. DD is the earliest sign of myocardial dysfunction and in our cohort was correlated with an increase in troponin in acute phase and was followed by an increase in NT-proBNP as a sign of adaptation and compensation.
Conclusions: DD in TEVAR patients is very common. Significant number of patients after surgery experience deterioration in diastolic function.

07AP13-10
Transesophageal Echocardiography (TEE) measured Left ventricular end diastolic area (LVEDA) as a guide for intraoperative goal directed fluid therapy (GDFT)

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Background and Goal of the study : GDFT uses dynamic monitoring to ensure optimal cardiovascular volume, tissue oxygenation and end organ perfusion . Goal of this study was to administer intraoperative fluids with TEE measured Left ventricular end diastolic area (LVEDA) in study group and CVP guided in control group , to study response to colloid bolus , postoperative complications and ICU stay in both the groups.
Materials and Methodology : Patients undergoing major abdominal oncosurgeries were included .30 patients in each group .Right IJV was cannulated in CVP group and crystalloids given to maintain CVP between 10-16 cm H20 . CVP <10 cm H20 bolus 200 ml colloid was given and change in value noted. In the study group using Esaote 022 multiplane TEE probe transgastric short axis midpapillary view was obtained and end diastolic left ventricular area including the papillary muscles LVEDA cm2 was measured , Fig1. Goal was to maintain LVEDA between 10-18 cm2 . For readings < 10 cm2, 200 ml colloid was given and increase in the LVEDA was noted Fig2
Results : Qualitative variables are compared between groups using Chi-square Test. Quantitative variables are compared across groups using unpaired t-test. Pvalue < 0.05 was considered statistically significant. Total intravenous fluids requirement in TEE group was less 2272.0 ± 539.6 ml than in CVP group 2614.17 ± 453.42 ml and the difference was statistically significant P = 0.010 . Response to colloid bolus was significant increase in LVEDA values P<0.05 consistent at all time intervals compared to rise in CVP value . Lactae <1.5 mmol in both groups .Serum creatinine levels were higher in CVP group at 24 and 48 hours and the difference was statistically significant P = 0.043 and 0.003 . The incidence of return of bowel sounds was more and earlier in TEE group on POD 1 and 2 and statistically significant P < 0.001 .The mean length of ICU stay was significantly shorter in TEE group1.07 ± 0.52 days than CVP 1.57 ± 0.68 P = 0.001.
Discussion : TEE group required less fluids and LVDEA bolus response was predictable parameter of LV preload .TEE group had reduced postoperative renal dysfunction ,significantly early return of bowel sounds and short ICU stay compared to CVP group upto 48 hours.
Conclusion: We recommend measuring LVEDA and cardiac output for GDFT in patients undergoing major abdominal oncosurgeries for early enhanced recovery and reduced ICU stay.

Acute and Chronic Pain Management and Palliative Medicine

08AP01-1
Postoperative analgesic effect of nasal transmucosal Fentanyl via intranasally packed sponge applied to patients who had the closed reduction of fractured nasal bone

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Background and Goal of Study: Nasal bone fracture reduction surgery is normally followed by nasal packing to control bleeding. Due to the bleeding control, patients suffer from pain and require further analgesics treatments. This study aimed to evaluate the effect of fentanyl-soaked packing as a method to control pain after nasal surgeries by a prospective, randomized, double-blind controlled trial.
Materials and Methods: 65 Patients that have undergone closed nasal bone fracture reduction surgery were set as the study group. 32 patients were handled by 50 mcg fentanyl-soaked Merocel®, a biodegradable synthetic polyurethane foams packing, and the other 33 patients were treated with saline-soaked packings. To analyze the relative nasal pain control effect of fentanyl, Numeric Rating Scale, Patient Satisfaction, and Ramsay Sedation Scale were used. Patients were closely monitored to check for the degree of adverse symptoms such as headache or sore throat and cardiopulmonary-relevant indicators were monitored.
Results and Discussion: Fentanyl group displayed a significantly lower Numeric Rating Scale and higher patient satisfaction for most of the time periods after operation (p<0.05). Symptoms of headache and sore throat were also significantly reduced and the Ramsay Sedation Scale scores improved compared to the control group (p<0.05). No remarkable differences in cardiopulmonary relevant indicators between the two experimental groups were observed (p>0.05).
Conclusions: Fentanyl soaked packing displayed a significant postoperative pain reducing effect with no observable adverse effects. Based on the experimental result, we suggest the method of topical fentanyl application to nasal packing as an effective method to reduce pain after closed nasal bone fracture reduction surgery.

08AP01-2
Dynamic analysis of the variations in postoperative pain trajectories over time in patients receiving epidural analgesia using latent curve models

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Background and Goal of Study: Although epidural analgesia (EA) is a popular method to provide reliable pain relief after major operations, few studies explored how the postoperative pain trajectories changed over time in patients receiving EA and what the influential factors were. This study aimed to model the dynamic features in pain trajectories after surgery and investigate factors associated with their variations using latent curve analysis.
Materials and Methods: This retrospective study was conducted in a single medical center in Taiwan and data were obtained from patients receiving perioperative EA by electronic chart review. Mean numeric rating pain scores were recorded daily in the first five postoperative days. Patient demographics, surgical sites and infusion pump settings were also collected. Latent curve models using two latent variables, intercept and slope, were developed to explain the variations in postoperative pain scores over time. The influences of potential predictors of postoperative pain trajectories were further evaluated for the final model determination.
Results and Discussion: Of the 1294 collected patients, the daily pain scores on average ranged from 2.0 to 2.9 for different surgical sites. Among the five significant influential factors of pain trajectories, patients receiving chest and lower extremity surgery tended to have less and more baseline pain, respectively, than those with abdomen surgery (both $p < 0.001$). Male and elderly had less baseline pain as well ($p = 0.011$ and < 0.001, respectively). Moreover, patients older, lighter or receiving chest surgery tended to have milder decreasing trends in pain trajectories. Note that higher infusion rate was associated with elevated baseline level and smoother decreasing trends in pain trajectories. The final model fit our data acceptably (RMSEA = 0.06, CFI = 0.96).
Conclusions: Latent curve analysis provided insights into the dynamic nature of variations in postoperative pain trajectories and more explanatory variables should be considered to elucidate the mechanisms behind the transitions of pain scores over time after surgery.

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08AP01-3
Influential Factors of Postoperative Pain Trajectories in Patients Receiving Intravenous Patient-controlled Analgesia: a latent curve analysis

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Background: Although intravenous patient-controlled analgesia (IV-PCA) is a common method to relieve postoperative pain, few studies have ever evaluated the influential factors of postoperative pain trajectories in patients using IV-PCA.
Materials and Methods: Surgical patients receiving IV-PCA at a tertiary medical center in 2012 were retrieved retrospectively through medical chart review. Latent curve models using with two latent variables, intercept and slope, were developed to depict the changes in daily mean numeric rating pain scores of the first postoperative week. The effects of demographics, PCA device settings, and surgical variables on these two latent variables were further assessed to determine the final multiple predictor model.
Results and Discussion: A total of 3,376 patients with 20,838 pain score observations were analyzed. Female and longer anesthesia time increase the baseline level of pain score ($p = 0.004$ and 0.003, respectively) but abdomen surgery and body weight decrease it (both $p < 0.001$). Regarding the decreasing trend of daily pain score, lower abdomen surgery tended to steepen the slope ($p < 0.001$); older age, American Society of Anesthesiologists (ASA) class ≥ 3 and longer anesthesia time tended to flatten the slope parameter ($p < 0.001$, $= 0.019$ and < 0.001, respectively). PCA settings did not affect the changes in postoperative pain trajectories.
Conclusion: Patient demographics, ASA class, anesthesia time, and surgical sites worked together to affect postoperative pain trajectories in patients receiving IV-PCA. Latent curve models provided valuable information about the dynamic and complex relationships between the pain trajectories and their influential factors.

08AP01-4
The Effect of Intrathecal Bupivacaine/Morphine on Quality of Recovery in Robot Assisted Radical Prostatectomy: A Randomized Controlled Trial.

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Background and Goal of Study: Robot Assisted Radical Prostatectomy (RARP) can cause discomfort in the immediate postoperative phase and various analgesic techniques have been investigated to limit this discomfort. We hypothesized that long-acting analgesic effects of intrathecal bupivacaine/morphine in addition to general anesthesia increased the quality of recovery.
Materials and Methods: A single center, double-blinded, randomized controlled trial was initiated (NCT02924974). All patients scheduled for a RARP were eligible for participation. Exclusion criteria were contraindications for intrathecal injections or for any of the study medication. Patients were allocated to the intervention group, in which patients received a single shot of intrathecal 12.5 mg bupivacaine/ 300 µg morphine (20% dose reduction in patients over 75 years of age) or to a control group that received a sham injection and an intravenous loading dose of 0.1 mg/kg morphine. Both groups received standardized general anesthesia and the same post-operative analgesic regimen. Primary outcome was the decrease in the Quality of Recovery-15 (QoR-15) questionnaire on postoperative day 1. Effects and side-effects of intrathecal morphine were secondary outcomes.
Results and Discussion: 155 patients were analysed, from which 76 received the intervention. Patients in the intervention group had less decrease in QoR-15 (-12.0 ± 19.9 vs. -21.5 ± 18.0, p=0.013, figure 1), used less morphine during the admission (5.8 ± 8.5 mg vs. 18.8 ± 11.3 mg, p=0.000) and perceived lower pain scores (NRS 3.4 ± 2.7 vs. 4.9 ± 2.6, p =0.001), bladder spasms (NRS 1.8 ± 2.6 vs. 3.5 ± 3.2, p=0.001) and sedation (24.2 % vs 50.7%, p=0.002). Moreover, the intervention group used less rescue medication. Pruritus was more common in the intervention group (47.0% vs 14.1%, p=0.000) and the severity was scored as moderate (NRS 3.7 ± 3.1 vs. 1.3 ± 2.2, p=0.001). After a week, no difference in QoR-15 was detected (124.3 ± 16.0 vs. 125.9 ± 15.6, p=0.569).
Conclusions: The addition of intrathecal bupivacaine/morphine increased the quality of recovery and limited the pain and sedation in the immediate post-operative phase after RARP. Pruritus, however, was threefold increased. We recommend this method of analgesia for all patients undergoing a RARP.

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08AP01-5
A clinical comparison of the ANAPA® and PAINSTOP® pumps for intravenous patient-controlled analgesia after laparoscopic gynecologic surgery

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Background and Goal of Study: In the Implementation of IV-PCA (intravenous patient-controlled analgesia), the choide of an appropriate analgesic and control of the appropriate bolus dose, background infusion rate and lockout interval are critical to the reduction of side effects and the achievement of effective analgesia. The aim of this study was to compare the efficacy and side effects of the nonelectronic ANAPA, and the electronic PAINSTOP, pumps operating in “patient optimizing backgound infusion”(POBI) mode after laparoscoic gynecologic surgery.
Materials and Methods: In total, 211 patients were randomized to ANAPA (n=106. Group A) or PAINSTOP (n=105, Group P) postoperative pain treatment groups. For both group, 700 mcg of fentanyl, 150 mg of ketorolac, and 0.6 mg of ramosetron were mixed with saline to a total volume of 100 ml. For Group A, the background infusion rate was set to 2 ml/h and the bolus dose to 0.5 ml, and a 15-min lockout interval was applied. For Group P, the background infusion rate was set to 6 ml/h, the bolus doses was 2 ml, and there was a 7-min lockout interval. Also, we set a waiting time of 60 minutes. If the patient pressed the bolus button, the background infusion rate increased by 1 ml/h in addition to injection of the bolus dose. If the patient did not press the button, it decreased by 0.5 ml/h. A blinded observer assessed pain using a numerical rating scale (NRS). We also assessed postoperative nausea and vomiting (PONV), the infused PCA dose, and patient satisfaction.
Results and Discussion: There was no significant difference in the overall NRS between the two groups. However, the use of rescue analgesics was significantly higher in Group A. The incidence of PONV did not significantly differ between the two groups at 0.5 h postoperatively; however, at 2 h, it was significantly higher in Group P than in Gorup A. In contrast, the incidence of PONV was significantly higher in Group A than in Group P at 24 h postoperatively. No significant group difference was observed in patient satisfaction.
Conclusions: PAINSTOP operating in POBI. mode demonstrated similar efficacy in terms of pain relief and patient satisfaction compared to ANAPA. However, no patient required rescue analgesics postoperatively, and the incidence of PONV was significantly lower at 24 h postoperatively. Therefore, with an appropriate waiting time, PAINSTOP could be an effective PCA pump to reduce postoperative pain and side effects.

08AP01-6
Ten Years After - Perioperative Analgesia with Intravenous Lidocaine in Ottawa (PAInLO).

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Background: Lidocaine is a local anesthetic which when administered systemically provides analgesia and anti-hyperalgesia. In 2009, our tertiary level University Hospital implemented an Acute Pain Service (APS) protocol that allowed for extended use of intravenous (IV) lidocaine in the postoperative period on surgical floors. The aim of this retrospective study was to review the efficacy and safety of IV lidocaine for postoperative pain over the past 10 years on our APS and identify surgical models and patient subgroups where this intervention was found useful.
Methods: This retrospective study was designed to identify all patients who received an IV lidocaine infusion from January 2007 to December 2017. Patients were excluded if they had received a lidocaine infusion in the ICU while sedated, if no major surgery was performed or no pain scores recorded. Data collected included demographics, surgery type, infusion duration, pain scores, analgesic consumption and adverse effects. Pain scores included rest and active pain scores (at 24 hours and infusion end postoperatively) and were analyzed by surgical model and subgroups. Clinically important differences (CIDs) in pain were determined by raw pain score difference of 2 or greater (11-point scale) or 30% or greater change in pain intensity[1]. Patients who received IV lidocaine as a rescue regime were identified and analyzed separately.
Results: A total of 702 patients received IV lidocaine with an average infusion duration of 68.60 hours (2.86 days). Main IV lidocaine indications included General Surgery (41%), Orthopedics (28%), Neurosurgery (15%) Vascular (11%) and others. Overall, 55.1% of the total study population experienced a CID with reduced pain scores at rest and/or with activity and reduced analgesic consumption postoperatively. CIDs were observed in 83.8% of chronic pain patients, and 86.6% of patients who received IV lidocaine as a rescue regimen. 38 patients experienced transient signs of possible mild toxicity, which resolved with conservative management. Only 1 serious adverse event occurred.
Conclusion: This single-center retrospective study over 10 years confirms the efficacy and safety of IV lidocaine implemented in the perioperative period and identifies benefits of IV lidocaine in certain surgical models and patient populations.
Reference:
1. Farrar JT et al. Clinical importance of changes in chronic pain intensity measured on an 11-point numerical rating scale. Pain 2001;94:149-158

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08AP01-7
Two case reports of using the costoclavicular approach for continuous brachial plexus block for elbow surgery

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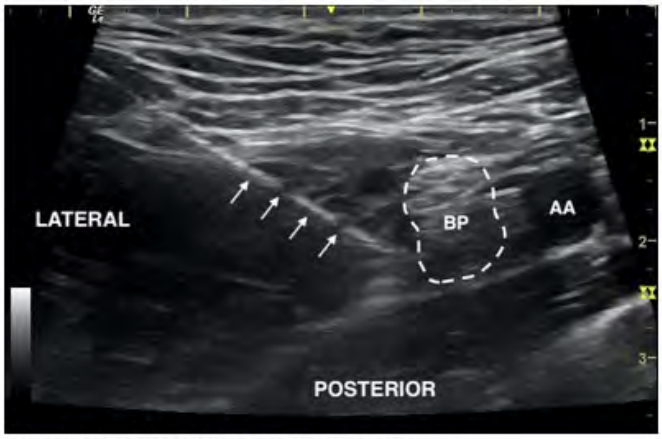
Background: Continuous perineural catheter is widely performed today. The most common approaches used in elbow continuous perineural catheterization include supraclavicular(SC), and infraclavicular(IF) block. Costoclavicular(CC) approach is a novel approach to BPB that is relatively simple to perform. This article will discuss two cases where continuous BPB was given through the CC approach for elbow surgery.

Case 1: A 14-year-old male with limited range of motion (ROM) ot the elbow underwent surgical manipulation. A perineural catheter for continuous BPB was inserted before the surgery via the CC approach for post-operative rehabilitation. 10ml of 0.5% ropivacaine was injected before the surgery to achieve totally motor and sensory blockage. Then general anesthesia was performed. 0.3% ropivacaine was used post-op for continuous block. With bolus dose, the patient's VAS (Visual Analogue Scale) was 1-2 during rehabilitation.
Case 2: A 23-year-old male presented with right elbow arthritis and stiffness after reduction for dislocated elbow. It is planned for him to receive surgical manipulation and ulnar nerve release as well as continuous BPB for rehabilitation. A perineural catheter was inserted via CC approached before surgery (Fig.1). 10ml of 0.5% ropivacaine was injected before surgery. However, his motor and sensory blockage was incomplete. So 1% ropivacaine 10ml was injected for rescue dose to achieve complete motor and sensory blockage. Then 0.5% ropivacaine was used for post-op continuous block. His VAS was 2-3 during his rehabilitation.



Arrows: needle; BP: brachial plexus; AA: axillary artery

Discussion: There are multiple approaches for performing continuous BPB for elbow surgery, including SC, IF and CC. Previous study reports SC has higher paraesthesia rate and incomplete ulnar block than IF. Compare IF with CC, IF is deeper and there is significant variation in cord separation; CC has a rapid onset, is shallower, the cords cluster. However, the cephalic vein and thoracoacromial artery are close to the plexus of CC. Care shoud be taken to avoid vascular injury.
Learning point: CC is a reliable way to perform BPB. It is relatively simple and requires less local anesthetic than IF to achieve same efficacy.

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08AP01-9
Prevalence of Pain in a Spanish University Hospital and its relationship with Quality of Life and Work Productivity: A cross-sectional study.

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Background and Goal of Study: Although pain is widely considered the fifth vital constant and has been widely studied in specific settings (including general population and inpatients), very little is known with regards to the outpatient population of hospitals. The goal of this study was to investigate both the prevalence of pain in outpatients in a Spanish Teaching Hospital and its relationship with Quality of Life and Work Productivity in active workers.
Materials and Methods: A cross-sectional study was performed at Clinica Universidad de Navarra. The study was based on a 13 questions survey that was performed on 2 consecutive days in patients attending the outpatients department. The questionnaire included 4 different topics: general epidemiology, pain related questions, EQ-5D and Work Productivity and Activity Impairment questionnaire for Pain (WPAI:Pain).
Results and Discussion: 620 patients participated in our study. The table below shows the results of pain prevalence, being the overall prevalence of pain 69,7% and the mean level of pain 2.93/10 on a NRS.

	No Pain	Mild Pain	Moderate Pain	Severe Pain
Prevalence (n)	40.3% (250)	20.3% (126)	26.9% (167)	12.4% (77)

The mean EQ-Index obtained was 0,77 and the EQ-VAS 71%. This results are clearly above those usually found in pain-related studies, which is explained by the fact that our cohort included outpatients, i.e. mainly working people. The WPAI:Pain gave the following results: Absenteism rate 11.9%, Presenteism rate 23.5%, Loss of Productivity 27.5% and Global Disability 27.2%. Finally, a linear regression was performed allowing us to predict the Loss of Productivity considering only the level of pain (10-point NRS) and the level of perceived health (100-point VAS). The R^2 for this linear regression was 0.41, meaning that these 2 simple questions can accurately predict the loss of productivity in more than 40% of our population.
Conclusions: This is the first time that a prevalence of pain in the outpatient population in Spain has been established. The results show that, although the prevalence of pain is similar to that of general population, the quality of life indexes are better. The linear regression model confirms the very high implication of pain in productivity related features. Further health economics studies are required to confirm these results in other populations.

08AP02-1
Excluding median results from meta-analyses of postoperative analgesics may increase type 1 errors in analysis

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Background and Goal of Study: Inclusion of reported median values into meta-analyses remains controversial. Estimating means from medians [1] risks false assumptions about the underlying data, whilst reporting in a narrative synthesis may risk excluding important data from analyses, with resultant errors in effect estimates and tests for publication bias.
Materials and Methods: We analysed a recently published Cochrane review [2] on pre-emptive opioids noting the number of statistically significant studies when reported as means versus medians ($p<0.05$) for 24-hour morphine consumption. We then present a solution based on the meta-analysis of p values using Edgington's normal curve method in Stata version 15.1. If p values were not fully reported, then results that were reported as $p>0.05$ were assumed to be 0.2.
Results and Discussion: The overall result reported in the meta-analysis showed statistically significant benefit ($p=0.03$) and evidence of possible publication bias ($p=0.07$). The overall effect p value increased when analysed using Edgington's normal curve method with studies reporting means ($p=0.16$). The proportion of statistically significant individual studies was 36% (4/11) when reported as means and 0% (0/5) when reported as medians. When the overall results included studies reported as medians using meta-analysis of p values, the overall p value increased and was no longer significant ($p=0.75$). These results have implications for reducing type 1 errors in overall results and publication bias tests. However, the limitations of p value meta-analyses must also be considered.
Conclusions: Omitting studies which report results as medians may cause type 1 errors in effect estimates and publication bias tests and therefore sensitivity analysis using meta-analysis of p values may be a potential solution.
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Acknowledgements: None.

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08AP02-2
What are the determinants and the consequences of opioids consumption? A PAIN-OUT single-center study.

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Background and Goal of Study: Post-operative pain remains a significant problem. PAIN OUT is a European project helping and guiding hospitals with the collection of data to map the current situation. This is a pilot project limited to the University Hospital of Brussels in co-operation with PAIN OUT. The goal is here to collect data of the current situation about post-operative pain, treatments and protocols and to identify the variables associated with opioids use.
Materials and Methods: A total of 60 women who had breast surgery in the UZ Brussel and stayed at least one night at the post-operative ward. An auto-administered questionnaire designed by PAIN OUT with a specific focus on pain, post-operative adverse effects, pre-operative pain, and treatments. Demographic and clinical data of the patients were also collected.
Results and Discussion: The median most severe pain score was 7 on an eleven-points scale. Interference of pain on activities has a median of 6 and side-effects scored a median under 5. Patient satisfaction and participation in the treatment of post-operative pain have a median of 8 and 9 respectively. A bivariate analysis showed that age, length of surgery, intra-operative and post-operative use of opioids have a significant ($P<0.05$) relation with outcome scores of the questionnaire. Further univariate analysis (Spearman Rank test) confirm that more opioids are used during longer operations and graphical multivariable modelling suggests the occurrence of opioid-induced hyperalgesia.
Conclusions: Most severe pain scores and interference with activities remain high, even in satisfied and participating patients. Outcomes are associated with opioids use suggesting the development of complementary approaches.

08AP02-3
Ratio of means fails to resolve statistical heterogeneity in meta-analyses of postoperative analgesics

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Background and Goal of Study: Statistical heterogeneity is a major issue in meta-analyses of postoperative analgesics and may reduce quality of evidence [1]. Ratio of means has been proposed as an alternative to mean differences [2] and such relative measures may reduce statistical heterogeneity.
Materials and Methods: We analysed 24-hour morphine consumption in three meta-analyses of paracetamol, NSAIDS and alpha-2 agonists using both mean differences and ratio of means (144 studies; 10,679 participants). Statistical heterogeneity was defined as considerable if I^2 >75% and moderate if >50%.
Results and Discussion: When analysed using mean differences, the I^2 values were 99%, 92% and 96% respectively. When re-analysed using ratio of means, I^2 values were 92% (Figure 1), 77% and 95% (Figure 2). Although ratio of means did improve I^2 values, considerable heterogeneity still exists and therefore ratio of means cannot be considered the only solution to resolving statistical heterogeneity in meta-analyses of postoperative analgesics [1].
Conclusions: Re-analysing meta-analyses using ratio of means does not appear to resolve statistical heterogeneity in meta-analyses of postoperative analgesics.
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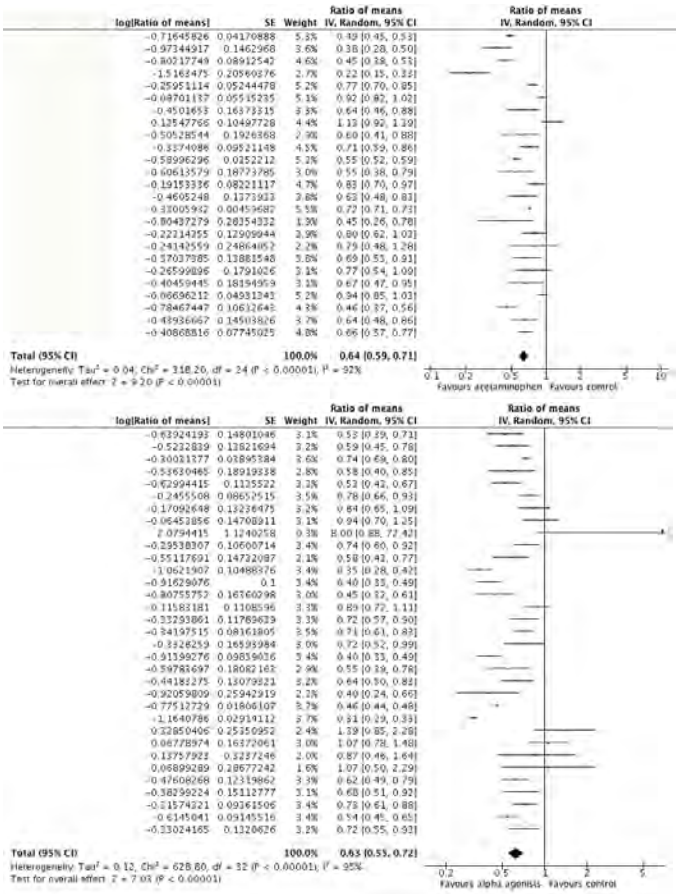

08AP02-4
Improved pain control and reduced opiate use after total knee replacement using a mobile e-health app.

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Background and Goal of Study: Opiates are effective as analgesic after total knee replacement (TKR). Regarding its side effects, low opiate use is desired. Less is known about pain and opiate use at home directly after TKR. An e-health application, PainCoach app, was developed to guide patients in pain control and opiate use. Objective: to investigate the effect of this app on pain and opiate use in the first two weeks at home after TKR. Hypothesis: using this app contributes to reduction of pain and opiate use.
Materials and Methods: RCT. TKR patients were randomized to the PainCoach-app group or control group. PainCoach-app group got access to the app to be used whenever the patient wanted. In response to patient's input of the pain experienced, advice on pain drug use and exercises/rest was given by the app. Control group received usual care. Primary outcomes were opiate use (Oxycodon) and Visual Analogical Scale (VAS) pain scores at rest, during activity and at night. Secondary, data on drug use other than opiates, experiences with executed exercises, pain acceptance, function and quality of life were obtained. Data were collected in both groups by questionnaires; preoperatively, daily the first two weeks and after 1 month. Actual amount of app use was recorded; active use was defined as ≥12 app visits. Analysis were executed with mixed and generalized linear models.
Results and Discussion: Mean VAS pain score was 23 and mean opiate use was 0.4 tablet/day. PainCoach-app group (n=38) used 23.2% less opiates (p=0.018) and 14.6% more acetaminophen (p<0.001) compared to the control group (n=33). 74% of the PainCoach-app group evaluated the app as added value. In the active PainCoach-app subgroup (n=19) a 4.1 times faster reduction of VAS pain during activity (p=0.015), 6.3 times faster reduction of VAS pain at night (p=0.001), 44.3% less opiate use (p<0.001), 76.3% less gabapentin use (p<0.001) and 21.0% more acetaminophen use (p<0.001) was found compared to the control group. Low pain scores and opiate use were found. Opiate use is substituted by acetaminophen use. Knowing 80% of interactive provided advice is remembered, this explains that active use of the app contributes to lower pain scores and further reduction of opiate use.
Conclusions: Using the PainCoach app contributes to reduced opiate use in the first period at home after TKR. Active use of this app leads to further reduction of opiate use and improved pain control during activity and at night.

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08AP02-5
A Comprehensive Acute Pain Anchoring Scale for the Outpatient Orthopaedic Surgery

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Background and Goal of Study: The number of orthopaedic outpatient surgeries grows, but there is an unmet need in pain treatment 72 hours postdischarge. The outpatient failure is mostly due to uncontrolled/catastrophized pain and questions on postoperative care. The role of anchoring in pain self-calibration is known to be helpful in chronic pain patients. However this approach is rarely used in the acute pain. We developed a Comprehensive Acute Pain Anchoring Scale for Outpatients Orthopaedic Surgery based on the examples of rational perception of postoperative pain and discomfort. This scale is designed as a part of structured educational interventions to empower patients in early postoperative period at home (PELOPS study, NCT03754699). We test the face validity of the developed scale.
Materials and Methods: Using an 11-items numeric patient-created personalized pain scales (Harich and Mankoski pain scales) and forward/back translation we created a color coded multi language scale. For each pain level a description of perceived pain intensity, discomfort, and possible physical activity proposed (anchoring). A French version of this scale (Figure 1) was tested in 2 groups of volunteers. 1 group (n=120) was proposed to give a numeric rating for light, moderate and severe pain anchors selected randomly without seeing the whole scale. Another group (n=57) rated their agreement for each anchor looking at the whole scale.

1 - Intensité de la douleur simplifiée	2 - Intensité de la douleur détaillée	3 - Exemple de perception/"activité possible
Douleur ATROCE	10	10 – vous ne vous contrôlez pas
Douleur **SEVERE**	9	**La douleur arrête vos activités** 9 – limite de tolérance / **perte de conscience** possible
	8	8 – vous avez des **difficultés à parler** à cause de la douleur, prêt à tout pour l'arrêter
	7	7 – **l'arrêt de toutes les activités**, vous ne pouvez pas manger ni dormir
Douleur **MODEREE**	6	**La douleur modifie vos activités quotidiennes** 6 – la douleur **occupe votre existence**, vos activités sont limitées par repas, toilettes, vous préférez passer votre temps sans bouger, sommeil difficile
	5	5 – vous ne pouvez ignorer la douleur, **vos activités sont limitées**, tâches ménagères sont difficiles, vous cherchez le calme, vous pouvez dormir
	4	4 – vous sentez la douleur en permanence, **vous pouvez l'ignorer**
Douleur **LEGERE**	3	**La douleur ne modifie pas vos activités quotidiennes** 3 – vous percevez la douleur. Vous pouvez facilement vous distraire de cette douleur
	2	2 – vous pouvez constater la douleur si vous la cherchez
	1	1 – on parle plutôt d'un inconfort
ABSENCE de douleur	0	

Results and Discussion: For the separate testing there was constant overrating of pain, however there was high agreement for the whole scale.

	Group 1 - single item test		Group 2 – whole scale test	
Pain Level	Agreement	Most rated level	Agreement	Most rated level
Pain 9	85%	9	67%	9
Pain 8	17%	9	82%	8
Pain 7	9%	9	78%	7
Pain 6	91%	6	84%	6
Pain 5	28%	6	87%	5
Pain 4	32%	5	73%	4
Pain 3	17%	2	87%	3
Pain 2	23%	1	79%	2
Pain 1	43%	1	91%	1

Conclusions: Also discriminant validity is low for a single anchor test, the face validity was confirmed by the high proportion of agreements for the whole scale presentation.
Acknowledgements: We thank Mr Jack Harich for the permission to use his scale

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08AP02-6
Personalized therapy of acute postoperative pain syndrome in cardiac surgery at the comorbids patients.

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Background and Goal of Study: Acute postoperative pain syndrome (PPS) which isn't stopped in the standard ways at patients of the III-IV ASA after cardiac operations is a current problem. To study the frequency and structure of acute PPS at patients(III-IV ASA) with comorbid diseases and to evaluate the results of the use of combined regional anesthesia techniques.
Materials and Methods: The 83 patients (pt) after of surgery and ACU with acute PPS were divided into two groups (gr):1-after aortocoronary shunting (AKSh); 2 -after reconstructive and recovery aorta surgery. Since 2014/15 42 pt with PPS were treated (33 males/9 females, 61.3±10.7 years): 1gr.-19 (15m/4f), 2 gr.-23 (18m/5f). 2015/16 – 28 pt with PPS (21 m/7f; 64.2±6.7 years): 1 gr.-10 (8m/2f); 2 gr.-18 (13m/5f accordingly).2016/17–13 pt with PPS (13 m; 62.5±10.7 years). In 100% patients had: degenerate diseases of cervical, thoracic and lumbar spine and other. In addition to treatment acute PPS to patients executed the regional blockade (RB, N 1-3 per day) of the trigger points (TP) of a thorax zone, shoulder joint or a lumbar zone (lidocaine-1mg*kg-1, dexamethasone 0.02 mg*kg-).
Results and Discussion: The acute PPS was (VAS at 84.3%-5.4±1.1 cm, at 15.7%-7.8±0.6 cm) after AKSh of-36,2% (30 per.), 2 gr.- 63,8%, i.e. 2/3 patients. Despite the carried-out general pain ACU therapy, patients showed complaints on: pains in thoracic spine or parasternal in the postoperative wound site (PPW); impossibility of an adequate breath or weakness in the left hand. PPS frequencies were: in 1-st stage: 1 gr. of the torakalgiya (T) - 27.5% (19/69), in 26,3% (6/19) PPS was combined with pain in the PPW; in 31% (6/19) from a positional plexopathy of the left hand; 2 gr. T-19,3% (17/88) and the plexopathy in 35% (6/17). In the 2-nd stage of T were: 1gr.-17,6% (9/51); 2 gr. - 17% (15/88); in 20% (3/15) were combined with pain in the PPW and plexopathy in 6,6% (1/15); at the 3-rd stage 1 gr.-T with-put-3% (2/64) from them 1 per. had plexite; 1-st gr. T of-4.8% (9/187), T+ plexite 11,1% (1/9), lumbago in 2 gr.-1% (2/187).Regional block(RB) was performed at the request of the patient and only it was stopped by PPS for 88% cases. In all cases, the result completely stopped acute PPS.
Conclusions: Regional blockade are highly effective method of treatment and completely stopped of acute PPS in comorbid pt after cardiac operations.

08AP02-7
Analysis of postoperative pain registers of caesarean sections during the period 2013-2017

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Background and Goal of Study: Moderate / severe pain in the postoperative period of cesarean section (CS) has an incidence between 20 and 40%. An epidemiological study that analyzes pain intensity in the first 24 hours places it in ninth place out of 176 surgical procedures. In addition, postoperative pain is a predictor of persistent pain, with some studies showing an incidence of 22% after one year of CS. The aim of our study is to analyze the evolution of indicators of Acute Postoperative Pain (APP) during hospitalization after CS in a tertiary hospital to assess the effectiveness of the implementation of analgesic protocols.
Materials and Methods: We have analyzed all the CS, urgent and programmed performed with subarachnoid anesthesia in the period 2013-2017. Intradural anesthesia is performed with hyperbaric bupivacaine 0.5% (10-12 mg) and morphine (100 mcg) for its analgesic effect in the first 24 hours. Postoperative analgesia is completed with metamizole 2 gr / 6 h iv, paracetamol 1 gr / 6 h iv and morphine 0.05 mg / kg sc if pain ≥ 3 according to Verbal Numerical Scale (VNS) (0 = absence of pain, 10 = maximum pain imaginable). The APP values are recorded (every 8 hours) by VNS in the electronic medical record. Based on these records, the following indicators are analyzed: percentage of patients with VNS ≥3, with VNS ≥7, with two consecutive records of VNS ≥3 and with two consecutive records of VNS ≥7, throughout the stay in the hospital.
Results and Discussion: We have registered 1663 CS. Table 1 shows the indicators analyzed in the 2013-2017 period. These data show a tendency to decrease, over the years, in the VNS ≥ 3 indicators in one assessment and in two consecutive ones.
Conclusions: The analysis of pain indicators allows to assess the efficacy of the treatment of postoperative acute pain in CS, and propose improvement measures.

Year	Nº cae-sarean section	% VNS ≥3	% VNS ≥7	% VNS ≥3 2 consecutives times	% VNS ≥7 2 consecutives times
2013	330	47.3	3.9	11.5	0.3
2014	316	42.2	5.1	8.2	0.3
2015	329	34.7	3.0	5.8	0.3
2016	337	39.2	2.1	6.2	0.6
2017	351	38.5	4.0	8.3	0.3

Table 1: Intensity of postoperative pain at any time during admission
VNS: Verbal Numeric Scale

08AP02-8
Examination of psychological factors affecting the divergence between subjective pain assessment and objective pain assessment.

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Background and Goal of Study: The Visual analog scale (VAS) is widely used to assess pain intensity. It's a subjective assessment and considered to be affected by a patient's mental state. The Pain Degree (PD) obtained by the Pain Vision TM, an electrical neurostimulator, is used to assess objective pain intensity. Many patients show that both VAS and PD tend to decrease together after treatment, some patients show diverged results. We examined the cause of the divergence of results using psychological tests on postherpetic neuralgia (PHN) patients and spinal canal stenosis (SCS) patients.
Materials and Methods: After approval of the institutional ethics committee, 11 PHN patients (39-83 y.o.) and 11 SCS patients (47-80 y.o.) were candidates for this study. The subjective assessment of pain used VAS. The objective assessment of pain were measured by an electrical neurostimulator (Pain Vision TM, Nipro Co., Japan). We measured VAS and PD at pre and post treatment. We used Kyudai Medical Index (KMI) questionnaire which simplified Cornell Medical Index as psychological test. It consists of 99 items of past and family history, psychological symptoms and physical symptoms. We evaluated the proportion of diverged results, percentage of total complaints number of KMI being 20 or more in both disease groups. T-test was used for comparison pre and post treatment. Chi-square test was used for a comparison of the divergence and total complaints number of KMI .A value of $P < 0.05$ was considered significant.
Results and Discussion: The patients with both VAS and PD decreased as divergent groups(DG) and the other patients were set as non-divergent group(NG). There were 6 cases of DG and 5 cases of NG in both disease groups. It is said that there is a neurosis tendency when the total complaint number of KMI exceeds 20. In PHN, the number of KMI total complaints exceeding 20 were 1(16.6%) in DG and 2(40%) in NG. There was no statistically significant difference. In SCS, the number of KMI total complaints exceeding 20 were 3(50%) in DG and 2(40%) in NG. There was also no statistically significant difference. Since we used only one psychological test, we may be able to determine the factors by using other psychological tests.
Conclusions: It was shown that PD as well as VAS are effective for assessment of the treatment effect of pain. We were unable to pursue factors that affected divergence.

08AP02-9
Virtual reality and post-operative pain treatment : a systematic review

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Background and Goal of Study: Background: Virtual reality (VR) is a non -pharmacological pain and anxiety treatment thatrecently gained in popularity, because it can be used without technical restrictions. Goal: To evaluate the use of VR in the post-operative pain treatment by searching the existing literature for clinical trials.
Materials and Methods: The investigators conducted a systematic review of English articles using the MEDLINE database. Search terms included anesthesia, virtual reality, mixed reality, post-operative, post-operative pain, pain, pain management and analgesia. The MEDLINE search yielded 271 titles, 117 abstracts were screened and 4 articles were analyzed.
Results and Discussion: In their uncontrolled study, Mosso–Vazquez et al applied VR therapy after cardiac surgery.88% of the patients reported a decrease level of pain post therapy from ''severe'' to ''moderate'' or ''moderate'' to ''light.'' Cacau et al. evaluated the in a controlled clinical trial the use of VR s an adjunct treatment in the functional rehabilitation of patients in the postoperative phase of cardiac surgery. Patients in the treatment groups showed less pain in the first and third postoperative and the discharge day. In the randomized within subject controlled trail of Schmitt et al, the adjunctive analgesic effect of VR was studied in pediatric burn patients during physycal therapy. The patients reported significant decrease (27-44%) in pain during VR using graphic rating scores. Patterson et al report a randomized controlled trail to assess the adjunctive analgesic efficacy of VR hypnosis in patients suffering from background pain associated with recovery from physical trauma. The VR hypnosis group reported less pain intensity and pain unpleasantness compared to the control and VR distraction groups. Only 4 studies are discussing VR for post-operative pain treatment, in a wide variety of conditions and none of them focus on post-operative pain as a primary outcome. Most studies discuss either VR for pain during procedures (dressing change or venipuncture) or VR for chronic pain (phantom limb pain).
Conclusions: There is only a very limited number of clinical trials discussing the use of VR for post-operative pain treatment. No objectif conclusion can be drawn from this literature review. More randomised controlled trials, with the focus on post-operative pain, are needed to answer this question.

08AP03-1
Usefulness of low - dose amitriptyline for extremely acute postoperative pain management: fifteen cases report

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Poorly controlled acute postoperative pain is identified as one of the most important risk factors for chronic postsurgical pain (CPSP). Severe acute postoperative pain contains often neuropathic components related to peripheral nerve injury, and is associated with delayed recovery time, prolonged duration of opioid use, and higher healthcare costs. Therefore, prompt acute pain relief is of paramount importance. Even if multimodal analgesic / anesthetic interventions are used for postoperative pain, there are some patients still hardly controlled. In our institution postoperative pain management team asked the pain intensity for two or three days after surgery, and found out the patients who could hardly move all the time and sleep because of severe pain. They were assessed whether there were features of neuropathic pain by using screening tool, painDETECT.
Cases: From August 2017 to January of the following year, among 512 postoperative patients, there were fifteen patients complained severe continuous and / or paroxysmal spontaneous pain with neuropathic components and sleep disturbance. Types of surgery were laparotomy (6 cases), laparoscopy (4 cases), thoracotomy (1 cases), and t extremities surgery (4 cases). For the patients, 10 mg amitriptyline (TCA) was started within a few days after surgery and administrated every night. Immediately, we could observe that TCA markedly improved the pain to mild and almost patients could sleep well. The effect was often observed from the first day of administration.
Discussion: By careful interview, it was clarified neuropathic components existed in addition to nociceptive pain. Though there is no evidence whether the pain will develop refractory neuropathic pain, there is a possibility to induce sensitization of peripheral and central nervous system. Moreover, of 15 cases 9 patients had chronic pain such as migraine and previous surgical pain. Hyperalgesia and central sensitization already might have been induced in these patients. TCA is the first - line drug of chronic neuropathic pain. There is little evidence for acute postoperative pain, and the effectiveness is not supported. However, it was really useful for our patients. It also decreased long-term opioid use. The side effect was few. Because of immediately after surgery, it had better to pay attention to the symptoms such as akathisia, arrhythmia and hypertension.
Conclusion: TCA could be useful for acute postoperative pain management.

08AP03-2
Postoperative analgesia after open radical nephrectomy: Comparison of intravenous morphine plus ketamine versus epidural ropivacaine plus morphine

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Background and Goal of Study: The aim of this study was to compare a multimodal analgesia technique with intravenous (iv) administration of morphine plus ketamine versus epidural administration of ropivacaine plus morphine, in patients undergoing open radical nephrectomy with respect to the efficacy of postoperative analgesia and the incidence of adverse effects.
Materials and Methods: 286 patients ASA PS I-II who underwent open radical nephrectomy were included in this retrospective study. Patients concerning postoperative analgesia for the first 24h following surgery were assigned in two groups: Group A (n=132) received epidural ropivacaine 0.2% plus morphine at a dose [mg/24h=18-(ageX0.15)] and Group B (n=154) received iv morphine (bolus 0.05mg/kg and continuous iv (CIV) at a dose [mg/24h=18-(ageX0.15)] plus ketamine (bolus 0.1mg/kg and CIV 0.15mg/kg/h). Postoperative analgesic technique started 30min before the end of surgery. Infusion pumps were designed to provide 24h postoperative pain relief. General anesthesia was standardised in all patients. Efficacy of postoperative analgesia and the incidence of side-effects were evaluated at 6h and 24h postoperatively. Pain intensity was assessed by numerical rating scale (NRS 0-10) at rest and movement. If NRS scores were >3, additional analgesics were provided. Statistical analysis was performed with t-test and chi-square test.
Results and Discussion: Demographic data were similar between groups. A satisfactory level of analgesia (NRS<4) was recorded in both groups at 24h after surgery. At 6h postoperatively, group B showed significant higher NRS scores at rest compared to group A ($p<0.05$). Additional analgesics were provided in all patients without significance among groups. Concerning adverse effects the incidence of pruritus was significant higher in group A compared to group B at 24h postoperatively ($p<0.05$), while nausea at the same time interval was significantly higher in group B compared to group A ($p<0.05$). Group A showed significant higher Bromage scores compared to group B at 6h and 24h post-surgery ($p<0.05$) as it is reasonable.
Conclusions: Intravenous administration of morphine plus ketamine and epidural administration of ropivacaine plus morphine were effective concerning postoperative anlgesia 24h post open radical nephrectomy surgery. Intravenous regimen was associated with greater incidence of pain at 6h postoperatively.

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08AP03-3
Influence of various postoperative analgesia regimens on the level of markers of the systemic inflammatory response and system of regulating the aggregate state of blood in geriatric patients with polytrauma

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Background and Goal of Study: The aim of the study was to compare the effect of various postoperative analgesia regimens on the level of the markers of the systemic inflammatory response and the system parameters of regulating the blood aggregate state in geriatric patients with polytrauma.
Materials and Methods: All patients were divided into 3 groups. In Group I, they received morphine 10 mg, in Group II – nalbuphine 10 mg, in Group III – combination of central inhibitor cyclooxygenase infulgan with rheumoxicam. The study was conducted on Day 1, 3, 5 and 7 after surgery. Concentration of mediators of systemic inflammatory response and indicators of system of regulating the blood aggregate state was studied.
Results and discussion: In Group III, with the cyclooxygenase inhibitor therapy, interleukins level was significantly lower than in groups of patients receiving opioids ($p<0.02$). At Day 1 after a surgery, endothelin-1 level was significantly decreased in patients of Group III, whereas there were no significant changes in its concentration (when Group III was compared with Groups I and II $p<0.015$) in Groups I and II. Only on Day 5 the tendency for hypercoagulability in Groups I and II began to decrease. It was fixed in Group II to a greater extent, so that there were no statistically significant differences observed between Groups II and III, whereas between Groups I and III they were stored. We also checked the level of markers of the systemic inflammatory response in the postoperative period in geriatric patients with polytrauma in the application of the studied anesthetic regimens. Concentration of interleukins on the 1st day after operation was naturally elevated in patients of the 1st and the 2nd groups without any significant differences between them. In group III, with cyclooxygenase inhibitor therapy, IL levels were already significantly lower than in opiate groups ($p<0.02$).
Conclusions: The revealed correlation dependences illustrate the etiological significance of the severity of the inflammatory response reactions in the development of the pain syndrome and confirm the expediency of suppressing these reactions during its treatment.

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08AP03-4
Impact of perioperative self-perception of pain, fears and management in CRS and HIPEC survivors: what can cancer patients teach us?

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Background and Goal of Study: Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) are increasingly performed worldwide despite technically challenging and high morbi-mortality potential. Clinical pathways development and institutional experience are essential to improve outcome and quality of life in this setting. The authors aimed to evaluate perioperative impact of patient´s pain perception and management in CRS and HIPEC.
Materials and Methods: In 2018, the authors performed a face-to-face structured interview to all CRS/HIPEC survivors, executed between 2010 and 2017, in a single reference center. The survey included: demographic, surgery and PACU data, Clinical Frailty Scale, Charlson Comorbidity score, P-POSSUM, QOR-15, WHODAS, Lawton Instrumental Activities Scale, EUROQUOL, Neuropathic pain scales: DN4, Brief Pain Inventory, LANSS, UW-NPS and Revised APS Patient Outcome Questionnaire (APS-POQ-R).
Results and Discussion: Between 2010-2017, 60 CRS and HIPEC surgeries were intended, but only 49 were completed. In 2018, 19 patients were dead remaining 30 survivors. Survey responders:17 (13 non-responders: 9 no contact and 4 without availability). Informed consent obtained in all patients. 16 patients answered the APS-POQ-R (1 did not remember). During the perioperative period, 56,3% experience no pain and 12.5% reported maximum pain score 10/10 in the numeric pain scale (mean maximum pain: 2.7); Patients also described related to pain: movement limitation in bed (37,5%), sleep disturbance (31,25%), anxiety (37,5%), depression (31,25%), feelings of fear about death, loss and relatives separation (37,5%) and helplessness (31,25%). Other side effects included nausea (50%) and drowsiness (62,5%); 31,25% declared not having been enrolled in the management of their pain, and 18,8% reported an active role on their pain management of 10/10 (mean: 4.6). Maximum global satisfaction in pain management (10/10) during in-hospital stay was 75%, with only 1 patient reporting total insatisfaction (0/10).
Conclusions: Anesthesiologists play a key role in the perioperative period of these patients, concerning 3 domains: 1) aiding in self- and illness-perception, 2) improvement in structures support and 3) treatment related. Despite a high global satisfaction in pain treatment, still are patients reporting severe pain after CRS and HIPEC, with a non-negligible impact in patient´s activity, sleep, anxiety and global well-being.

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08AP03-5
Perioperative factors associated with persistent pain after breast cancer surgery: a retrospective, single-center study

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Background and Goal of Study: Up to 60% of patients undergoing breast cancer surgery complain about persistent pain (PerP).[1] The most commonly reported risk factors include young age, axillary lymph node dissection and adjuvant radiotherapy.[1] This study was undertaken to identify *perioperative* factors that could be involved in the persistence of pain after breast cancer surgery.
Materials and Methods: We retrospectively studied 342 consecutive patients scheduled for breast cancer surgery between January and June 2018 at the Comprehensive Cancer Center of Angers, France. Subject characteristics, perioperative data, and prevalence of PerP (defined as lasting ≥2 mo)[1] were collected from the institutional medical software. Adjusted odds ratios (OR) were calculated in a multivariate logistic regression model, adjusting for variables identified to be significantly associated with PerP in the univariate analysis or considered clinically relevant. Data are presented as OR, 95% confidence interval (CI) or median (Q1-Q3). A $P<0.05$ was considered significant.
Results and Discussion: PerP was reported by 97 patients (28%), of whom 27 (28%) had severe pain, 30 (31%) had moderate pain, and 40 (41%) had light pain. Younger age (<65 yr) and greater acute postoperative pain were the two factors significantly associated with PerP (respectively, OR 1.94, CI 1.11-3.41, $P=0.020$; OR 1.84, CI 1.09-3.10, $P=0.023$). When compared to breast conservative surgery, mastectomy was significantly associated with higher postoperative morphine

consumption (1.3 (0-15) *vs* 2.4 (0-12) mg, *P*=0.001). In the present study, acute postoperative pain provides the only target for a modifiable risk factor to prevent the development of PerP. However, current comprehensive analgesia (including preoperative ketamine administration and pectoral nerve block) was not found to significantly reduce the incidence of severe acute postoperative pain.
Conclusions: Finally, tracking and tight follow-up of the patients experiencing severe acute postoperative pain appears as a main concern for early detection and treatment of PerP after breast cancer surgery.
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8AP03-6
Long term development of neuropathic pain after cytoreductive surgery and hyperthermic intraperitoneal chemotherapy defined by a structured interview of surgery survivors in a single reference center

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Background and Goal of Study: Improved outcome and quality of life after cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) led to an increasing number of centers performing such complex procedures[1]. In the present, a minor number of studies report chronic pain after such complex surgeries. The authors main goal was to recognize neuropathic pain presence in HIPEC and CRS survivors, its characterization and associated factors.
Materials and Methods: In 2018, the authors performed a face-to-face structured interview to all survivors of CRS and HIPEC, executed between 2010 and 2017, in a single Portuguese reference center. The survey included: demographic, surgery and post-anesthesia care unit data, Clinical Frailty Scale, Charlson Comorbidity score system, P-POSSUM, QOR-15, WHODAS, Lawton Instrumental Activities Scale, EUROQUOL, Neuropathic pain scales: DN4, Brief Pain Inventory, LANSS scale, UW-NPS and quality of analgesia survey.
Results and Discussion: Between 2010-2017, a total of 60 CRS and HIPEC surgeries were intended, but only in 49 patients were completed. Mortality rate at 90 days: 4,1% and at 1 year of surgery: 14,3%. In 2018, 19 patients were dead remaining 30 survivors. Survey responders: 17 (13 non-responders: 9 no contact and 4 without availability). Informed consent obtained in all patients. Male:female ratio=6:11. Mean age: 54,6. ASA classification: ASA II: 14 and ASA III: 3. Clinical Frailty Scale: 5 (n=1): 5,9%; 6 (n= 6): 35,3%; 7 (n:5): 29,4%; 8 (n=5): 29,4%. Neuropathic pain development in 3 patients: 17,6% (DN4 scale and LANSS scale). A correlation between neuropathic pain and cisplatin based chemotherapy regimens was found (p< 0,004). In this study, neuropathic pain was not associated with gender, epidural use, frailty syndrome, peritoneal carcinomatosis index or reoperation. The impact on daily life activities in the survivors who developed neuropathic pain was insignificant.
Conclusions: Despite the small sample size, the authors found that cisplatin based chemotherapy regimens were associated with long-term neuropathic pain development. The authors believe that patients submitted to CRS and HIPEC are a susceptible group to develop neuropathic pain and would benefit from strict follow-up.
References:
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08AP03-7
Impact of pectoral nerve block (Pecs) type-II on the chronic postoperative pain after breast cancer surgery

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Background and Goal of Study: Chronic pain (CP) after breast cancer surgery is a major medical problem. According International Association for the Study of Pain, it is a persistent pain, either continuously or intermittently, for more than 3 months after surgery. Thoracic epidural or paravertebral block may prevent CP after breast cancer surgery. Pectoral nerve block type-II (Pec II) is a novel easy superficial technique for peri-operative pain control. The goal of this study is to evaluate the impact of Pec II on postoperative chronic pain.
Materials and Methods: We present part of prospective cohort study included women ASA I to II, scheduled for elective unilateral modified radical mastectomy or lumpectomy with axillary dissection. Exclusion criteria: prior breast surgery, history of the chronic pain on ipsilateral breast or arm, regular use of pain medication, previous radiotherapy. Before operation patients received Pec II block with 20 and 10 ml of 0.375% ropivacaine after the technique offered by Blanco, after that general anesthesia was performed. We used standard our clinic multimodal approach in postoperative period. In 3 months patients were interviewed by phone about any neuropathy, in particular pain intensity using a numeric pain rating scale (from 0 – no pain to 10 – worst pain imaginable), pain location and impact of pain on daily life (yes\no).
Results and Discussion: The study included 15 patients. Mean age was 57±12. Eight patients had radiation therapy before interview. After 3 months CP had 67% (10) women. From these patients, mild pain (score 1-3) had 60%, moderate (score 4-7) – 40%, severe – no one. The location of pain was in the breast 70%, axilla 20% and arm 10%. CP didn't impact on daily life of 80% (8) of patients with pain. The frequency of appearance of CP in previous studies ranges widely from 20 to 74,4%, our data do not differ. However, there was no patient with severe pain, which in some previous researches arrived up to 13% percent.
Conclusions: Pectoral nerve block type-II may impact on the chronic pain after breast cancer surgery, in particular may reduce its intensity. Further research is needed.

08AP03-8
Evaluate the efficacy of proximal phrenic nerve block with ropivacaine on the incidence and severity of ipsilateral shoulder pain after video-assisted thoracoscopic surgery (VATS), prospective, randomized study

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Background and Goal of Study: The aim of this prospective, randomized study was to evaluate the efficacy of a more proximal phrenic nerve block with ropivacaine 0.375% on the incidence and severity of ipsilateral shoulder pain after video-assisted thoracoscopic surgery (VATS) in patients receiving continuous thoracic epidural analgesia.
Materials and Methods: After local research ethics committee approval, the 83 patients recruited to the study. They were randomly allocated to receive infiltration of the phrenic nerve at the level of the azygos vein with ropivacaine 0.375% 10 ml (phrenic nerve block group: PNB group, n=41) or saline 10 ml (control group, n=42) just before chest closure. Shoulder pain and thoracotomy pain were assessed using a numeric rating scale, at 2,4,8,16 and 24 hours after surgery.
Results and Discussion: Finally, 73 patients were included in the analysis. Ten patients were excluded because their surgical technique were changed to open lung resection. The cumulative incidences of ipsilateral shoulder pain during the first 2 hours after surgery were 10/38 in the PNB group and 12/35 in the control group. (p=0.458) No significant differences were observed between the two groups 4,8,16 and 24 hours after surgery. The severity of shoulder pain in the PNB group presented significantly less than that in control group the 2,8,16 and 24 hours post-surgery check point (U-Mann-Whitney test).Thoracotomy pain in both groups did not show any significant difference at all times postoperatively.
Conclusions: Proximal phrenic nerve block did not reduce the incidence of ipsilateral shoulder pain during 24 hours after VATS. However, that block alleviated the severity of shoulder pain.
Acknowledgements: This trial was resistered at UMIN (UMIN000030464).

08AP03-9
The effectiveness of multimodal post thoracotomy pain syndrome prevention protocol after thoracic surgery and its influence on neuropathic pain incidence

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Introduction. A number of investigators have identified that in patients with chronic pain after thoracic surgery a neuropathic component is present in 35% to 83% of cases. We aimed to assess the frequency of postthoracotomy pain syndrome (PTPS) in patients who received multimodal prevention protocol including thoracic epidural anesthesia, pregabaline, nefopam, NSAIDs and ketamine perioperatively.
Materials and methods: 140 patients who underwent anterolateral thoracotomy were included in the study. All patients received combined general anesthesia with epidural catheter placed at the T4–T6 interspace. Patients in all groups received oral pregabalin (75 mg twice a day) before surgery and once on the day of surgery, 2 hours before anesthesia induction. Pregabalin was continued after surgery until hospital discharge. Patients also received lornoxicam (8 mg) preoperatively and twice a day after surgery. Nefopam (20 mg) was administered 40 minutes before the end of surgery and was continued for 5 days from the onset of initial pain syndrome. In the case of persistent pain syndrome, morphine (10 mg) was also prescribed. All patients received an electronic message with the painDETECT questionnaire in period of 6-12 month after surgery. They were asked to send the filled questionnaire back.
Results: Only 105 patients were eligible for analysis, among them 17 patients (16,2%) suffered from PTPS. 12 (11,38%) patients suffered from non-neuropathic pain, 4 patients (3,87%) had unclear PTPS and only by 1 patient neuropathic PTPS was determined. The intensity of pain in patients with neuropathic and unclear PTPS did not differ from patients with non-neuropathic pain (5,0±3,2 and 4,7±1,9 respectively, p>0,05). Only one patient with neuropathic pain reported about the persistent use of oral gabapentine. Two patients with non-neuropathic pain received opioids. Almost all patients used NSAIDs periodically.
Conclusion: In our study the frequency of potentially neuropathic PTPS was found between 0,95% - 4,82%. In patients who underwent multimodal prevention protocol of PTPS the frequency of neuropathic component is more than twice smaller than non-neuropathic.

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08AP03-10
Multimodal postcesarean delivery analgesia at University Hospital of Salamanca

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Background and Goal of Study: Pain after cesarean remains a major problem which affects 78-85% of the patients. Multimodal analgesia is the core principle for cesarean delivery pain management. The use of neuraxial morphine and opioid-sparing adjuncts is recommended for all women undergoing cesarean delivery. The study purpose is demonstrate that the use of a multimodal analgesic approach after cesarean delivery is associated with decrease pain intensity (1).
Materials and Methods: A descriptive and cross-sectional epidemiological study was conducted at University Hospital of Salamanca.71 patients were enrolled at the study. The primary end-points of the study were pain intensity rating and the different analgesic approaches performed at 12, 12-24 and each 24 hours until hospital discharged. The pain intensity rating was measure using a numeric rating scale (NRS) at rest and at movement at 12 and 24 hours after cesarean delivery. Secondary end-points included patient`s satisfaction and hospital stay. Descriptive statistics were calculated for all variables of the study. Association between categorical variables were investigated using X^2 and Fisher exact tests. To compare quantitative variables t Student test and ANOVA were used. IBM SPSS Statistics version 21 was employed to data analysis. For hypothesis testing the significance level was 0.05.
Results and Discussion: Compliance with the multimodal analgesic approach was 88,74% in the Post Anesthetics Care Unit (PACU) compared to 0-30,98% achieved in the obstetric hospitalization area. The two most frequently used analgesic precriptions were the combination of nonsteroidal anti-inflammatory and acetaminophen, as well as neuraxial morphine associated with nonsteroidal anti-inflammatory and/or acetaminophen. The prevalence of acute postoperative pain in the first 24 hours ranged between 29,58-46,48% for rest pain and 78,87-98,59% for pain in movement and it wasn`t related to patient`s satisfaction. The low adherence to multimodal approach wasn´t affected the hospital stay.
Conclusions: Only the analgesic regimens used in the first 12 hours, whose adjusted to a multimodal approach among 30-88% of patients, showed efficacy in the reduction of pain intensity.
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08AP04-1
Targeting The Leak Sodium Channel (NALCN) Alleviates Chronic Constriction Injury (CCI)-induced Neuropathic Pain

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Background: NALCN, a voltage-independent cation channel, forms the background Na^+ leak conductance and controls neuronal excitability. NALCN is modulated by neuropeptide including substance P and contributes to the neuronal rhythm such as respiration. Pathological expression of ion channels is the critical cause for neuropathic pain. Here in this study we hypothesized that up-regulated expression of NALCN may contribute to CCI-induced neuropathic pain and NALCN serves as a novel therapeutic target for neuropathic pain.
Materials and Methods: Adult male Sprague-Dawley rats were randomized into 4 groups: CCI (chronic constriction injury), CCI + NALCN-siRNA, CCI + control-siRNA and the sham groups. NALCN-siRNA or control-siRNA was injected into (L4-L6) dorsal root ganglia (DRG) and/or into the lumbar subarachnoid space (L5-L6). Mechanical and thermal allodynia was tested daily following CCI until to postoperative 14 days (P14). At P3 and P14, L4-L6 DRG and spinal cord (SC) at the level of lumbar enlargement region were sampled for RT-PCR and immunohistochemistry. Electrophysiological recordings were performed on the acute isolated DRG neurons and spinal cord slices to determine the NALCN channel currents.
Results and Discussion: Immunohistochemistry revealed that NALCN is abundantly expressed in DRG neurons that double-labeled by NF200, TRPV1, IB4 and SP, respectively. The percentage of NCLAN expression on substance P positive neurons was significantly increased after CCI. Mechanical and thermal allodynia developed since P2 in the CCI-ipsilateral hind limb compared to the contralateral side. The level of NALCN mRNA in DRG and SC from the ipsilateral side was significantly increased compared to the contralateral side both at P3 and P14. Mechanical and thermal allodynia was improved at P2-P4 in the CCI+NALCN-siRNA group compared to the CCI + control-siRNA group. Accordingly, the level of NALCN mRNA was decreased by NALCN-siRNA. Electrophysiological recordings on the acute isolated DRG neurons and spinal cord slices confirmed the increased NALCN channel currents and neuronal excitability after CCI-induced neuropathic pain. NALCN-siRNA treated DRG neurons and spinal cord slices produced less NALCN currents and hyperactivity of the sensory neurons was alleviated.
Conclusions: Up-regulated expression of NALCN contributes to CCI-induced neuropathic pain and NALCN may be a novel therapeutic target for neuropathic pain.

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8AP04-2
Flupirtine suppresses spontaneous neuronal activity and sensory response in the adult rat anterior cingulate cortex

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Background and Goal of study: Flupirtine is a non-opioid centrally acting analgesic, and in use in Europe for the management of pain following surgery, trauma, cancer, degenerative joint diseases. However, the central neuronal mechanism of flupirtine is not fully understood. The anterior cingulate cortex (ACC) plays important roles in pain, emotion and cognitive control. Neurons in the ACC are activated by noxious sensory stimuli, and their increased activity induces a functional neuronal plasticity. These are considered to be responsible for chronic pain. In this study, we investigated effects of flupirtine on sensory neuronal activities in the ACC using an in vivo electrophysiological recording technique.
Materials and Methods: Adult rats were deeply anesthetized with urethane (i.p.,1.5-1.7 g/kg). Craniotomy is performed to make a small hole above the ACC based on the stereotaxic coordinates to allow insertion of a tungsten electrode. Multiunit neuronal activities elicited in the ACC were recorded. Mechanical stimulation was applied with von Frey filaments. Flupirtine was administered via femoral vein and into the ACC by microinjection (1.0 µl for 5 min). Statistical significance was determined using Student's paired t-test.
Results and Discussion: ACC neurons exhibited spontaneous bursting firings at ~ 1 Hz (n = 25). The firing frequency during the bursts was ~ 120 Hz (n = 20). When mechanical stimulation was applied to the hind paw with the filaments more than 60 g, the firings were elicited, and the responses were lasted during the stimulation. The firing frequency during the stimulation was increased to 153 ± 9.6% of basal control activity (n = 16). Microinjection of flupirtine (10 µM) did not show any strong inhibitory action on neuronal activities (n = 6). However, the local administration of flupirtine at 100 and 300 µM significantly inhibited mechanical sensory responses evoked in ACC neurons. The firing frequency of ACC neurons during the stimulation were 102 ± 3.9% (100 µM, n = 5, $p < 0.05$) and 111 ± 9.6% (300 µM, n = 5, $p < 0.05$) of basal control activity. Intravenous administration of flupirtine (7 mg/kg) also suppressed mechanical responses elicited in the ACC. The present results suggest that flupirtine directly acts on the ACC to suppress sensory mechanical responses.
Conclusions: Flupirtine suppresses ACC neuronal activities. This may induce the inhibitory actions on pain and its related emotional aspects.

08AP04-3
Identification of Glycogen Synthase Kinase-3β as a potential target molecule of paracetamol by using magnetic nano beads

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Background and Goal of Study: Recently, high-performance magnetic nano beads, called ferrite glycidyl methacrylate (FG) beads have been developed, and various target proteins of drugs have been successfully purified.[1] In this study, we aimed to identify the new target proteins of paracetamol (PARA) using FG beads.
Materials and Methods: PARA-immobilized beads were incubated with the cytoplasmic fraction of Hela cells and collected by a magnet. The proteins bound to PARA-immobilized beads were eluted with solution containing PARA and subjected to electrophoresis. The proteins were stained with silver staining and subjected to LC/MS/MS analysis to search the protein database (Swissprot) for identifying candidate protein matches. These experimental procedures are illustrated in the figure. The proteins were analyzed by western blotting (WB) using a mouse monoclonal antibody to glycogen synthase kinase-3β (GSK-3β). Luminescent kinase assay was performed to investigate the effects of PARA (0, 100, 200, and 400 μM) on kinase activity of GSK-3β.
Results and Discussion: A band of the proteins bound to PARA-immobilized beads was detected at approximately 50-kDa in silver-stained gel. GSK-3β was identified as a candidate PARA-binding protein with highest sequence coverage (47%) by LC/MS/MS analysis, followed by database search. The protein was stained with GSK-3β antibody for WB. Luminescent signals, which correspond to the amount of GSK-3β activity, significantly decreased with increasing doses of PARA ($P < 0.0001$, one-way ANOVA). These results indicate that PARA binds to GSK-3β and inhibits its activity at clinically relevant concentrations. GSK-3β is highly expressed in the central nervous system, and its pharmacological inhibition is proven to have analgesic and anti-inflammatory effects.[2,3] Further study is needed to investigate the role of GSK-3β activity in antipyretic and analgesic effects of PARA.
Conclusion: We identified GSK-3β as a potential target protein of PARA using PARA-immobilized beads.
References:
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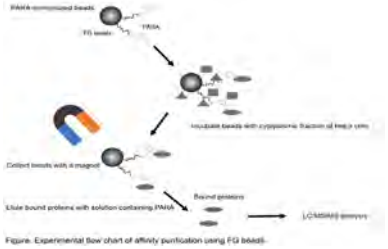

Figure. Experimental flow chart of affinity purification using FG beads.

08AP04-4
Oxycodon inhibits neuronal firing in rat hippocampal CA3 pyramidal neurons

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Background and Goal of Study: Oxycodone, an opioid analgesic, is widely used to alleviate moderate to severe acute pain. In addition, oxycodone has been found to alleviate neuropathic pain effectively in several studies. Given that glutamate plays a crucial role in mediating pain, we hypothesized that oxycodon may affect the glutamatergic system in CNS.
Materials and Methods: Whole-cell patch-clamp recordings in hippocampal slices were used to examine the effect of oxycodon on the increased spontaneous excitatory postsynaptic currents (sEPSCs). The effect of oxycodon on the tetrodotoxin-resistant miniature excitatory postsynaptic currents (mEPSCs) was examined as well.
Results and Discussion: Whole-cell patch clamp recordings revealed that oxycodon effectively decreased the frequencies of sEPSCs and mEPSCs without changing their amplitudes in hippocampal CA3 pyramidal neurons. In addition, glutamate-evoked inward currents were not affected by oxycodon, implicating a presynaptic mechanism of action. Furthermore, burst firing induced by 4-aminopyridine and tonic repetitive firing induced by depolarizing pulses could be attenuated by oxycodon.
Conclusions: Our results suggest that oxycodon presynaptically inhibits glutamatergic synaptic transmission without modifying postsynaptic receptor sensitivity, and that the decrease of excitation consequently suppresses neuronal hyperexcitability in the hippocampal CA3 area. These findings may delineate the possible analgesic mechanisms of oxycodon.
Acknowledgements: This work was supported by the grants from the Ministry of Science and Technology of Taiwan, Republic of China (MOST-107-2314-B-418-005)

08AP04-5
Analgesic and anti-inflammatory effects of losmapimod: Comparison of morphine, ketoprofen, ketamine and paracetamol

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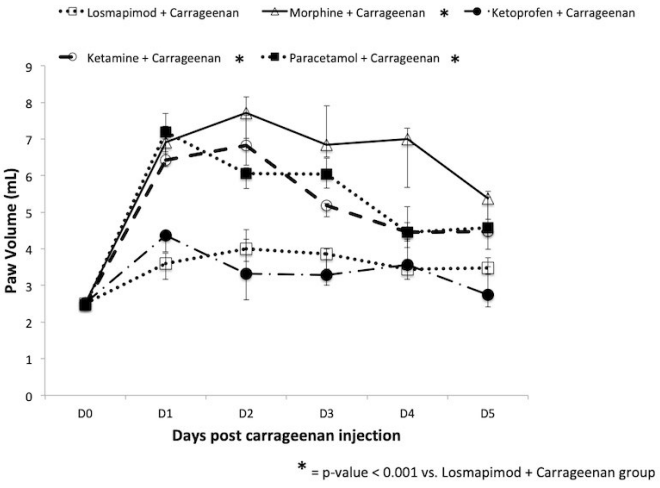
Background and Goal of Study: Inhibition of proinflammatory signalling pathways is a potential target of analgesic drugs. In a previous study, we found that losmapimod, a new oral inhibitor of p38 α and β sub-units, displays analgesic and anti-inflammatory effects in a peripheral acute inflammatory pain model. The goal of this study was to compare losmapimod effects with those of usual analgesic and anti-inflammatory drugs.
Materials and Methods: All experiments had been previously approved by an animal ethical committee. Fifty-eight adult Sprague-Dawley rats were included and distributed between 5 groups. After 10 days of habituation, rats received a 100 μL intraplantar dose of 3% carrageenan at D0. Rats also received once daily losmapimod (12mg/kg), paracetamol (500mg/kg), ketamine (20mg/kg), ketoprofen (5mg/kg) or morphine (3mg/kg) from D0 to D2. Paw threshold was calculated after mechanical stimulation using von Frey hair application (kPa) and thermal stimulation using the Hargreaves test (sec). Paw inflammation was evaluated using a water plethysmometer volume measurement (mL). Results are expressed as median and IQR. Nonparametric analysis of variance for repeated measures was performed. A p value < 0.05 was considered significant and Holm correction was applied after multiple comparisons.
Results and Discussion: Analgesia provided by losmapimod was similar to that provided by morphine after mechanical stimulation (p=0.25). Compared to the losmapimod group, the mechanical threshold was higher in the ketoprofen group (p=0.03) and lower in the paracetamol and ketamine groups (p=0.002). After thermal stimulation, paw withdrawal latency was similar in the losmapimod and ketoprofen groups (p=0.06) and higher than in the other groups. Anti-inflammatory properties of losmapimod were also significant because rats' paw volume was similar in the ketoprofen and losmapimod group (p=0.58) but smaller than in the other groups (p<0.001 vs. losmapimod group).
Conclusions: Losmapimod appears to be promising for pain control by providing analgesic and anti-inflammatory effects similar to morphine and ketoprofen in a murine inflammatory peripheral acute pain model.



* = p-value < 0.001 vs. Losmapimod + Carrageenan group

08AP04-6
Analgesic and anti-inflammatory dose/response of losmapimod in a murine acute inflammatory pain model

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Background and Goal of Study: P38 MAPK is a major protein system involved in the pro-inflammatory signalling pathway. In a previous study, we found that losmapimod, a new oral inhibitor of p38 αand βsub-units, displays analgesic and anti-inflammatory effects in a peripheral acute inflammatory pain model. The effective dose of losmapimod in a murine model of cardiovascular disease has been shown to be 12mg/kg. The aim of this study was to determine the dose/response curve of losmapimod in a peripheral acute pain model.
Materials and Methods: All experiments had been approved by an animal ethical committee. Thirty-six rats were accustomed 10 days before behavioural experiment and distributed in 6 groups. On Day 0, rats received 3% carrageenan (100µL intraplantar) and losmapimod (0, 2, 4, 12 or 50 mg/kg). To assess analgesic response, the paw withdrawal threshold was measured after mechanical stimulation with von Frey hairs (kPa) and thermal stimulation with the Hargreaves test (sec). The anti-inflammatory response was assessed by measuring the paw volume using a water plethysmometer. All these tests were performed daily, once a day from D0 to D5. The effect of losmapimod (E) was tested using a simple Emax model (E = E0 Emax*D/(D50+D)), and means + for von Frey and Hargreaves tests and – for volume. We used NONMEM version VI with a simple multiplicative error parameter. D50 estimated with its 95 % confidence interval (CI95) was calculated using log-likelihood profiling.
Results and Discussion: Data obtained on Day 1 were used because of a higher effect of losmapimod at this time in all groups. Values of D50, E0 and Emax are summarised in the Figure for the different types of response. The previously described losmapimod dose of 12 mg/kg corresponds to the ED64 and ED78 for mechanical allodynia and thermal hyperalgesia blocking effects and to the ED26 for anti-inflammatory effect.
Conclusion: Losmapimod properties appear to be dose-related and a dose of 12mg/kg seems to be suitable to obtain significant analgesic effect but is not large enough to obtain an anti-inflammatory effect in rats.
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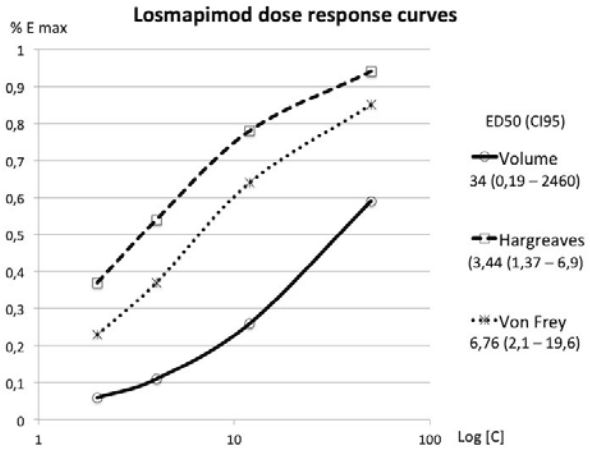

08AP04-7
Analgesic and anti-inflammatory properties of losmapimod in a murine acute inflammatory pain model

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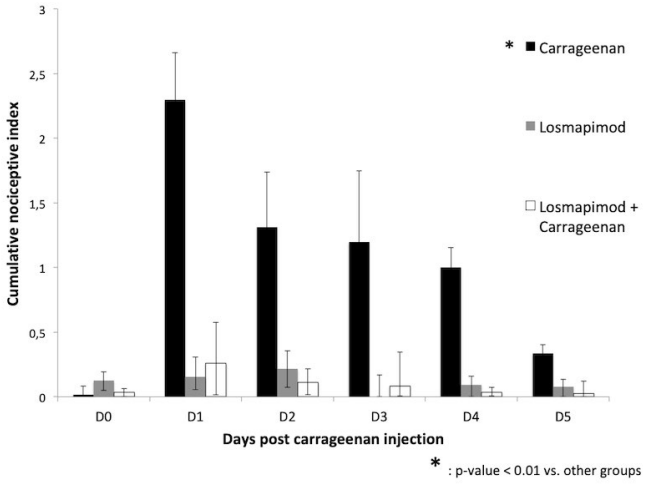
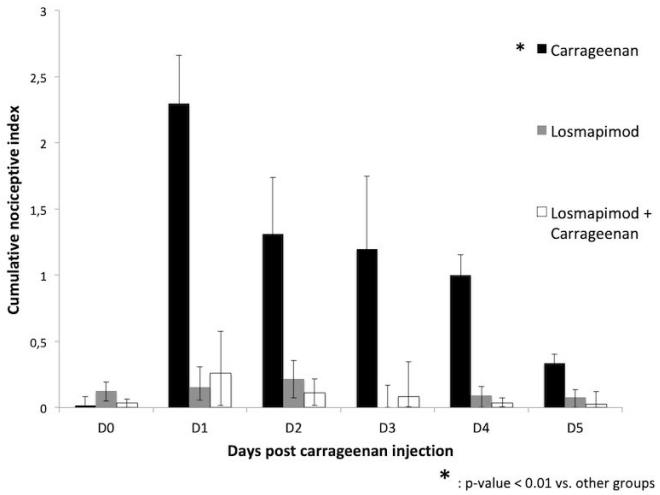
Background and Goal of Study: Inhibition of proinflammatory signalling pathways is a potential target of analgesic drugs. Activation of the p38 MAK system by phosphorylation leads to the secretion of proinflammatory cytokines. Our study aims to evaluate the effect of losmapimod, a new orally administered p38 MAPK inhibitor in an acute inflammatory peripheral pain model.
Materials and Methods: Experiments were approved by an animal ethical committee. Before each behavioural experiment, 36 adult rats were habituated during 10 days and distributed in 3 groups of equal size (carrageenan only(C), losmapimod(L) and carrageenan + losmapimod(LC)). On Day 0, 100 µL of carrageenan 3% was injected in the left hindpaw. Losmapimod was administered once daily by feeding at dose of 12mg/kg from D0 to D2. Behavioural experiments were performed from D0 to D5. The nociceptive index was calculated by analysing rats' analgesic paw posture on videos. Paw threshold was calculated after vonFrey hair application (kPa) and response to thermal stimulation was measured using the Hargreaves test (sec). Paw inflammation was evaluated using a plethysmometer volume measurement (mL). Results are expressed as median and IQR. Nonparametric analysis of variance for repeated measures was performed. A p value <0.05 was considered significant.
Results and Discussion: Losmapimod provided significant analgesic and anti-inflammatory effects. The nociceptive index was significantly higher in the C group compared to L and LC groups (p<0.01). Paw whithdrawal threshold was decreased after either vonFrey hair stimulation or Hargreaves tests in the C group compared to others (p<0.01). Rats which had received carrageenan only had a significantly larger paw volume (p<0.01).
Conclusion: Losmapimod was studied for the first time in an acute pain model and expressed significant analgesic and anti-inflammatory properties.





08AP04-9
The effect of intraarticular ibuprofen injection on the cartilage and sinovium in rats

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Background and Goal of Study: Postoperative poor pain control is an important cause of late discharge and rehabilitation after arthroscopy. In treatment, Intraarticular drug injections are preferred methods because of their minimal systemic side effects. For this purpose, showing the cytotoxic effects of local anesthetics used on cartilage tissue has been restricted to the use of these drugs. In recent years, the intra-articular application of non-steroidal anti-inflammatory drugs has been discussed. However, there is no study investigating the histopathological effects of ibuprofen in healthy cartilage tissue. Therefore, we aimed to study the histopathological effects of ibuprofen, which come into question with the use of intraarticular use.
Materials and Methods: The right lower extremities of the 20 rats included in the study were used for treatment group and the left lower extremities for the control group. 0.25mg/0.25 ml of ibuprofen into left knee and 0.25 ml of 0.9% SF were injected intraarticularly. Five randomized groups were sacrificed following 1, 2, 7, 14, and 21 days, both knee joints were dissected. They were stained with hematoxylin-eosin and examined by light microscopy 4 weeks after decalcification. Signs of inflammation in the knee joint, synovium and peripheral areas; congestion, edema, neutrophil infiltration, chronic inflammation, synovial hyperplasia, subintimal fibrosis were evaluated histopathologically. Bonferroni-corrected Mann Whitney U test and Wilcoxon Sign Rank test was used for intergroup and intra-group comparisons, and $p<0.010$ and $p<0,0025$ was considered statistically significant respectively.
Results and Discussion: Synovial hyperplasia and subintimal fibrosis scores were 0 (zero) in all samples. Although congestion, edema and neutrophil infiltration were more common in the ibuprofen group on days 1 and 2, no statistically significant difference was found. The groups were similar in terms of chronic inflammation findings.There are studies that examine the histopathological effects of NSAI drugs on joints and exhibit that it reduces inflammation in rat models. Intraarticular tenoxicam injection has also been shown to contribute to analgesia in patients with osteoarthritis.
Conclusions: In our study, although intraarticular ibuprofen injection seems safe, more detailed studies are needed to evaluate both histopathological and analgesic effects for more accurate results.

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08AP05-1
Postoperative analgesia after wound infiltration with dexmedetomidine as an adjuvant to ropivacaine versus ropivacaine alone for lumbar discectomies: A randomized-controlled clinical trial

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Background and Goal of Study: Alleviating postoperative pain linked with lumbar disc surgeries is crucial as it can lead to earlier mobilization and decreased side effects from narcotic medications. Optimisation of post-operative pain control by wound infiltration with local anesthetics (LA) might be limited by their short half time. Several reviews highlight the potential role of alpha 2 adrenergic receptors agonists like dexmedetomidine for postoperative pain control . The aim of our study was to evaluate the analgesic efficacy of the sole LA : ropivacaine (R) with the combination of ropivacaine and dexmetedomidine (RD) for wound infiltration in lumbar discectomies.
Materials and Methods: This study was prospective, randomized, double- blind, controlled in nature conducted among adult patients belonging to American Society of Anesthesiologists' physical status 1 and 2, of either sex aged between 18 and 70 years undergoing elective lumbar discectomies (single level). Patients were randomly allocated into 2 equal groups: group (R) received 2mg/kg (ideal body weight) of wound infiltration with ropivacaine 4.75 mg/ml without exceeding a total volume of 30 ml of infiltration, group RD received the same dose of ropivacaine as the first group adding 0.5 ug/kg of dexmedetomidine. Visual analog scale (VAS) at 0, 2, 6, 12, 18 and 24 hours; time to first rescue analgesia (opoid analgesia), total post-operative opiate demand and side effects were assessed during the first 24 hours postoperatively.
Results and Discussion: The two groups were comparable for age, sex, body weight. VAS values at all time intervals were significantly lower ($p<.0001$) in the RD group as compared with the R group. The median time to first rescue analgesia was significantly shorter in the R group 6H (6-12) than RD group 24 H(18-24); ($p<.0001$). The median (interquartile range) opioid use was 3 (3-6) morphine milligram equivalents in the R group and 0 (0-2) morphine milligram equivalents in the placebo group during the first 24 hours.These low doses may be explained by the multimodal analgesic post-operative regimens.No statistical significant side effects could be discerned among the two groups.
Conclusions: Wound infiltration with ropivacaine and dexmetedomidine were found to be significantly superior for post-operative analgesia for lumbar dissectomies. Health economic analysis is warranted to justify the use of dexmetedomidine.

08AP05-2
First impressions on Sublingual Sufentanil Zalviso® use in Bariatric Surgery

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Background and Goal of Study: Postoperative pain relief after bariatric surgery can be an anaesthetic challenge and sublingual sufentanil (Zalviso®) seems a promising alternative1. This study aimed to evaluate postoperative analgesia and nausea and vomiting prophylaxis management in bariatric surgical patients.
Materials and Methods: A prospective audit was conducted during June and July of 2018, after institutional approval, in patients submitted to laparoscopic bariatric surgery. Analysed variables were demographics, postoperative pain scores, analgesics, complications and nausea and vomiting 'post-op' (NVPO) prophylaxis.
Results and Discussion: Data from 30 patients (23 women;7 men), mean age of 43 years old (min. 23; max. 63) and mean BMI 43.9kg/m2 (min 30.5; max 61) was collected. 28 patients were classified as ASA 3 and 2 as ASA 2. General anaesthesia using an opioid sparing technique was used (mean intravenous lidocaine 397.4 mg and fentanyl 286.9 mcg). 19 patients were treated with Zalviso® (Z group) and 11 with conventional analgesia (C group) postoperatively. Both protocols included paracetamol and an NSAID. Maximum pain scores in Z group were distributed as follows: 2 (11%) patients at 24h had a pain score of 5/10 and 1 (5%) patient at 48h had a pain score of 5/10. In C group, 6 (55%) patients at 24h had pain scores≥ 5/10 and 1 (9%) patient at 48h had a pain score of 8/10. During the 'intra-op' period, 9 (47%) patients in Z group and 4 (36%) patients in C group were given NVPO prophylaxis according to modified Apfel scale. Five (26%) of them in Z group had NVPO, 3 (16%) at post-anesthesia care unit (PACU), while 8 (73%) patients in C group had NVPO (3 (27%) at PACU). Other complications included 1 case of respiratory insufficiency with non-invasive ventilation requirement, in Z group; 1 case of anastomotic leakage in C group and constipation in both groups. Furthermore, 2 (18%) patients in C group had pain referred to drain insertion, which is was not registered in Z group.
Conclusion: Zalviso® was used as part of a multimodal analgesia after bariatric surgery, with better pain control and less NVPO comparing to conventional analgesia. These results cannot be generalized due to a small sample size, although data suggests that it could play an important role on postoperative analgesia in bariatric patients.
References:
1. Meijer F et al., Sublingual sufentanil for postoperative pain relief: first clinical experiences, J Pain Res 2018; 11:987-992

08AP05-3
An option in the treatment of knee pain following total knee arthroplasty: genicular nerve radiofrequency ablation

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Background: Osteoarthritis of knee is a frequent problem in aged patients and its related to high morbidity. The gold standard in osteoarthritis is total knee arthroplasty. Despite being very valuable treatment modality pain complaints continue in 15%-30% of patients (1). Radiofrequency ablation of the superior lateral, superior medial, and inferior medial genicular nerves reported to be effective in chronic pain due to knee osteoarthritis (2). We aimed to report our experience of radiofrequency ablation of genicular nerves (GNRF) in patients who had undergone total knee arthroplasty.
Case report: Following detailed information about the technique provided; consent of the patients obtained. All patients were unresponsive to medical treatments and had undergone total knee arthroplasty with prepatellar paramedian incision 6-12 months before. Despite surgery their pain had no relief and administered to pain clinic. The multimodal pain treatments were unsuccessful and use of opioids were neglected because of side effects in these elderly patients. Patients Visual Analog scores were recorded and conventional GNRF performed to genicular nerves. Patients followed up to 6 months and VAS scores recorded. GNRF performed to 5 female and one male patient aging 64-82 years old. Other than one patient all had multi-systemic problems as hypertension, cardiac rhythm problems, diabetes mellitus (type II).

Pt	Age	Pre RF VAS Move/Rest	Immediate VAS Move/Rest	1st week VAS Move/Rest	12th week VAS Move/Rest	24th week VAS Move/Rest
1	64	9/6	2/0	2/0	0/0	0/0
2	75	8/6	4/3	4/4	4/4	4/4
3	67	8/4	0/0	0/0	0/0	3/1
4	82	9/9	2/0	4/4	5/4	5/5
5	67	8/5	0/0	3/0	4/2	4/3
6	69	7/5	0/0	3/0	4/2	4/2

Discussion: Similar to report by Sylvester et al (3) at the end 3 months 5 of the patients had 50% decrease in their knee pain. In patients with knee pain following knee arthroplasty GNRF can be an alternative to medical therapy.
References:
1. Regier NG, Parmelee PA. . Aging Ment Health 2015;19:1113-22. 2.Baysal PK,etal.J Back Musculoskelet Rehabil. 2017;14: 10. 3.Sylvester LN, Goree JH. 2017 Nov 15;9(10):292-293.
Learning points: GNRF is a successful alternative in operated knee surgery.

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08AP05-4
Neuraxial opioids for cesarean delivery at University Hospital of Salamanca

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Background and Goal of Study: Effective pain management should be a key priority in women undergoing cesarean delivery. Intrathecal morphine is the gold standard for pain management and epidural morphine and intrathecal fentanyl are alternatives. The purpose of this study is to describe our experience with neuraxial opioids and their effectiveness.
Materials and Methods: A descriptive and cross-sectional epidemiological study was conducted at University Hospital of Salamanca in a sample of 71 patients. Neuraxial opioid administration and postoperative pain intensity were evaluated for up to 24 hours after surgery. A validated numeric rating scale (NRS) was used for pain assessment at rest and at movement (at 12 and 24 hours after cesarean delivery) and the side effects are registered and documented. IBM Statistics 21 was used for data analysis. Descriptive data are presented as percentage or median and interquartile range (IQR). Association was performed using t-test for continuous data and the χ^2 test for categorical data. A p-value < 0.05 was considered statistically significant.
Results and Discussion: Cesaren delivery was carried out under regional anesthesia in a 95,76% of the study sample by spinal (71,83%) or epidural (23,94%) techniques. In spinal technique group a 100% of patients received administration of fentanyl (15 µg,10 µg) and 45,10% of patients received fentanyl (10 µg,5µg) and morphine (0,1 µg, 0µg) simultaneously. In epidural technique group was employed fentanyl in a 23,53% patients (62,5µg, 25 µg) and nobody received epidural morphine. Intrathecal morphine administration was associated with reduction in a pain intensity in movement at first 12 hours after cesarean and spinal or epidural fentanyl din not reduce the painful intensity during postoperative period of cesarean. The only side effect registered en association with analgesic treatment with neuraxial opioids was pruritus (19,64% of patients), no nausea and vomiting, sedation o respiratory depression were documented in our study.
Conclusions: The use of intrathecal morphine covered 45,10% of our patients and its use was associated with a reduction in pain scores during the first 12 postoperative hours after cesarean delivery with a low rate of side effects, which in most cases did not require treatment.

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08AP05-5
Preoperative epidural analgesia in hip fracture patients – A systematic review and meta-analysis

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Background and goals: Hip fracture is a common, painful injury and requires early surgery. The global incidence is expected to rise[1]. Patients require optimal acute pain control. Systematic reviews have investigated perioperative use of epidural analgesia (EA). A meta-analysis found that EA might have advantages over systemic analgesia (SA) in the post-operative period for surgery in general[2]. To our knowledge, the evidence regarding preoperative use of EA in hip fracture patients is yet to be investigated, which this review of the current literature aims to do.
Material and methods: We included randomized controlled trials comparing pre-operatively initiated EA with any method of analgesia, in adults of at least 55 years, who were scheduled for hip fracture surgery. Studies were excluded if none of our pre-specified outcomes were investigated. Electronic searches of four major medical databases were performed, with 566 hits. Two independent, non-blinded authors screened for eligibility, extracted pre-determined data and assessed risk of bias. A single author evaluated the evidence using the GRADE method[3] and meta-analysis was performed on outcomes when feasible.
Results and Discussion: Three articles were included, with 179 randomized patients in all. All compared EA with SA, and all reported preoperative pain. Other comparisons and outcomes were heterogeneously investigated. Meta-analysis of preoperative pain on a visual analogue scale, 1-100, comparing EA to GA, resulted in a difference in means of -5.85 95% CI [-14.90; 3.19] (negative favouring EA). Certainty of evidence for this comparison was very low and limited by inconsistency, imprecision and high risk of bias, mainly from insufficient blinding.
Conclusions: The effect estimate for preoperative pain seems to favour EA over SA, but no conclusions can be drawn, due to the limits of available evidence. Other alternatives to EA are even less well described. Further investigation, in well-designed randomized trials, is warranted.
References:
1. Gullberg, B., Johnell, O. & Kanis, J. A. World-wide Projections for Hip Fracture. Osteoporos. Int. 7, 407–413 (1997)
2. Wu, C. L. et al. Efficacy of postoperative patient-controlled and continuous infusion epidural analgesia versus intravenous patient-controlled analgesia with opioids: a meta-analysis. Anesthesiology 103, 1010–1079 (2005)
3. The GRADE Working Group. GRADE handbook for grading quality of evidence and strength of recommendations. (2013)

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08AP05-6
Sublingual sufentanil tablet system vs continuous morphine infusion for postoperative analgesia in cardiac surgery patients

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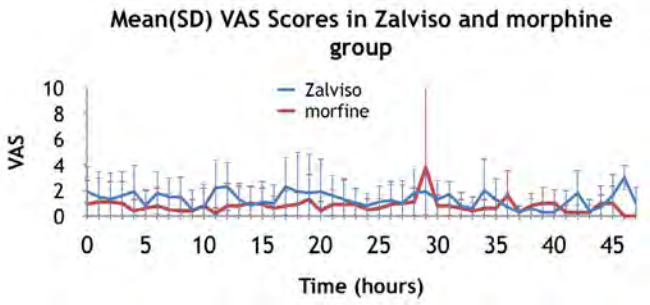
Background: Insufficient pain control in the postoperative cardiac surgical patient leads to adverse effects, resulting in higher morbidity and mortality rates. While Zalviso® (sublingual sufentanil PCA) is well known for pain relief after orthopedic and spinal surgery; to our knowledge the system has never been used after cardiac surgery. This study aims to compare the analgesic effects of the Zalviso® system with continuous infusion of morphine after cardiac surgery. The primary outcome variable is the VAS score in rest; the purpose of treatment is a VAS < 3. We hypothesized Zalviso® will result in equal or better VAS scores compared to continuous morphine infusion.
Materials and Methods: In this ongoing prospective randomized study 29 postoperative cardiac surgery patients have been included so far. Patients' age, height, weight and BMI was noted during a pre-op consultation. Anaesthetic protocol during surgery was at the discretion of the anesthesiologist. After patients were extubated at the ICU, either a morphine pump (starting dose 1 mg/h) or Zalviso® was initiated. If a VAS < 3 was not reached, the morphine pump was increased by 20%. With the Zalviso® system, the patient was able to administer himself another 15 µg sufentanil tablet after a 20 minute lag time. VAS scores were assessed every 60 minutes until ICU discharge. VAS scores were subject to unpaired T-test with Bonferroni adjustment. ($P<0.05$)

Results and Discussion: Mean(SD) characteristics in the morphine group (n=16) and Zalviso® group (n=13) were respectively: age 63(10) vs 66(6), BMI 25,5(4,8) vs 27,8(3,5). None were significantly different. After Bonferroni adjustment, no significant differences in VAS were observed between the two groups, although the study may be underpowered at this level due to insufficient patient inclusions. Despite absence of statistical significance, nurses reported that patients in the Zalviso® group were more easily mobilized.
Conclusion: These preliminary results suggest that the Zalviso® system is an equal analgesic compared to continuous morphine infusion in postoperative cardiac surgery patients.



08AP05-7
Preoperative magnesium sulfate versus paracetamol in pediatric posttonsillectomy pain management

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Background and Goal of Study: Postoperative pain is a significant distress after tonsillectomy in pediatric patients. Despite various analgesia strategies, pain control could be often unsatisfactory. Our prospective randomized double-blind clinical study was designed to compare the impact on pediatric posttonsillectomy pain of preoperative magnesium sulfate, known for its potentiating effect on postoperative analgesia, versus paracetamol.
Materials and Methods: After institutional Ethics Committee approval and informed consent from parents, 51 patients (ASA I-III, aged 3-7 years), candidates to elective tonsillectomy under general anesthesia were randomly allocated to two groups. Group M (n=27) was treated with magnesium sulfate as an intravenous loading dose of 25 mg/kg over 15 minutes, followed by a continuous infusion of 10 mg/kg/h one hour before induction. Group P (n=24) received an iv bolus of 15 mg/kg of paracetamol continued with 10 mg/kg/h administered according to the same protocol. For the first four hours postoperatively all the patients were admitted and monitored in the postanesthesia care unit. The primary outcome was the intensity of postoperative pain measured by FLACC score when the patient was admitted in the postanesthesia care unit, at 30 min, 1h, 2h, 3h and 4h. For a score > 4, morphine was administered as a dose of 0.1 mg/kg in all patients. Secondary outcomes were the dose of rescue analgesia and the incidence of adverse events such as bleeding and sedation. Student t-test and Mann-Whitney test were used for statistics, the significance being considered above 0.05.
Results and Discussion: The analysis of pain scores reveals a significant advantage of group M compared to group P in terms of analgesia for the first two hours posttonsillectomy ($p<0.05$). For the other two time intervals the postoperative pain control becomes similar in both groups (p=ns). The consumption of morphine during the stay in postanesthesia care unit was statistically decreased in group M versus group P ($p<0.05$). Concerning side-effects, we found similar incidence in both groups.
Conclusions: Preoperative intravenous magnesium sulfate significantly attenuates early posttonsillectomy pain in pediatric population and minimizes the need for rescue analgesics compared to paracetamol administered according to the same protocol, without documented severe adverse events.

08AP05-8
A service evaluation of patient-controlled methoxyflurane inhalers for analgesia during inpatient burns procedures

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Background and Goal of Study: Pain from burn injuries and procedures (dressing changes, showers) typically requires general anaesthesia (GA), opioids, ketamine and N_2O:O_2; with associated expense (staff, operating theatres); complexity (monitoring, iv access, infection control); side effects (confusion, nausea, apnoea); witholding feeding (nil by mouth); and prolonged recovery. Methoxyflurane is a fluorinated hydrocarbon previously used for inhalational anaesthesia. In sub-anaesthetic doses it is a very potent short acting inhaled analgesic, and has been formulated for this purpose as single-use 3 mg hand-held patient-controlled inhalers (Penthrox®) which may be administered by nursing staff.[1] Although widely used in Australasia for pre-hospital care,[2] Penthrox® is not licensed for procedural use in the UK, and there is little experience of Penthrox® for this application.
Materials and Methods: We developed a protocol for administration and evaluated efficacy and side effects using objective and subjective criteria over a 1 year period in 14 patients (11 M: 3 F) undergoing 42 procedures. All patients received oral premedication with morphine syrup 10-30 mg ± diazepam 10-20 mg 1 h prior to procedures.
Results and Discussion:

	Min	Max	Median
Patient Age	15	76	42
Burn size (% TBSA)	6	91	37
Total procedures per patient	1	8	2.5
Total inhalers used per patient	1	9	3
Inhalers per patient per procedure	1	2	1.6

Good analgesia was achieved in 40/42 procedures: 2 required rescue analgesia. There were no side effects or excessive sedation. All patients were able to eat up to, and <1 h after procedures. 3 attendants complained of dizzyness. The single-use inhalers may help infection control.
Conclusions: Penthrox® is an effective alternative to existing methods of analgesia for procedural pain in burns. Efficacy is between that of GA and N_2O:O_2, and may reduce need, risk and expense of GA. Although Penthrox® has short $t_{1/2}$, the long $t_{1/2}$ of premedication makes our protocol unsuitable for outpatient use. Environmental contamination is a potential concern.
References:
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2. Int Wound J. 2014;11(1):74-8

08AP05-9
Effects of opioid free anaesthesia on intraoperative hemodynamics, postoperative recovery and analgesia compared to opioid based anaesthesia in patients undergoing breast cancer surgery. A prospective randomized double blind study

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Background and Goal of Study: Intraoperative use of opioids are associated with adverse effects like respiratory depression, sedation, hyperalgesia, PONV, immunosuppression and cancer recurrence etc. Several non-opioid drugs have been shown to provide analgesia during and after surgery. The aim of the study was to compare intraoperative hemodynamics, recovery profile and postoperative analgesia between patients undergoing breast cancer surgery under opioid free anaesthesia versus opioid based general anaesthesia.
Materials and Methods: In this prospective randomized controlled double blinded trial, 50 ASA I-II adults scheduled for modified radical mastectomy were randomly allocated into two groups to have either opioid-based anesthesia with morphine and propofol infusions (Group C) or opioid-free anesthesia with dexmedetomidine, lidocaine, ketamine and propofol infusions (Group S). Primary outcomes were intraoperative hemodynamics. Secondary outcomes were recovery time, postop sedation score, postop analgesia duration, total analgesic requirement in 24 hr and any complications.
Results and Discussion: Intraopoerative hemodynamics were stable and comparable. Opioid free group showed statistically significant prolongation of postoperative analgesia (18.6hrs) compared to opioid group (6.5hrs) so also 24 hrs analgesic consumption. Postoperative pain score at all time points were less in opioid free group ($p<0.05$). opioid group patients were more sedated in PACU.No complications noted in any patients.
Conclusions: Opioid free anaesthesia is found to be a safe alternative in breast cancer surgery as it maintains intraoperative hemodynamic stability and offered prolonged analgesia.

08AP05-10
Comparison of femoral nerve block, adductor canal block and conventional IV analgesia methods for postoperative pain control in patients undergoing lower extremity orthopedic surgery

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Background and Goal of Study: Several analgesic treatment methods and techniques are used for postoperative pain management of lower extremity orthopedic surgery. We aimed to find out the most effective method in the postoperative pain period in patients undergoing lower extremity orthopedic surgery by evaluating peripheral nerve blocks to conventional treatment.
Materials and Methods: Following approval of Institutional Review Board 60 patients who planned to undergo lower extremity orthopedic surgery in major regional were included in the study. Following standard anesthesia technique before the end of surgery patients were assigned into three groups of 20 patients either to femoral nerve block(FSB), adductor canal block (ABP) under ultrasound guidance with 0.025% bupivacaine 40ml and 30 ml respectively or conventional analgesic (1mg/kg tramadol and 1000mg parasetamol). Rescue analgesics prescribed. Visual analog scale (VAS) and verbal numering rating scale (VNRS) were recorded to evaluate the pain scores of the patients at extubation, 6,12,24 postoperatively. Chi square Fisher's exact test, one way ANOVA and Mann Whitney U test were used for statistical evaluation.
Results and Discussion: The mean age of the patients was 50.3 ± 1.3 years. No statistical difference was found between the 3 groups in terms of demographic. VAS and VNRS values were lower in block group compared to the conventional group at all time points, and the decrease in the 6th hour was statistically significant. When the analgesic efficacy of peripheral blocks were compared to each other; both VAS and VNRS values were lower in the ACB group at all evaluations, and the decrease in 24th hour was statistically significant. Patients treated with peripheral blocks, required less analgesics than the patients who received conventional treatment, this difference was statistically significant at the 6th and 12th hours. There was no statistically significant difference between the patients who underwent FSB and AKB in respect to additional analgesia needs.
Conclusions: Blocks such as FSB and ABP are very effective in preventing postoperative pain in patients undergoing lower extremity orthopedic surgery. With the widespread use of ultrasound in anesthesia practice, the use of these blocks in postoperative will increase the quality of postoperative pain treatment in orthopedic surgery.

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08AP06-1
Somatosensorial differences in patients with radiculopathy secondary to disc herniation and treated by epidural injection or simple discectomy

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Background and Goal of Study: The objective assessment of the radiculopathy secondary to lumbar disc herniation is essential to optimize treatment. The Quantitative Sensory Test (QST) is a useful psychophysical tool to evaluate the alteration of somatosensory nerves. The main objective of our study is quantifying by QST the alterations of patients treated by conservative invasive technique (epidural pharmacological infiltration) or surgical decompression (simple discectomy).
Materials and Methods: Prospective, cohort study, along 2 years, including patients with radiculopathy over 3 months due to lumbar disc herniation, treated by epidural injections (EI) or lumbar discectomy (LD). Participants underwent a brief battery of QST at baseline and after 1, 3 and 6 months of follow-up. The Limits method was used by measuring cold and warm thresholds (CDT, WDT), and cold and heat pain thresholds (CPT, HPT). Variables were analyzed by Chi-Square, Student's T, ANOVA and Levene tests. Results were expressed by mean ± standard deviation.
Results and Discussion: We included 74 patients (40 men) who underwent EI (50 patients) or LD (24 patients). The mean age was 42.5 years (22-66). In the EI group, WDT measurements were significantly lower after 3 and 6 months of follow-up (40.44±3.42°C vs 38.30±3.73°C and 37.48±4.58°C respectively, p=0.031 and p=0.043). LD group showed lower WDT measurements at 1, 3 and 6 months of follow-up (40.20±2.97°C vs 37.43±3.80°C and 36.55±2.77°C respectively, p=0.032 and p=0.024) and lower HPT levels after 3 and 6 months of follow-up (48.75±1.37°C vs 43.26±0.60°C and 42.06±1.37°C respectively, p=0.037 and p=0.021). QST explorations were compared between both groups of treatment. At 1-month follow-up only the WDT parameter was different in both groups (40.98±4.04°C vs 37.98±2.04°C, p=0.043). There were no differences in any parameter measured by QST after 3 and 6 months of follow-up between both groups of treatment.
Conclusions: The QST represents an objective test for the assessment of the function of small sensory fibers. Treatment with EI or LD showed significantly improvements in QST explorations at short and medium follow-up. There were no differences in QST parameters after 6 months of follow-up between both groups of treatment. So, in patients with chronic radiculopathy secondary to lumbar disc herniation, epidural injection should be considered the first-step of treatment.

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08AP06-2
Case report: therapy of chronic ophthalmological pain syndrome with xenon inhalations

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Background: The etiology of eye pain is multifactorial, the drugs of choice for the treatment of pain are NSAIDs. However, with prolonged use of drugs often develop complications, which requires looking for alternative methods of pain relief. In various areas of medicine, Xe is used as a strong analgesic for the treatment of pain[1].
Case Report: Patient H, 24 age, came to the clinic with complaints of reduced vision and bouts of excruciating pain in the area of the inner corner of the eye-neuralgia n. nasociliaris (Charlin syndrome). Later trophic and inflammatory disorders in the form of keratitis were added. To relieve pain attacks, NSAIDs and antidepressants were used, endonasal lidocaine electrophoresis. Pain syndrome did not stop, at the same time, the patient had complaints of discomfort and pain in the epigastrium, which required the abolition of NSAIDs. It was decided to conduct a course of inhalation of the oxygen-xenon mixture an anesthetic apparatus Xena-010 with monitoring of hemodynamic, respiration, and gas composition of the mixture. Xenon mask anesthesia was performed according to standard procedure. After the denitrogenation stage (5 min), xenon was combined at a target concentration of 40%. The stage of anesthesia III1 began 20 min after connecting xenon. Exposure to 40% xenon was 40 minutes. Hemodynamic and gas exchange indications were stable. The exit from anesthesia occurred 3 minutes after stopping the supply of xenon. After the first session, the patient noted the cessation of pain in the affected eye. Permanent pain relief was noted after 5 sessions of xenon therapy. In parallel, the state of trophism and cornea recovery improved.
Discussion: Due to the ability to relieve pain and relieve emotional tension, xenon has been used in the treatment of traumatic, ischemic and dyscirculatory brain lesions. Xenon, as an antagonist of NMDA receptors, suppresses neuronal hyperactivation under the action of glutamate, preventing excitotoxicity [2,3].
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BanksP, FranksN, DickinsonR. Anesthesiology.2010;112(3):614-22.
Learning points: Considering the literature data and our own experience about the positive results of using xenon inhalation in the treatment of painful neurological syndromes of various etiologies, the use of this method can be recommended, especially in cases when other drugs are not effective or their use is limited by contraindications.

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08AP06-3
Explorative study of CYP2D6 gene polymorphism in a cohort of chronic pain patients.

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Background and Goal of Study: The treatment of chronic pain is based on drug therapy. CYP2D6 gene polymorphism is known to harbor inter-individual variation in response to drugs and individuals can be classified in Poor (gPM), Normal (gNM), Intermediate (gIM) or Ultrarapid (gUM) Metabolizers. gPMs and gUMs correlate to therapeutic response and manifestation of adverse drug reactions (ADRs). In addition, drug-drug interactions (DDIs) and drug-drug-gene interactions (DDGIs) seem to have a high incidence in chronic pain (CP) patients influencing drugs' efficacy and increasing the risk of ADR, as consequence of polypharmacy (phenocopying). Our study investigated the incidence of gPMs and gUMs in a cohort of CP patients receiving opioid treatment. As secondary objective, phenocopying was evaluated.
Materials and Methods: The protocol (NCT03411759 on clinicaltrials.gov) was approved by the local Ethics Committee. One hundred patients (98 of referred European ancestry, 1 from Northern Africa and 1 from Brazil) referring to the Pain Therapy Unit of Policlinico S. Orsola-Malpighi were enrolled after signing the informed consent. The participation did not interfere the normal therapeutic plan.

Information on demographic and medical data, therapies, efficacy (Numeric Rating Scale, NRS) and ADRs were collected. Buccal swabs were collected and genotyped following Sistonen et al.. Metabolic phenotype from genotype was predicted with Activity Score (AS), following Gaedigk et al.. Population genetics data analysis was performed with Arlequin software 3.5.2.2. The correlations with in vitro reactions, DDGIs, polypharmacy and AS were evaluated by Chi square test.
Results and Discussion: Mean NRS was 5.8±0.4. ADR incidence was 46.1%. gNMs (90%) were prevalent than other phenotypes (gUM=0%, gIM=7%, gPM=3%). We assessed as possible phenocopying all patients taking ≥2 drugs (56%), which can interfere with CYP2D6 metabolism. Due to phenocopying risk, the need for phenocopying prediction models is requested. Moreover, since many factors can alter CYP2D6 functionality regardless of the genotype, predicting phenotype from genotype is complex. In addition, variants of genes codifying phase II enzymes could interfere.
Conclusions: Pharmacogenetics analysis plays a role in CP treatment influencing response to therapy. Our results could be a starting point to stratify the population basing on metabolic warnings, reducing the ADR risks and therapy ineffectiveness.

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08AP06-4
Epidural blood patch for treatment of secondary chiari syndrome due to spontaneous intracranial hypotension

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Background: spontaneous intracranial hypotension (sih) is a well-established cause of orthostatic headache and neurological symptoms due to brain herniation and pachymeningeal enhancement
Case Report: a 19 years old (asa i class) female , with no previous history of any kind of pathology and surgery presented in our department with history of headache for the past 12 months. Headache was occipital and getting worse in the upright position. In the last 6 weeks she also complained for upper limb power reduction and paresthesia. Neurological examination revealed upper limb power mrc 4/5 proximately and 3/5 distaly for left upper limb and 5/5 ,4/5 for the right upper limb . Pinprick sensation was partialy reduced for the upper abdominal quadrant. mri findings were mri(1)
1)spinal cord edema c2-t8
2)enlargement of anterior subarachnoid space c3-c6
3)floating dura sac sign c2-l4
4) adhesions or possible minimal spinal cord herniation with signs of dura mater rupture c5-c6 (possible csf leakage)
Csf flow study results suggest chiari syndrome with intracranial hypotension)
For treatment an epidural blood patch(ebp) was decided.surgery remained as a last option because csf leakage point was not exact. 20 ml of antilogous venus blood were injected into the lumbar epidural space over a 5 minutes period. The patient was placed in trendelemburg position for 6 hours , and at full bedrest for 24 hours. For the next 4 days she remained at bed with minimal activity. Patient symptoms relieved within a week and mri scan (3) showed reverse of cereberallar tonsil herniation.
Discussion: Sih presents a challenging situation. In our case all diagnostic criteria were fulfield and due to the severity of the symptoms intervation with an ebp were decided. Blood volume and secondary management was according current practice.
References: Jin-ping Lin et al the status of diagnosis and treatment to intracranial hypotension, including sih. The Journal of Headache and Pain(2017)18;4
Learning points:1) sih is a rare but well recognized entity; 2) diagnostic criteria can separate sih from chiari type i syndrome; 3) epidural blood patch with subsequent management present an effective therapy

08AP06-5
Muscle trigger points artikaine blockades efficiency in non-specific low back pain treatment

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Background and Goal of Study: Nonspecific low back pain(NLBP) is the leading cause of seeking medical help among working-age patients. The goal of study was to evaluate the effectiveness of the use of therapeutic medical blockades with articaine in the complex NLBP therapy.
Materials and Methods: The study included 96 patients with NLBP, divided into 2 groups. The main group (48 people) underwent medical therapy (diclofenac 150 mg/day for 5 days and tizanidine 6 mg/day for 14 days) and a course of injection therapy for lumbar trigger points. The control group (48 people) underwent only medical therapy. The treatment effectiveness criteria included the pain intensity (using a Visual Analogue Scale(VAS)),the amount of active and passive movements in the lumbar spine, and the severity of myofascial disorders. Treatment results were assessed on 10th day and after 2 months of treatment.
Results and Discussion: At the time of study inclusion, the pain intensity was 7.3±1.9 and 6.7±1.6 points by VAS in the main and control groups, respectively. Clinical symtopms in both groups were characterized by severe myofascial disorders. 100%(n=96) respondents had active and passive movements limitation caused by pain. After 10 days of therapy, the intensity of pain by VAS was 1.3±0.6 and 2.9±1.0 points in the main and control groups($p < 0.005$).A range of motion was regained in 83% of the patients in the main group and in 16% in the control group. The number of trigger points and their activity regressed in a shorter time and with greater intensity in the main group of patients. Evaluating the results of treatment after 2 months, there were no significant differences in the studied groups.
Conclusions: The use of trigger points blockades in the complex therapy of NLBP allows to relieve pain in a shorter time and reduce the severity of myofascial disorders on the early stages of treatment.

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08AP06-6
Pain management in cervix brachytherapy

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Background and Goal of Study: Uterine cervix cancer is one of the most common malignancies worldwide. Acute Postoperative Pain (APP) after needle implantation high-dose rate brachytherapy (HDR) for cervical cancer is frequent, but its incidence remains unknown. We aimed to review the incidence and intensity of APP after HDR and the satisfaction of the patients regarding administered postoperative analgesia.
Materials and Methods: Once approval of the Ethics Committee of our Hospital was obtained, we carried out a retrospective study, including those patients who had undergone HDR for uterine cervix cancer for 5 years. Following data were recorded: visual analogue scale (VAS), subjective analgesia scale (SAS) 24h after HDR, type of intra-procedural anaesthesia and postoperative intravenous analgesia administered. Results were analysed using SPSS 24.
Results and Discussion: One-hundred-and-fifty-four patients who had received 247 HDR-treatments were analysed. Intra-procedural anaesthesia provided was spinal anaesthesia in 73.7% and general anaesthesia in 26.3%. No statistical significant differences were found regarding to VAS ($p=0.2$) and SAS ($p=0.4$) in relation to the anaesthesia provided. Postoperative analgesia was administered using well-stablished analgesic protocols utilizing mild-opioids or NSAIDs, depending on the patient's characteristics. APP was mild (VAS 0–3) in 81.8% and fair (VAS 4–7) in 18.2% of the patients. No patients referred severe pain (VAS 8–10). SAS was considered as excellent in 6.1%, good in 72.5%, moderate in 20.6% and bad in 0.8% of the patients. No statistical differences were found regarding VAS ($p=0.1$) or SAS ($p=0.1$) in relation to the postoperative analgesia administered. VAS higher than 4 was found in 18.2% of the patients and 21.4% reported their satisfaction regarding analgesia received as moderate or bad. A high incidence of depression or anxiety was found in the population referring worst pain management.
Conclusions: APP after HDR is frequent. Nevertheless, a well stablished analgesic management can mitigate its appearance. The addition of drugs aimed at treating depression or anxiety could improve the perception of pain after HDR.

08AP06-7
A recently introduced multimodal pain management protocol improves pain outcomes in children undergoing posterior spinal fusion surgery

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Introduction: Posterior spinal fusion in children is associated with severe postoperative pain (1). Pain protocols aimed at reducing opioid consumption in the idiopathic patient group are emerging (2). For the first time we compared two perioperative pain protocols in both idiopathic and non-idiopathic patients. Anesthesia technique remained the same in both groups. Opioids used intraoperatively were remifentanil, fentanyl and morphine. The old protocol (group 1) comprised intraoperative tramadol, and postoperative morphine Patient Controlled Analgesia (PCA), with on demand paracetamol and metamizole. The new protocol (group 2) comprises preoperative oral gabapentin, intraoperative paracetamol, dexamethasone, and an infusion of low dose ketamine + ultra-low dose naloxone continued into the postoperative period, and postoperative continuous morphine infusion with PCA, with on demand tramadol and diazepam. The primary objective was to reduce the total perioperative opioid consumption.
Methods: Following research ethics board approval, we retrospectively collected data for both groups between 1/2014 and 6/2016. 187 patients were included in the study. 86 (24 non-idiopathic) in group 1 and 101 (33 non-idiopathic) in group 2.
Results: Both groups were similar at their base line characteristics (age, sex, etiology). Intra-operative remifentanil (mean 0.213 vs 0.195 mcg/kg/hour, P=0.05), fentanyl (mean 0.442 vs 0.363 mcg/kg/hour, P=0.04), and morphine + morphine equivalent dose of tramadol (mean 0.053 vs 0.035 mcg/kg/hour, P<0.001) were significantly higher in group 1. Total opioid consumption in the intraoperative and post anesthetic care unit was significantly higher in group 1 (mean 0.085 vs 0.074 Mcg/Kg/Hour, P=0.027).
Conclusions: The new multi-modal pain protocol for posterior spinal fusion reduced the total opioid consumption perioperatively.
References:

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2. Devin CJ, McGirt MJ. Best evidence in multimodal pain management in spine surgery and means of assessing postoperative pain and functional outcomes. Journal of Clinical Neuroscience. 2015 Jun 1;22(6):930-8.

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08AP06-8
Gene expression profiles in the spinal cord and dorsal root ganglion in a rat model of cisplatin-induced peripheral neuropathic pain

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Background and Goal of study: Although chemotherapy-induced neuropathic pain (CINP) is a significant side effect associated with many chemotherapeutic agents, there are no analgesics that effectively treat this disorder. However, microarray gene analyses of nervous system tissues hold great promise for the identification and development of novel targets for persistent pain modulation. Thus, the aim of the present study was to determine in gene expression changes in a rat model of CINP.
Methods and Methods: A rat model of cisplatin-induced peripheral neuropathic pain was used in the present study. Mechanical allodynia was measured using von Frey filaments, and global gene expression in the lumbar spinal cord (SC) and dorsal root ganglion (DRG) was analyzed at 5 and 14 days following cisplatin administration. Finally, the validity of the array results was evaluated using real-time reverse-transcription polymerase chain reaction (qRT-PCR).
Results and Discussion: The microarray analyses revealed significant differences in the mRNA expression profiles of cisplatin-injected and control-injected rats. On day 5 after cisplatin injection, 186 altered mRNAs (128 up-regulated and 58 down-regulated) were identified in the SC, and 197 altered mRNAs (145 up-regulated and 52 down-regulated) were identified in the DRG. On day 14 after cisplatin injection, 220 altered mRNAs (130 up-regulated and 90 down-regulated) were identified in the SC, and 198 altered mRNAs (133 up-regulated and 65 down-regulated) were identified in the DRG. The expression patterns of several mRNAs were further confirmed by qRT-PCR. The gene ontology results showed that the most significantly enriched biological processes associated with the up-regulated genes included immune responses and chemical stimulus detection in the SC and cellular homeostasis and muscle system processes in the DRG.
Conclusions: Changes in mRNA expression patterns were identified in rat SC and DRG under conditions of CINP. These altered mRNAs may represent novel therapeutic targets for the treatment of neuropathic pain. Further studies are needed to elucidate the roles of individual genes in CINP.

08AP06-9
Protective Effect of Resveratrol on Complex Regional Pain Syndrome Type I in The Rats

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Background: Complex regional pain syndrome(CRPS) is a multifactorial disorder with clinical features, such as neurogenic inflammation. Most CRPS patinets are considered to suffer from type I, the trauma without overt nerve injury. Chronic post-ischemic pain(CPIP) in rats is viewed as an animal model of CRPS-I, induced by ischemia–reperfusion(IR). Previous reports using CPIP model has suggested that CRPS-I is related to peripheral microcirculation impairment associated with activation of inflammatory pathway. According to the previous study, endoplasmic reticulum(ER) stress response is also a significant driver of neuropathic pain in CPIP rats. Resveratrol has anti-inflammatory capacity and has been reported to modulate ER stress response. It has been shown to have beneficial effects on many organ systems during IR injury. However, its protective effect on CPIP has not been investigated. Thus, we hypothesize that resveratrol may exert protective effect against CPIP through modulating ER stress and inhibiting inflammation.
Methods: Male SD rats were randomly allocated into 5 groups(6 rats per group): Sham, Sham plus resveratrol 40mg/kg(Sham-R40), CPIP, CPIP plus resveratrol 20mg/kg(CPIP-R20) and CPIP-R40. CPIP was induced by applying O-ring on unilateral hindpaw to produce a 3-hour IR injury. All drugs were administrated intraperitoneally 10 minutes before reperfusion. We measured the behavioral parameters at baseline as well as post-reperfusion day 1, 2, 3, 5, and 7. The ER stress and proinflammatory makers in sciatic nerves were measured by Western blot at the time point when the makers expressed maximally according to our previous study. We used two-way ANOVA for data analysis and P<0.05 was thought to be significant.
Results: Our data showed that CPIP induced by IR led to hindpaw mechano-allodynia, heat hyperalgesia, and impaired grip strength, indicating the development of neuropathic pain and motor deficit as symptoms of CRPS-I(Fig.1). With resveratrol, the parameters were improved significantly in a dose-dependent manner. The molecular data revealed the significantly increased expression of the ER stress markers and the inflammatory regulators in sciatic nerves(Fig.2). Resveratrol could significantly attenuate the expression of the markers, indicating it had therapeutic potential in CPIP rats.
Conclusion: Resveratrol significantly attenuates the symptoms of CRPS-I. The mechanisms may involve anti-inflammation and reducing ER stress response.

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08AP06-10
When opioids are not enough: Palliative pain management for bladder cancer- A case report

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Background: Opioids are enshrined as the panacea for cancer pain and severe pain at the pinnacle of the WHO analgesic ladder. Alone, strong opioids have neither been sufficient nor the ideal drug for many riddled with cancer due to mechanism of action and debilitating side effects.
Case Report: We describe a 64 year old community ambulant male with Stage 4 bladder transitional cell carcinoma, metastases to peritoneum and lungs, who had undergone diversion nephrostomies now admitted for gross hematuria and resultant bladder spasm pain from clot retention. We delineate the important role of a pain physician in the multidisciplinary team caring for this patient, providing analgesic options, coordination and suggestions, as well as an anesthesiologist for his potential operations and alleviating procedures.
Discussion: While the death of a palliative patient is inevitable, the journey of every patient sets a learning opportunity to improve the care of others so that their departure remains one of dignity and comfort.

08AP07-1
Comparative study of somatosensorial alterations determined by Quantitative Sensory Testing in patients with compressive radiculopathy and healthy subjects

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Background and Goal of Study: Radiculopathy secondary to disc herniation is one of the most prevalent causes of chronic lumbosciatic pain. The Quantitative Sensory Test (QST) is a non-invasive psychophysical test that allows an early detection of peripheral neuropathies. The objective of our study is to evaluate the differences of the QST values in patients with radiculopathy secondary to lumbar disc herniation with respect to a group of healthy subjects.
Materials and Methods: An observational case-control study was designed from January 2015 to December 2017. Case group included adult patients, affected of radiculopathy secondary to lumbar disc herniation confirmed by imaging test. Control group was based on healthy subjects with similar demographic characteristics and comorbidities. Participants underwent a brief battery of thermal QST. The limits method was used by measuring cold and warm thresholds (CDT, WDT), cold and heat pain thresholds (CPT, HPT) and paradoxical sensations to cold and warm perception (PCS, PHS). Variables were analyzed by Chi-Square, Student's T, ANOVA and Levene's tests. Results were expressed by mean ± standard deviation.
Results and Discussion: We included 148 subjects (74 cases and 74 controls). The case group presented differences with the control group in the family history of herniated disc (p=0.046, OR 1.42, 95%CI:1.15-6.35), overweight (p=0.023, OR 1.61, 95%CI:1.13-3.28), and prolonged standing (p=0.039; OR 1.36; 95%CI:1.03-3.45). The patients with radiculopathy, in the symptomatic limb, presented most of the QST thresholds significantly different from the control group: CDT (26.57±3.01°C vs 28.81±1.01°C, p=0.048), WDT (40.44±3.42°C vs 36.53±1.18°C, p=0.021), CPT (19.45±9.26°C vs 25.36±2.23°C, p=0.025), HPT (47.48±3.12°C vs 41.01±2.15°C, p=0.038), and PCS (3.89±0.84 responses vs 0.92±0.65 responses, p=0.006). Regarding the asymptomatic limb, the different QST thresholds were only CDT (27.16±0.47°C vs 28.81±1.01°C, p=0.045) and WDT (39.45±1.19°C vs 36.53±1.18°C, p=0.034).
Conclusions: QST is useful for detection of neuropathy in compressional radiculopathy. The measurement by QST of the sensory involvement in patients with radiculopathy due to lumbar disc herniation, demonstrates an alteration in thermal thresholds, in comparison with control group. Moreover, these differences appeared not only in the symptomatic limb, but also in the asymptomatic one.

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08AP07-2
The problem of chronic pain syndrome in children with hemoblastosis due to transferred chemotherapy

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Background and Goal of Study: The percentage incidence of leukemia in children in Ukraine is constantly growing. Accordingly, the number of children with a low quality of life due to the chemotherapy is increasing. In this regard, we decided to conduct a study in which to establish the presence of chronic pain syndrome in this group of children with a view to the subsequent correction of anesthetic therapy at the stages of treatment of hemoblastosis.
Materials and Methods: Conducted a survey of 26 patients with hemoblastosis age from 6 to 16 years living in the Poltava region, the last course of chemotherapy during 2016-2017 and included in clinical remission in order to identify chronic pain. A visual analogue scale was used to determine the presence and severity of pain. The DN4 questionnaire was used to determine the neuropathic component of pain.
Results and Discussion: A survey of 26 children with hemoblastosis living in the Poltava region and undergoing chemotherapy during 2016-2017, including 5 girls and 21 boys, was conducted. During the treatment of hemoblastosis, children received anesthesia with morphine preparations at different stages of chemotherapy. It was revealed that 18 children (69%) have moderate pain syndrome - from 1 to 4 points on a visual-analogue scale. In 5 children (19%) severe pain - more than 5 points on the visual analogue scale. And in 3 children (12%) there is no pain syndrome. All children with chronic pain syndrome (23 people) according to the DN4 questionnaire have a neuropathic component - more than 17 points. Also, all 26 children have a pronounced asthenic syndrome, according to the survey.
Conclusions: Given the findings an important goal is to improve the patient's quality of life due to leveling of chronic pain. This can be achieved by improving the management of pain therapy at all stages of the treatment of hemoblastosis, improved maintenance therapy and psychological support. We will continue the study of this problem to determine the effectiveness of various combinations of analgesics at the stages of chemotherapy in the prevention of chronic pain syndrome and asthenia.

08AP07-3
Pulsed Radiofrequency of the C2 DRG for the treatment of cervicogenic headache and postherpetic neuralgia

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Background and Goal of Study: Pulsed radiofrequency ablation (PRF) is a potential treatment option with good outcomes for patients suffering from cervicogenic headache (CH) and postherpetic neuralgia (PHN) related to the C2 nerve. Although PRF provides shorter duration of pain relief than the conventional radiofreuquency ablation, it has fewer complications and is safer. However, there is only one case series report for the C2 PRF. Therefore, the aim of this study was to investigate the effect of C2 DRG PRF on patients with CH and PHN.
Materials and Methods: From January 2012 to February 2018, we investigated patients who underwent pulsed radiofrequency of the C2 DRG at Seoul National University Bundang Hospital Pain Center. The following details were available for analysis: patients' age, gender, diagnosis, pain intensities at the initial outpatient visit, duration of symptoms, results of previous GONB and C2 blocks, cervical spine MRI and x-ray findings.
Results and Discussion: The study included a total of 45 patients who received C2 DRG pulsed radiofrequency. In 40.0 % (18/45) of patients, there was a pain reduction of more than 50% after 6 months of treatment. In logistic regression analysis, the success rate of pulsed radiofrequency was higher in patients who experienced previous pain relief after C2 ganglion block (odds ratio [OR] = 24.14, P = 0.005). The success rate of pulsed radiofrequency was higher in patients who experienced previous pain relief after C2 ganglion block (odds ratio [OR] = 21.25, 3.57-411.91).
Conclusions: C2 DRG PRF is an effective and safe treatment for patients with cervicogenic headache and postherpetic neuralgia, especially in patients who have experienced pain reduction in the previous C2 DRG block.
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08AP07-4
Failed back surgery syndrome – a case, demonstrating a significant role of cognitive psychotherapy in a complex treatment

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Background: The development of new techniques for neurosurgery along with high rate of chronic low back pain(LBP) patients causes the growth of spine surgeries. Nevertheless strong pain remains in 4-50%[1].Its control is challenging, but current literature shows a significant role of biopsychosocial approach in failed back surgery syndrome(FBSS) management. We present a case, demonstrating significant role of cognitive therapy
Case Report: A 76-year-old woman was admitted for inpatient treatment due to high-intensity(7-8 points by Visual Analogue Scale(VAS)) LBP and sciatica, significantly interfere with everyday activities (Oswestry Disability Index(ODI) 60%),performing pain fixation and pain behaviour. Physical examination showed L5-S1 left sided facet joint disease and sacroiliac joint dysfunction. LBP appeared 2 years ago after strong psycho-traumatic situation. Patient received conservative treatment (analgesics, physical therapy) with no effect. MRIs, revealing moderate degenerative-dystrophic changes at L4-S1 levels, were performed repeatedly despite the clinical symptom's stability. Without distinct indications patient was operated twice in a 6-month period in the lumbar spine with no improvements. In our university clinic we corrected the pharmacotherapy(added Duloxetine 60mg/day) with active implementation of cognitive psychotherapy. In a 3-week period pain intensity was significantly lower(up to 3points by VAS)with moderate effect on everyday life(ODI 25%)
Discussion: It is known that psychotherapy improves the treatment effectiveness in a pain syndrome complex therapy[2],but it doesn't widespread used with FBSS patients. This case demonstrates the need of minimal invasive approach to FBSS patients. The special aspects of this case are the onset of LBP after stressful situation, obvious correlation between psychological pain perception and intensity, unsubstantiated surgical interventions and the absence of post-surgery positive dynamics. Current literature shows that surgery success rates reported to drop to 30% after a second spine surgery,15% after a third and approximately 5% after a 4th[3]
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Learning points: Prevention and treatment of FBSS should remain a key goal by means of completing MRI as well as spine surgery for those with invariable indications. Selecting patients that may benefit from cognitive psychotherapy should be widely implemented

08AP07-5
The efficiency of 2% lidocaine and 2% articaine injections for performin the thrapeutical medical blocades of the occipital nerve-comparative analysis

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Background and Goal of Study: The occipital nerve blockade is a therapeutic and diagnostic procedure that not only relieves pain, but is also a diagnostic criterion for cervicogenic headache (CGH).The study goal was to evaluate the effectiveness of occipital nerve blockades for treating the CGH with the use of various local anesthetics (2% lidocaine and 2% articaine solutions).
Materials and Methods: 43 patients with CGH were randomized into 2 groups(the main group(22 patients) and the control group(21 patients)).All patients received diclofenac 150 mg/day for 10 days and therapeutic blockades of the occipital nerve on 1,3,5 days of treatment with 2% articaine in the main group and 2% lidocaine in the control group.
Results and Discussion: Treatment efficacy was evaluated after 5 and 10 days of therapy, analyzing pain intensity(using a Visual Analogue Scale (VAS)) and the duration of individual pain episode. Upon request the intensity of pain was 6.3±1.2 and 5.9±2.0 points by VAS, and the duration of individual painful paroxysm was 7.8±2.3 and 9.1±2.8 hours among the respondents of main and control groups respectively. On the 5th day the intensity and duration of pain were3.0±0.8 and 4.3±1.2 VAS points($p<0.05$)and 1.9±0.6 and 4.8±1.3hours($p<0.05$)-in the main and control groups, respectively. On the 10th day the pain intensity in the main group was 1.2±0.5 points by VAS, in the control one-1.7±0.7 points ($p>0.05$).The duration of individual pain episode was 0.5±0.08 hours in the main group and 2.4±0.8 hours in the control group($p <0.05$).
Conclusions: 2% articaine injection for occipital nerve blocks in patients with CGH allows to raise the pain control effectiveness in the acute period and significantly reduce the duration of individual pain episode during the entire course of treatment.

08AP07-6
Headache due to cerebrospinal fluid leak after lumbar surgery – treatment with epidural blood patch.

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Background: Accidental dural injury with cerebrospinal fluid (CSF) leak is a frequent complication of spinal surgery (1-17%) and most cases are identified in the first 48 hours. Late manifestations (>5 days) are rare (0.28-0.83%) but may have important morbidity.[1] Treatment is usually surgical, but an epidural blood patch (EBP) was successfully used in some cases.[2]
Case Report: A 59yo woman with history of posterior L5-S1 laminectomy 15 days prior presented a debilitating temporal headache refractory to analgesia with 1 week of evolution, which relieved with decubitus and disallowed orthostatism, photophobia and emesis. She had no previous history of headache. At examination: apiretic, negative for meningeal signs and neurological alterations, no inflammatory signs of the surgical wound. Lumbar CT: signs of laminectomy in L5-S1. Cranioencephalic CT: no changes. CSF hypotension secondary to lumbar surgery was suggested as diagnosis. An EBP was performed in the operating room, under standard ASA monitoring above the surgical incision (L1-L2). 16mL of autologous blood was collected and injected aseptically, without complications. Post-dural puncture headache protocol was initiated: hydration, paracetamol, NSAIDs, caffeine and antiemetics. The patient referred relief of the headache the next day, being discharged after 3 days of hospitalization completely asymptomatic. 2 weeks later she resumed the initial symptoms being diagnosed with CSF fistula and pseudomeningocele. Surgical repair was performed with resolution of symptoms and no further complications.
Discussion: Late dural lesions after lumbar surgery occur when the dura mater is anchored on bony tips in the lateral gutters. EBP can be performed for symptomatic relief given its low rate of complications and possible avoidance of surgical re-intervention.[2] In our case, the blood patch was successful, with total symptomatic relief and return to normal life. The relapse of symptoms was due to a large CSF leak requiring surgical repair.
References:
1. Incidence and treatment of delayed symptoms of CSF leak following lumbar spinal surgery. Eur Spine J. 2015 Sep;24(9):2069-76.
2. Delayed Presentation of Incidental Durotomy. Bull Hosp Jt Dis (2013). 2013;71(3):231-4
Learning points: Post-laminectomy late-onset headache due to CSF hypotension is rare, but with disabling symptoms. The blood patch should be tried for symptomatic relief and to avoid re-intervention which increases patients' morbidity.[2]

08AP07-7
The pain acceptance and quality of life dynamics in patients with chronic nonspecific low back pain

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Background and Goal of Study: Chronic nonspecific low back pain (LBP) is one of the most resistant pain conditions often combined with co-morbidities with high emotional pattern. The aim of the study is to analyze the pain acceptance and quality of life dynamics in patients with chronic nonspecific LBP.
Materials and Methods: 36 patients with LBP who attended the clinic in September 2017-August 2018 were randomized into two comparable groups (18 patients each) by the sealed envelope method in a randomized double-blinded placebo-controlled study, that was approved by the Institutional Review Board. The control group received venlafaxitine 75 mg/day and tizanidine 8 mg/day during 16 and 2 weeks respectively. The study group got the same drug therapy and was additionally 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 16 weeks after the treatment by revised Chronic Pain Acceptance Questionnaire (CPAQ-R) and Oswestry Disability Index (ODI).
Results and Discussion: The mean age was 35.5±4.1 and 41.5±6.4 in the study and control group, respectively. Both groups mostly consisted of mails – 11 in the study, 10 in the control groups. The pretreatment CPAQ-R score on activity engagement subscale was 31.7±8.1 and 25.6±6.5 points, on pain willingness subscale was 18.1±4.5 and 22.3±6.1, ODI – 54.8±2.2% and 50.8±3.5% in the study and control groups, respectively. After 16-weeks treatment, CPAQ-R score showed higher rates in both engagement and willingness subscales in the study group – 47.4±4.6 and 38.1±5.7 points versus 35.5±5.2 and 20.4±3.4 points in control group ($p<0.05$), as well as positive ODI score dynamics (22.4±4.2% in the study and 42.8±5.5% in the control group, $p<0.05$).
Conclusions: Mindfulness therapy can significantly improve pain acceptance and quality of life in CGH patients.

08AP08-1
Sphenopalatine Ganglion Block – An emerging treatment for Postdural Puncture Headache

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Background: Headache after dural puncture is a relatively common complication of neuraxial anesthesia and its management has been challenging. When conservative methods fail, the gold standard treatment for postdural puncture headache (PDPH) is the epidural blood patch (EBP), which is an invasive method with considerable risks. Sphenopalatine ganglion is a parasympathetic ganglion, which has been used on the treatment of headaches with diverse etiologies. Recently, bilateral sphenopalatine ganglion block (SGB) has emerged as an alternative treatment for PDPH.
Case Report: Female, 30 yo, ASA 2, proposed for removal of tibial osteotaxia, with no history of chronic headaches. The anesthetic choice was a combined spinal-epidural anesthesia; however the technique was complicated with an inadvertent dural puncture with an 18G Touhy needle, through which a subarachnoid (SA) catheter was placed and used during the procedure. The surgery was uneventful.
On the Post-Anesthesia Care Unit the patient reported headaches with typical characteristics of a PDPH evaluated in numeric scale [NS] 8/10. Conservative measures were performed and the SA catheter was removed after 24 hours of its placement. The patient was transferred to the nursery and evaluated everyday referring the same symptoms. At day 4 after surgery an EBP was performed with 15 ml of autologous blood, with some relief (NS 6/10). At day 6 a bilateral SGB was performed with 0,375% ropivacaine embedded cotton swabs for 20 minutes. Symptoms relief to NS 0/10 in sitting position 5 minutes after the block. The patient remained asymptomatic and was discharged on day 7.
Discussion: There are multiple references on headache relief after SGB. The majority of the patients report at least temporary relief, and the technique can be repeated. A few comparisons were made between SGB and EBP without any significant difference on the results of both techniques. Despite obvious contraindication in patients with basilar skull fractures, SGB can be done in cases where EBP is contraindicated. This case shows that even when EBP fails, SGB manages to give proper and sustained relief.
Conclusions: SGB is a simple and safe technique that can be done at bedside, has a non-invasive profile and can provide sustained and immediate pain relief. We consider it an appealing option on PDPH management vs EBP, however it has yet to be considered as first line therapy after unsuccessful conservative management.

08AP08-2
Pulsed radiofrequency of proximal sciatic nerve for acute phantom limb pain after above-knee amputation and hip disarticulation: a case report

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Background: Phantom limb pain (PLP) after limb amputation remains difficult to treat. We present here 2 cases of successful management of acute PLP using multimodal analgesia combining pharmacotherapy and the pulsed radiofrequency (PRF) of the sciatic nerve.
Case Report: Case 1: A 49-year-old-man, suffering from recurrent phlegmon of his left limb for 10 years, underwent an above-knee amputation under general anesthesia with peripheral nerve block. Although the stump pain was adequately controlled with medication, 3 days after operation, sharp PLP acutely developed emanating from the posterior lower leg to the plantar. Treatment with tramadol, pregabalin, and amitryptiline failed to control the PLP, and the numerical rating scale (NRS) increased to 6/10 at 17 days after the operation. However, a test subgluteal sciatic nerve block using mepivacaine completely relieved PLP for several hours. Therefore, we performed sciatic nerve PRF 22 days after operation, and NRS gradually reduced to 1/10 in 2 weeks. At 6 months after PRF, the pain relief continued and the patient became able to walk wearing prosthetic device. In 1 year, his PLP completely resolved and his only complaint was slight stump pain with reduced dose of medication. Case 2: A 54-year-old-man, suffering from fibrosarcoma in his left thigh, underwent hip disarticulation under general anesthesia combined with epidural anesthesia. Severe PLP of NRS 10/10 developed in his left posterior lower limb 1 day after the operation despite of high doses of oxycodone and pregabalin. Continuous intravenous administration of ketamine only for 24 hours eradicated most of the burning component of his PLP. However, rather dull PLP of NRS 5/10 remained even after 7 days of medication with pregabalin, amitryptiline, and acetaminophen. After successful resolution of the remaining PLP with test parasacral sciatic nerve block with mepivacaine, PRF was also performed in this case. NRS reduced to 2/10 in 2 weeks, although he sometimes felt slight phantom limb sensation. He became able to walk with his prosthetic device and abolished all the medication after 4 months.
Discussion: In acute phantom limb pain after the above-knee amuptation and hip disarticulation, multimodal analgesia including PRF of the proximal sciatic nerve was effective and can possibly prevent the chronification of PLP.
Learning points: Introduction of PRF at an early stage of PLP may be effective in combination with conservative medications.

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08AP08-3
Sacro - iliac joint: the correlation between clinical examination and outcome of intra-articular infiltration and radiofrequency treatment.

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Background and Goal of Study: In common practice provocative maneuvers (PM) followed by an intra-articular infiltration (IA) have been used for diagnosis of sacro-iliac pain (SI). The patients with a successful diagnostic block are eligible for sacral radiofrequency denervation (RF). While widely used, to our knowledge this approach has never been validated. In this abstract we evaluate the correlation of patient selection using PM and a positive IA.
Materials and Methods: In a third line multidisciplinary pain center clinical data was retrospectively collected from 1st of June until 31th of October 2018 of all patients who received an IA injection. The standard clinical examination for the SI joint consisted of 5 PM: Patrick Test, distraction test, compression test, local compression and thigh trust. If 3 or more test were positive the SIJ was considered as the source of the pain and the PM were categorized as positive. Clinical success was defined as a pain reduction of at least 50% during the first weeks after IA, or after 6 weeks after RF. Statistics were analyzed (JMP) with a two sided Fisher's Exact test.
Results and Discussion: 51 patients were identified who received an IA, of which 12 received a RF. Baseline value: 69,8% of the patients were women, the average age was 63,2 years, the average NRS score was 7,42. 73% of the IA showed clinical success . RF of the SI joint had a success ratio of 58,3% A two-sided Fisher's Exact test showed a significant correlation (p<0,0001) between positive PM and an IA(n=51). There was no significant correlation between a positive IA of the SI joint and a radiofrequency treatment (p=0,15). No significant correlation was found between positive PM and a positive outcome after RF (p= 0,52).
Conclusions: Positive PM for the SI joint are highly correlated with clinical success after IA. Because of the small sample size of RF group, no additional correlations could be found. The place of an IA in the treatment algorithm remains a matter of discussion. On one hand it can be viewed as a diagnostic procedure, where in case of a negative clinical outcome a RF treatment should not be considered. On the other hand, it can also be considered as a treatment on itself, where in case of a negative clinical outcome a RF treatment can still be considered as a stepwise approach for the management of the SI joint.

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08AP08-4
Effectiveness of a radiofrequency treatment of the genicular nerves in chronic knee pain

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Introduction: Knee pain has a lifetime prevalence of 45%.[1] The innervation of the knee joint consists of branches from the sciatic, femoral and obturator nerve. Recently the superomedial (SM), inferomedial (IM) and superolateral (SL) genicular nerves became targets of interest for a radiofrequency (RF) treatment.[2] Using ultrasound (US), these sensory branches are easy to target since their proximity to the genicular arteries and the bony cortex at the junction of the metaphysis and epiphysis of femur and tibia.
Objectives: The aim of this retrospective analysis was to evaluate the effectiveness of US guided RF treatment of the genicular nerves (SM, IM, SL) in patients with chronic knee pain due to refractory osteoarthritis or persistent postoperative pain after a total knee arthroplasty.
Methods: We retrospectively reviewed data of the first 13 patients treated in our department to evaluate the global perceived effect (GPE), the Numeric Rating Scale (NRS) and complications. We considered the treatment to be successful when observing a GPE of at least 50% pain reduction. The patient-reported NRS was scaled from 0 to 10, 0 representing 'no pain at all' whereas the upper limit represents 'the worst pain ever possible'. From September 2017 until October 2018 these parameters were recorded from the patient records at a mean follow-up period of three months after a US guided RF treatment of the genicular nerves (SM, IM, SL). A diagnostic block of the genicular nerves was performed prior to the RF procedure. Only after obtaining a positive diagnostic block (GPE of 50% or more), an US guided RF treatment of these 3 branches was performed at 70° for 90 seconds per branch after excluding motor stimulation at 2 Hz below 1.0 V. A 10 cm 21 G Cosman RF cannula with a 5 mm active tip was used during the procedure.
Results: In our group of 13 patients, 1 was lost to follow-up. At a mean follow-up time of 3 months after the RF treatment, 50% of the patients reported a GPE of 50% or more pain reduction. The overall mean NRS reduction was 2.5 points. In the group of responders the mean NRS reduction was 5 points. Six patients reported no benefit. No complications were reported.
Conclusion: Our retrospective small case series of US guided RF treatment of the genicular nerves (SM, SL, IM) shows similar results as mentioned in the literature (52-69% patients with a GPE of 50% or more[2-4]). The results of this first analysis justify further research.

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08AP08-5
Efficacy of ultrasound-guided radiofrequency ablation for genicular nerve in knee osteoarthritis-related chronic pain

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Background: Knee osteoarthritis (OA) is the common joint disorder and chronic knee pain represents a source of severe disability and reduces quality of life. Genicular nerve is the sensory nerve that transmits pain signals from the knee to the brain, and some studies have reported the efficacy of radiofrequency ablation (RFA) for genicular nerve under X-ray, but no study utilizing ultrasound has been reported.
Objectives: In the present study, we aimed to evaluate the efficacy of ultrasound-guided RFA for genicular nerve in chronic knee pain.
Methods: We applied RFA on genicular nerve of patients with painful knee OA when diagnostic blocks using local anesthetic provided the patient with 80% or better pain relief. This study included 25 knees of 19 patients. Ultrasound-guided RFA was performed 80°C for 90 seconds. Pain intensity was assessed by Numeric Rating Scale (NRS 0-10) and knee disability was assessed by The Western Ontario McMaster OA Index (WOMAC). Each assessment was observed before procedure (baseline) and at 2, 4, 8, 12weeks after procedure. All measurement values were expressed as mean ± SD. Outcome measures over time were evaluated using the repeated measurement general linear model. A value of $p < 0.05$ was considered statistically significant.
Results: Baseline NRS was 7.1±1.1, and WOMAC was 74.9±9.3. Significant decrease in pain and significant improvement in knee function were observed at 2 weeks (NRS; 3.3±1.3, WOMAC; 44.4±8.4, p<0.05), 4weeks (NRS; 3.9±1.5, WOMAC; 48.2±8.7, p<0.05), and 8 weeks (NRS; 5.2±1.1, WOMAC; 57.2±11.1, p<0.05), compared to baseline values. No serious complication was found in any patient.
Conclusions: Ultrasound-guided RFA for genicular nerve could be safe and beneficial treatment in the patients with knee osteoarthritis-related chronic pain.

08AP08-6
Accuracy of ultrasound–guided dorsal ramus branch block compared to fluoroscopy for facet joint pain syndrome. A retrospective cohort study in overweight patients.

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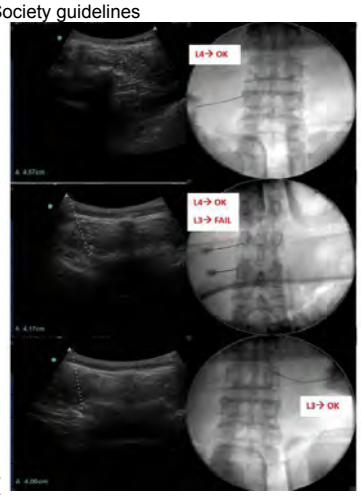
Background and Goal of Study: Lumbar facet nerve block is usually carried out with fluoroscopic guidance but an US guided approach has been described.[1] This technique has been validated in cadavers and showed high rates of accuracy compared to fluoroscopy (95%) in lean patients.[2] The main hypothesis was that US–guided accuracy rate is still high in overweight subjects. As secondary endpoint we investigated whether patients' characteristics can influence accuracy.
Materials and Methods: Single centre retrospective study. Inclusion criteria: (1) Patients undergoing at least one US–guided block from L1-L4 for facet syndrome pain. Exclusion criteria: (1) Scoliosis (2) Previous arthrodesis. Routine anteroposterior fluoroscopy image was obtained after US–guided needle placement. Accuracy was assessed following the International Spinal Injection Society guidelines



( ).[3]
Sample size was estimated for a 80±5% accuracy. A mixed logistic regression model was fitted to investigate the influence of patients' characteristics on accuracy.
Results and Discussion: 233 blocks from 42 (21 male, 21 female) patients were evaluated. Age was 54±9 and skin–facet distance was 5.3±1.0. BMI was 29±5. Blocks were 15% at L1, 22% L2, 32% L3, 31% L5 and side was envely distributed. The overall accuracy was 62%. Mixed logistic model showed that BMI (OR 1.02, 95CI:0.94-1.10, P =0.63) and skin–facet distance (OR 0.84, 95CI:0.61-1.18, P=0.29) influence negatively the rate of accuracy after controlling for age, gender and vertebra side and level without reaching significance probably because of the lack or power due to the lower accuracy rate we observed.
Conclusion: Our results show a lower rate of accuracy for US–guided technique compared to previous studies. Further studies are warranted to elucidate the role of patients´ characteristics.
References:

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08AP08-7
Comparison of clinical efficacy of epidural injections with or without platelet rich plasma in lumbal back pain patients

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Background and Goal of Study: Low back pain has become a major public health issue limiting of life quality. There has been a widespread use of epidural injections (EI) with steroids. Platelet Rich Plasma (PRP) is a novel therapeutic tool. To evaluate and compare effectiveness after EI with or without PRP in lumbal back pain patients.
Materials and Methods: The prospective observational study was carried out during 2018 including 32 patients with an aware age 55 ± 17 and BMI 26 ± 4 kg/m2. 17 patients (PRP+EI group) were injected with 80 mg of Depomedroli and 5 mg of Bupivicaini in Epidural space of lumbal part and afterwords they received 8 ml of autologous PRP on multiple levels of facet joints bilaterally by 1 ml on each join. The control 15 patients (EI group) got only EI. All patients received the second EI in 2 weeks. The protocol included evaluation by VAS (Visual Analogue Scale) and overall improvement assisted by MODQ (Modified Oswestry Disability Questionnaire): T1 (before treatment), T2 (after 2 weeks) and T3 (after 3 month). Significance, $P < 0.05$.
Results and Discussion: Totally, 32 patients were analysed. At the baseline VAS score in the PRP+EI compare to EI group was 5 ± 2 vs. 6 ± 2; $p = 0.3$ and patients were older 61 ± 15 vs. 48 ± 17; $p = 0.03$. Duration of pain PRP+EJ and EI groups were widely spread 38 vs. 28 months, $p = 0.9$. Seven patients had disc protrusion and herniation, 8 - spinal stenosis, spondylolisthesis, 2 - facet join pain in PRP+EI group. In contrast, in EI group only 4 had spinal stenosis, 11 - disc protrusion or herniation. After 2 weeks in PRP+EI group the clinical improvement was by 52% (VAS from 5 to 2.7; $p = 0.004$) and by 48% (VAS from 6 to 3.4; $p = 0.002$) in EJ group. After 3 months in PRP +EI group by 64% (VAS from 5 to 2; $p = 0.006$) vs. 36% (VAS from 6 to 4; $p = 0.03$) in EI group with intergroup difference 28%; $p = 0.03$, respectively. Stronger correlation was found in PRP+EI group between VAS and clinical improvement after 3 month compare to EI group, $r = 0.9$ vs. $r = 0.8$; $p < 0.0001$. After 3 month back stiffness decreased in 40% vs 12%, night pain in 58% vs 45% and tingling in 42% vs 37% of all patients in PRP+EI vs. EI groups with no significant intergroup difference.
Conclusions: EI combined with PRP injections on multiple facet joins might demonstrate better clinical improvement, particularly, in longer time period in patients with low back pain.

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08AP08-8
Cryoneurolysis: an analgesic tool?

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Background and Goal of Study: Treatments for acute and chronic pain have limited efficacy and associated risks. Therefore, there is an increasing need for individualized multimodal therapy, largely based on minimally invasive non-pharmacological therapies. An alternative to consider is cryoneurolysis as it is a minimally invasive non-surgical treatment which, by local application of extremely low temperatures, leads to reversible nerve ablation, with consequent analgesia. This state can be maintained for weeks to months, thus constituting a long-term analgesic alternative to patients with acute postoperative pain and established chronic pain.
Materials and Methods: Articles were searched using research search engines (pubmed, clinicalkey, medline and medscape), retrieving 67 articles. After applying the inclusion (retrospective and prospective studies with cryoneurysis application in the last 4 decades and literature reviews of the last 15 years) and exclusion criteria (retrospective and prospective studies involving a sample of less than 2 patients and literature reviews older than 15 years), 44 articles of the 67 originally retrieved articles were used as the bibliographical source for literature review.
Results and Discussion: As there is a greater need for reduction of opioids, treatment with safe and effective minimally invasive methods, such as cryoneurysis, becomes more attractive. In contrast to pharmacological therapies that present the greatest risk in long-term schedules, the safety profile of cryoneurysis allows multiple treatments, with no increased risks and no permanent neurological damage, due to its reversibility with axonal architecture maintenance. Cryoneurolysis does not present systemic toxicity, allowing, when effective, the execution of activities that can decelerate the progression of the disease. If used with ultrasound support it has advantages over chemical and thermal methods, such as direct visualization of the site and having probes of different shapes and sizes, allowing a more accurate neuronal ablation.
Conclusions: Multiple studies demonstrate that cryoneurolysis of peripheral nerves can lead to an improvement of acute and chronic pain. However, more randomized controlled trials are needed to allow future inclusion of this method in day-to-day analgesic as an integral part of a multimodal approach.

08AP08-9
Pulsed radiofrequency ablation: a minimally invasive approach for the treatment of lumbar facet joint pain.

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Background: Low back pain (LBP) is a common problem and facet joint pain (FJP) is responsible for 15 – 45% of cases.[1] Treatment is multidisciplinary and includes oral agents, physical therapy, regular exercise and, if indicated, psychotherapy. When conservative measures are not sufficient, radiofrequency ablation is required. It allows the interruption of nociceptive input, producing a heat lesion in a continuous or pulsed mode. The aim of this retrospective observational study was to evaluate the efficacy of pulsed radiofrequency (PRF) ablation in the treatment of lumbar chronic FJP.
Materials and Methods: Medical records of 60 patients who underwent PRF ablation were examined. The standard procedure provided follow-up of pain intensity using NRS and DN4 just before treatment, and again 15 days, 40 days, and 6 months after treatment. Successful treatment was defined as a reduction ≥ 50% in the NRS and DN4 scores at 6 months compared with pre-treatment scores. The study was conducted in Campania (Italy), from January to December 2015.
INCLUSIONS CRITERIA:
- Chronic LBP lasting for at least 3 months.
- Clinical manifestations suggesting FJP.
- Pain score of NRS ≥ 4.
- Pain relief ≥ 50% for at least 30 minutes after a diagnostic block using 40 mg (2 mL) of mepivacaine and 1.5 mg (2 mL) of betamethasone.

EXCLUSION CRITERIA:
- Radicular syndrome with sensory or motor deficits.
- Prior lumbar surgery.
- Prior RF treatment for LBP.
- Mental disability or psychiatric disorder.
- Major comorbidities or pregnancy.

Results: Scores on NRS and DN4 were statistically different over the time ($p < 0.05$). Scores at 6 months were lower when compared with pre-treatment scores ($p < 0.05$). In fact, 57 patients (97%) reported successful pain relief.
Conclusions: PRF is an effective and safe technique to treat FJP when it is refractory to conservative treatment. The procedure is relatively painless, well tolerated in absence of contraindications, and repeatable if the nerve endings regrow. The duration of effect of the procedure and the lack of complications confirm other past studies. Moreover, in our experience a correct diagnosis of the origin of lumbar pain, defined as facet pain syndrome, is essential to obtain a significant pain relief.
References
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08AP08-10
Ultrasound guided pulsed radiofrequency of the saphenous nerve for pain associated with chronic venous ulceration, facilitating complete ulcer healing: a case report

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Background: Pain caused by chronic venous ulceration (CVU) can produce significant morbidity, and have a large impact on a patient's quality of life (QoL) (1). It can also prevent CVU treatment, through compression therapy (CT). Pulsed radiofrequency (PRF) is recent method of pain treatment, with growing therapeutic use (2). However, its effectiveness in controlling pain associated with CVU is unknown. We present a case where PRF was used to alleviate pain due to CVU, and enabled healing through facilitation of CT.
Case Report: A 53 year old patient was referred for review of analgesia in relation to a large venous ulcer over their left lower leg. They were unable to tolerate CT due to their pain, and this was leading to worsening of their CVU. Amputation was being considered because of their worsening symptoms. The patient was offered PRF of the saphenous nerve in an attempt to control the pain, and facilitate CT. Prior to PRF, the patient reported pain scores of 9-10/10 on a pain numerical rating scale (PNRS) with CT, over the area of ulceration on their left leg. This was despite regular medication of paracetamol, pregabalin and 76mg morphine equivalent per day. As a result, they were unable to tolerate CT. After PRF, PNRS rating with CT was 3/10. The patient was able to tolerate CT without any regular medication. The patient was very pleased with PRF, and this pain control allowed an increase in their QoL. Analgesia provided by PRF lasted approximately 2 ½ months, after which another PRF session was offered to further facilitate CT and ulcer healing. At six months there was complete ulcer healing, and complete pain relief.
Discussion: Pain associated with CVU can be difficult to control, and inhibit CT treatment. PRF is a well-tolerated intervention with minimal side effects, which we have demonstrated in this case can be used to successfully control this pain, allowing the patient to stop all regular analgesic medications. This allowed successful treatment of their CVU by CT, and an increase in the patient's QoL.
References:
1. Green J, Jester R, McKinley R, et al. The impact of chronic venous leg ulcers: a systematic review. J Wound Care 2014;23:601–12.
2. Vanneste T, Lantschoot AV, Van Boxem K, Van Zundert J. Pulsed radiofrequency in chronic pain. Curr Opin Anaesthesiol. 2017;30(5):577–582.
Learning points: This case demonstrates pulsed radiofrequency to be an effective, novel analgesic approach for pain associated with chronic venous ulceration.

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08AP09-1
Intraoperative lidocaine infusion reduces opioid consumption after laparoscopic bariatric surgery

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Background and Goal of Study: In morbidly obese patients, reduction of morphine consumption is an important objective, due to respiratory side effects of opioids. The objective of this study was to evaluate the impact of intraoperative introduction of intravenous (IV) lidocaine infusion on postoperative opioid consumption after laparoscopic sleeve gastrectomy in our institution.
Materials and Methods: We conducted a monocentric retrospective impact study between July 2014 and September 2015 on all obese patients who had undergone sleeve gastrectomy in our institution. No lidocaine had been used during the "before" period, while patients had received intraoperative lidocaine (1.5 mg/kg IV bolus followed by a 1.5-2 mg/kg/h continuous IV infusion) during the "after" period. The primary outcome was cumulative 24h morphine consumption (i.e., Post Anesthesia Care Unit (PACU) consumption + subsequent 24h Patient Controlled Analgesia (PCA) consumption). Secondary outcomes were pain scores at 0h, 24h and 48h, nausea and vomiting, and length of hospital stay.
Results and Discussion: 254 patients were analyzed: 129 in the before (control without lidocaine) period and 125 in the after (with lidocaine) period. Mean BMI was 41,8 (IQR [38 - 45]) and 42 (IQR [39 - 45,6]) during the 2 periods, respectively. IV lidocaine was associated with a significant reduction of cumulative 24h morphine consumption (median 17 mg, IQR [9 -24], versus 22 mg, IQR [12 - 31], p= 0.003). This was mainly related to a lower morphine titration in PACU (median 9 mg, IQR [3 - 12] versus 3 mg, IQR [0 - 9], p=10-5). There was no difference subsequent in 24h PCA consumption (median 12 mg, IQR [5 - 18] without lidocaine, versus 11 mg [5 - 21] with lidocaine, p= 0.11). We also observed reduced pain scores in PACU during the after period but no difference in the other secondary outcomes.
Conclusions: Consistent with previous randomized controlled studies in non-bariatric surgery, the present impact study confirmed that introduction of intraoperative lidocaine IV infusion was associated with a reduced cumulative 24h morphine consumption in our obese population. This was mainly related to a lower morphine titration in PACU.

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08AP09-2
Greater occipital nerve block for postdural puncture headache (PDPH): modified algorithm for the management of PDPH.

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Background and Goal of Study: Postdural puncture headache (PDPH) is a well-recognized complication of dural puncture. It causes significant short-term disability and prolongs hospital stay. Bilateral greater occipital nerve block (GONB) has been used previously to treat chronic occipital headache. In patients with PDPH it could be used to avoid performing an epidural blood patch (EBP).
Materials and Methods: We decided to include in our algorithm GONB after two days of conservative management with paracetamol 1g/8h, caffeine 300 mg/12 and NSAIDS. Patients who fail conservative treatment are offered an EBP on the third day. We administered 2 ml ropivacaine 0.2% + triamcinolone 10 mg per nerve.
Results and Discussion: Out of 26 PDPH in 2017-2018, we performed a bilateral GONB in four patients (three females and one male, mean age was 35,2 years-old). They all began with symptoms the first day after the puncture, VNRS ≥ 6, and we started conservative treatment. On the third day we decided to perform GONB instead of blood patch. In the first 24 hours we obtained VNRS≤3 with no side effects. Patients were asymptomatic at discharge the day after the block. The sensory neurons in the upper cervical spinal cord are quite close to the trigeminal nucleus caudalis (TNC) neurons. Therefore, the sensory input from both the cervical and trigeminal fibres finally gets transmitted to the TNC neurons. When a GONB is performed, there is a 'winding down' of central sensitisation due to interruption of afferent input to the dorsal horn and TNC neurons, temporarily. This may relieve the headache due to PDPH.
Conclusion: Bilateral GONB is a minimally invasive, low-volume, safe peripheral nerve block which can be offered to patients who are suffering from PDPH when conservative management is ineffective. Benefits include: effective and prompt symptom management, avoidance of an invasive treatment (EBP) with known potential complications. More studies in this sense can be addressed to obtain more experience.
References :
1. Efficacy of bilateral greater occipital nerve block in postdural puncture headache: a narrative review.Abhijit S. Nair Korean J Pain 2018 April; Vol. 31, No. 2: 80-86

08AP09-3
Anesthesia's ultimate challenge: monitor intraoperative analgesia

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Background: Harmful effects of maintaining an excessive depth of anesthesia are well known, thus the recommendation of monitoring it. Same could happen with intraoperative analgesia, but to this day there was no way to measure it (1). Nociception Level Index (NoL™ Index) measures plethysmography variability, heart rate, galvanic skin response and temperature changes to obtain a numeric index, useful in guiding intraoperative analgesia. Values vary from 0 to 100, the desirable being keeping it between 10 and 20
Case Report: A case of a laparoscopic subtotal gastrectomy is presented. Surgery proceeded under total intravenous anesthesia: propofol and remifentanil on TCI mode. Propofol dosage was guided by BIS, and remifentanil dosage according to NoL™ values. Muscle relaxants were dosed to keep TOF between 0 and 1. Every 10 minutes, blood pressure, heart rate, BIS and NoL™ Index were measured. 30 minutes before ending surgery, paracetamol 1 g, dexketoprofen 50 mg and morphine 8 mg were delivered. Surgery lasted 3 hours. Average vital signs during intervention were: blood pressure 139/64 mmHg; heart rate 93 bpm; BIS 38. Average NoL™ Index was 8. Total doses amounted to 884 mg of propofol, 3331 mcg of remifentanil. Postoperative analgesia was intravenous paracetamol 1 g every 8 hours, alternating with dexketoprofen 50 mg. The patient VAS was under 3 for the first 12 hours after surgery, only needing morphine 4 mg as rescue analgesia on the first hour
Discussion: Inadequate analgesia seems to have serious consequences(2). Measuring balance between analgesia and painful stimuli is a fair interest. In an experimental work, NoL™ Index proved superior to separate interpretation of all the parameters that conform it (3)
References:

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2- Edry R. Intraoperative validation of the Nociception Level Index. A non-invasive nociception monitor. Anesthesiology 2016;125(1):193
3- Ben-Israel N:Monitoring the nociception level: A multi-parameter approach Clin Monit Comput 2013;27:659–68

Learning points: There is a growing interest on accurately measuring intraoperative analgesia, thus improving perioperative results, but the ideal device is yet to be determined. NoL™ Index seems a useful tool but more studies are needed to confirm this hypothesis

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08AP09-4
Analgesic efficacy of postoperative patient-controlled sublingual sufentanil intake after total knee arthroplasty.

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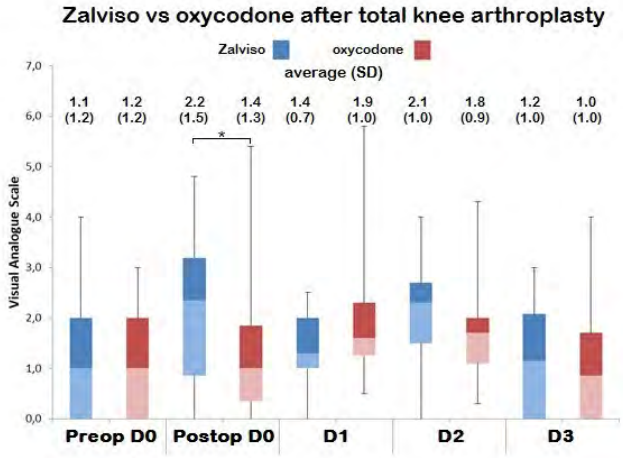
Background: Total Knee Arthroplasty (TKA) is one of the most commonly performed orthopaedic procedures and is associated with moderate to severe postoperative pain. This study evaluated patient-controlled sublingual sufentanil (Zalviso®) versus oral oxycodone as the rescue pain relief component in a multimodal analgesia protocol after TKA.
Materials and Methods: After ethics committee approval, a total of 61 patients of the AZ Maria Middelares hospital in Ghent were included in this retrospective study. All patients underwent a primary TKA between November 2017 and May 2018. All surgeries were performed with the same surgical technique by the same orthopaedic surgeon, under a standardised general anaesthesia with multimodal intravenous analgesia (paracetamol, NSAID, ketamine, clonidine) and additional Local Infiltration Anaesthesia (LIA). In the control group (n=30) oral oxycodone 5mg twice daily was used until D3. In the Zalviso group (n=31), patient-controlled sublingual sufentanil (15mg dose, max 45µg/hour) was used. Pain was measured with Visual Analogue Scale(VAS) scores on day 0-3 (D0, D1, D2, D3). After D3, both the Zalviso and oxycodone were stopped. VAS scores were compared between both groups using the Mann-Whitney U test. The significance level was set at $p<0.05$.
Results & Discussion: The mean(SD) VAS scores for the Zalviso group were significantly higher postoperatively on D0 than in the control group. The VAS scores at D1-D3 showed no statistically significant difference. The mean VAS was <2,5 at all times in both groups, thus suggesting appropriate pain management in either group. While neither require intravenous access and permit fast-track recovery and early mobilisation, Zalviso requires in-hospital use, and thus hinders early discharge. Considering the cost (>100€ per patient) of Zalviso and its additional nursing and logistic requirements compared to oxycodone (0,9€ per patient), no sufficient advantage in favour of Zalviso advocates its routine implementation.
Conclusion: In a balanced analgesia regimen for TKA, consisting of multimodal intravenous therapy and LIA, Zalviso does not provide superior analgesia compared to oxycodone.



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08AP09-7
Local Increased Expression of Acid-sensing Ion Channel 3 (ASIC3) Contributes to Postoperative Pain in A Rat Plantar Incision Model

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Background and Goal of Study: Postoperative pain is a significant clinical concern and critical for the patients recovery after surgery. However, the exact mechanisms of postoperative pain are still poorly understood. Local pH near the incisions is decreased because of increased concentrations of lactate and inflammatory factors, which can facilitate nociceptor activation and contribute to postoperative pain. In this study, we examine the peripheral expression of acid sensing ion channel 3 (ASIC3) which can be activated by extracellular protons, and its role in regulation of incisional pain.
Materials and Methods: The plantar incisional pain model of rats was used in this study. Incisional pain related behaviors were measured by Von-frey and heat stimulus. Polymerase chain reaction (RT-PCR) was used to measure the ASIC3 messenger RNA (mRNA). Western blotting, immunohistochemistry and Immunofluorescence were applied to detect ASIC3 protein expression.
Results and Discussion: Plantar incision induced significantly mechanical and thermal hyperalgesia behaviors after the surgery and lasted until 7 days after incision. The ASIC3 mRNA in muscle and skin significantly increased within 4h after incision but recovery to normal level at one day after incision. ASIC3 protein increased in the local tissues since 4h after incision and maintained for several days, which is consistent with the pain behaviors. ASIC3 of the skin adjacent to the incision had the greater expression than that of outer place and the up-regulated expression of ASIC3 protein only found in incision nearby tissues but not in ipsilateral DRG (dorsal root ganglia), indicating the local increased expression of ASIC3. Immunohistochemical staining indicated the presence of ASIC3 in the skin, the muscle and localization in NF200-positive axons and isolectin B4-positive axons of deep tissues and dorsal root ganglion. Plantar injection of a specific ASIC3 channels blocker (the toxin APETx2) decreased the guarding behaviors and mechanical hyperalgesia but had no effect on thermal hyperalgesia.
Conclusions: The ASIC3 mRNA and protein increase after the plantar incision. Intraplantar of ASIC3 blocker can reduce the pain behaviors of incisional pain. The local increased expression of ASIC3 in the nearby tissues of the incision after the surgery appears to contribute to postoperative pain.

08AP09-8
Two nociception monitoring systems in gynecological surgery. Would they be useful to control surgery stress? A clinical case

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Background: There are different nociception monitors (1), although at present there is no scientific evidence of which is more sensitive and specific. For the detection of surgical stress there are different strategies: Detection of high frequency waves in the electroencephalogram (qNox, CVI, RE / ES) and derivatives of the autonomic nervous system response (ANI, SPI, NOL TM).
Case Report: Patient 46 years old operated on for abdominal hysterectomy and double ooforectomy by laparoscopy with general anesthesia. Personal antecedents of alergy to penicillins, streptomycin, eritorimicine and ibuprofen, Lynch syndrome and colonoscopy. We prepared a standard monitoring, Tof cuff for neuromuscular monitoring, hypnosis monitoring with BIS and qCon / qNox in contralateral side, and nociception monitoring with qNox and NOL TM. Anesthesiologist was blind for these monitors and antinociception balance depended on Heart rate and arterial pressure. Induction without incidence with propofol, remifentanil and rocuronium, maintance with general anesthesia with propofol TCI Schnider Model Ce 2.5-3 micrg ml and remifentanil TCI Minto model Ce 2-3 ng ml. ERAS protocol and multimodal analgesia (metamizol 2 g, paracetamol 1 g, dexamethasone 4 mg, intravenous lidocaine 1 mg / kg / h, and fentanyl 0.3 microg kg at the end of surgery were administered). The anesthesiologist was blind for these nociception monitors and antinociception balance depended on heart rate and arterial pressure. Both monitors showed high values in different periods of surgery. After surgery and wake up the patient was transferred to postoperative unit, where she needed a total of 14 mg of morphine to control pain for reaching visual analytical score (VAS) <3. The patient was transferred to the room and during the admission did not need new rescues of morphine. The pain was controlled with analgesia scheduled and discharged on day 3 of the postoperative period.
Discussion: The specificity and sensitivity of nociception monitors is higher than heart rate and arterial pressure, coinciding higher values with episodes of surgical stress. NOL TM multiparametric system seems more sensitive in the marked ranges than qNox, although both systems could point to the most intense surgical events.
References:

1. Abad-Gurumeta A. et al.Rev Esp Anestesiol Reanim. 2017;64:406-414

Learning points: We need more studies that can show evidence of nociception monitoring in clinical practice.

-intensive Care Medicine

09AP01-1
The role of high doses nebulized colistin in the therapeutic management of multidrug-resistant Pseudomonas aeruginosa nosocomial pneumonia

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Background and Goal of Study: Nebulized colistin is considered a last resort treatment for nosocomial pneumonia (NN) caused by multi-drug resistant (MDR) and extensively-drug resistant (XDR) P.aeruginosa (1,2), although there is a strong concern about its safety and a lack of adequate evidence confirming its efficacy. The objective was to describe our experience with the use of high doses of nebulized colistin for MDR and XDR P.aeruginosa management.
Materials and Methods: Retrospective single-center study was performed from January 2015 to December 2017 in all critically ill patients admitted to our surgical intensive care unit with diagnosis of NN caused by MDR or XDR-P.aeruginosa, treated with high doses of nebulized colistimethate sodium (CMS) (3 MIU/8h or 5 MIU/8h). Most important variables were analysed: demographics and clinical data, potential adverse effects related to CMS treatment (bronchospasm, neurotoxicity or nephrotoxicity), microbiological data, clinical cure, microbiological response (eradication or colonization), length of ICU and hospital stay, and 30-days all-cause mortality.
Results and Discussion: 14 patients were analysed. Demographics and clinical data are shown in Table 1. 6 patients showed XDR P.aeruginosa colonization (all sensitive to colistin). Nebulized CMS therapy was well tolerated in all patients, with no episodes of bronchospasm or signs of nephrotoxicity. Renal impairment during CMS treatment was observed in 6 patients, but others nephrotoxic were present in all cases. At the end of treatment, clinical cure had been achieved in 64% (9/14) of patients, 30 days all-cause mortality was 21% (3/14).

Patients' clinical characteristics	
Male, n (%)	9 (64)
Age (yr)	74± 8
SOFA score	6 ± 3.8
Treatment duration (days)	15 (6-30)
Length of ICU stay (days)	61± 35
Length of hospital stay (days)	89± 45

Table 1
Conclusions: High doses nebulized colistin might be reasonably efficacious and safe for treatment of NN caused by MDR or XDR-Pseudomonas aeruginosa.
References:

1. Kalil AC et al. Clin Infect Dis. 2016.
2. Valachis A et al. Crit Care Med. 2015

09AP01-2
Low gene expression levels of FCER1A are associated to presence of sepsis in infected surgical patients

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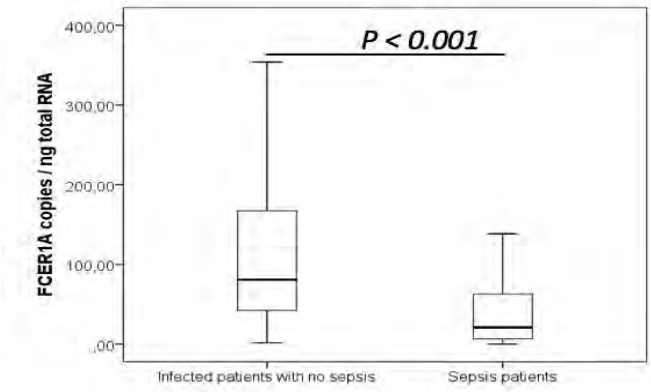
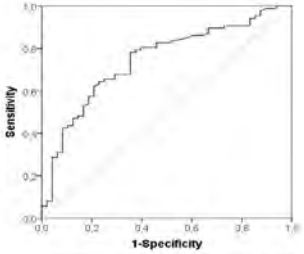
Background and Goal of Study: Sepsis is an organ dysfunction caused by a dysregulated host response to infection. One feature of this response is the immunosuppression, which deteriorates outcomes. Leucocyte gene expression levels in has been proposed for evaluating the degree of immunosuppression associated to sepsis. In a previous study, we evidenced that FCER1A (Fc Fragment Of IgE Receptor Ia) has the lowest expression levels of the transcriptome in sepsis. Here we studied the association between FCER1A expression and the present of sepsis in infected surgical patients.
Materials and Methods: FCER1A expression was quantified by droplet digital PCR (ddPCR) in blood of 139 infected surgical patients. 50 of these patients presented with sepsis following the Sepsis-3 definitions. Differences in expression levels between septic and infected patients with no sepsis were assessed using the Mann Whitney U test. Area under the receiver operating curve (AUROC) and multivariate regression analyses were employed to test the ability of FCER1A to identify sepsis.
Results and Discussion: Septic patients showed lower expression levels of FCER1A compared to infected patients with no sepsis (Figure 1).



Multivariate regression analysis showed that low gene expression levels of FCER1A are associated to presence of sepsis, independently of age, immunosuppression, presence of hypertension, chronic obstructive pulmonary disease (COPD) and chronic renal insufficiency (Table 1). FCER1A gene also showed significant AUROC to predict sepsis in infectedsurgical patients (Figure2).

	OR	95% CI	P
Age	0.99	0.96 - 1.02	0.632
Immunosuppression	3.55	0.83 - 15.11	0.087
Hypertension	2.66	0.83 - 8.47	0.099
COPD	4.34	0.70- 26.73	0.114
Chronic renal insufficiency	3.67	0.27 - 48.99	0.325
Ln FCER1A copies / ng total RNA	0.53	0.37 - 0.74	0.000



	AUROC		
	AREA	95% CI	P
FCER1A copies/ ng total RNA	0.75	0.66-0.83	<0.001

Conclusions: Depressed gene expression of FCER1A is associated with presence of sepsis in infected surgical patients. Quantifying FCER1A gene expression levels by ddPCR is promising strategy to monitoring the risk of sepsis in surgical patients with infection.

09AP01-3
Lymphopenia as a long-term mortality risk factor in an elderly sepsis cohort

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Background and Goal of Study: Sepsis is a syndrome defined as an exaggerated inflammatory host response to infection. Sepsis initiates anti-inflammatory immune mechanisms results in periods of immunosuppression. The immune dysfunction is a cause of late mortality in sepsis. Neutropenia and lymphopenia have been reported as a predictor of 28 days mortality in septic patients (1,2). No evaluation about the influence of lymphopenia in long-term mortality has been done so far. The goal of study is to evaluate the effect of lymphopenia in long-term mortality in a elderly septic surgical cohort.
Materials and Methods: A retrospective search for patients with sepsis or septic shock was performed. The patients who met the criteria for sepsis and septic shock (Sepsis-3 definition) were over 65 years old and had been hospitalized for at least 24 hours in the Intensive Care Unit of the Hospital Universitario Rio Hortega were recruited using our electronic database between 1 January 2011 to 31 December 2016. Variables as patient demographic data, ASA classification, comorbidities, previous immunosuppression, APACHE and SOFA scales at admission, reason for ICU admission, type of infection, Procalcitonine, lactate on admission, blood neutrophils and lymphocytes on admission and at 24h were collected. A multivariable logistical regression analysis in relation to long-term mortality (1 year) was performed. A p value <0.05 were considered statistically significant.
Results and Discussion: 178 patients were recruited. After logistical multivariable regression analysis, lymphocytes count at 24 h was an independent significant risk factor of a year mortality. OR 0,481 IC 0,95% (0,231-1,001)(Figure I). Our results confirm the role of lymphopenia as a predictor of mortality in septic patients.

Variables

	B	E.T.	Wald	gl	Sig.	Exp(B)	I.C. 95% for EXP(B)	
							Inferior	Superior
Age	.049	.015	9,988	1	.002	1,050	1,019	1,082
SEX	.335	.378	.789	1	.374	1,398	.667	2,930
Neuropathy	1,350	1,207	1,252	1	.263	3,858	.362	41,077
SOFA24	.070	.073	.940	1	.332	1,073	.931	1,237
ARF	.799	.389	4,225	1	.040	2,224	1,038	4,766
Urinary infection	-.328	.516	.404	1	.525	.720	.262	1,981
Mechanical Ventilation	.476	.428	1,237	1	.266	1,610	.696	3,725
Gram negative	.560	.362	2,395	1	.122	1,750	.861	3,557
Linfo_24hs_0.5	-.732	.374	3,835	1	.050	.481	.231	1,001
Constant	-5,132	1,365	14,131	1	.000	.006		

Conclusions: Lymphopenia at 24 h in septic surgical patients is an independent risk factor of long-term mortality in septic elderly surgical patients.
References:
1) Boran ÖF, et al Med Sci Monit. 2018 May 27;24:3531-3539
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09AP01-4
Bilateral blindness after severe septic shock: a rare complication in the intensive care unit

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Background: Hypoperfusion of the optic nerve can lead to an uncommon condition known as posterior ischemic optic neuropathy (PION), which can cause an acute loss of vision[1,2]. Perioperative PION is mostly related to neck dissection and spine surgery. Few cases have been described as a complication of septic shock in the intensive care unit (ICU).
Case Report: A 72y-o patient with a history of arterial hypertension, hypercholesterolemia and chronic kidney disease was admitted to the ICU with severe septic shock secondary to colonic ischemia. An emergency left hemicolectomy with ileostomy was performed. He received broad-spectrum antibiotherapy (including Linezolid), crystalloids, high-dose norepinephrine (up to 1.6 µcg/Kg/min), corticotherapy, and dobutamine to assess adequate tissue perfusion. He remained sedated, intubated and mechanically ventilated. When the patient was extubated one week later, a bilateral painless loss of his vision was found. The neurological examination showed no light perception, isochoric pupils with slow pupillary response to light, without other cranial nerve deficit. The fundoscopic exam revealed no apparent optic nerve alterations without pallor/ edema, and cranial MRI discarded acute ischemic cortical disorders. Finally, visual evoked potentials showed an absence of cortical conduction while normal electroretinogram, consistent with posterior ischemic optic neuropathy (Figure

1). The patient did not recover from his vision loss during his ICU stay. Further ophthalmologic follow up was not possible, because the patient died from an intestinal perforation one week later.
Discussion: Main risk factors for PION are anaemia, prolonged hypotension, high-dose vasopressor therapy and high positive end-expiratory pressure, which reduce the optic nerve blood flow and can lead to monocular/bilateral blindness. Linezolid optic neuropathy was unlikely after only three days of treatment. As visual outcomes rarely improve, it is of a great importance to prevent PION by treating its risk factors and also by routinely assessment of vision in the ICU. Daily sedation-weaning is recommended in intubated patients.
References:
1. Hayreh SS. Eye, 2004; 2. Roth S et al. Front Neurol, 2018.
Learning points: PION is a devastating, highly incapacitating and usually irreversible condition. It should be considered when other causes of vision loss have been discarded. Rapid optimization of tissue perfusion in septic shock is essential to prevent PION

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09AP01-6
From cough to shock: case report

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Background: Spontaneous abdominal wall hematomas are rare condition. Usually they occur in elderly people taking anticoagulant therapy. Rupture of the epigastric vessels leads to accumulation of large collection of blood in the front abdominal wall.
Case Report: A 74 years old female patient was admitted to Emergency Department in severe shock condition. She was hypotensive 70/50mmHg, tachycardic 130/min, anuric, anxious and confused. She complained having abdominal pain, her abdomen was tender and she also had right lobar pneumonia finding. Her medical history revealed she was taking acenocumarol because of cardiomyopathy and AFF, she also had Diabetes mellitus type 2 and hypothyroidism. Contrast enhanced CT scan was done and large hematoma (16x12cm) which was tearing the left front abdominal wall paraumbilicaly was noted. It was also compressing the mesenterium and the urinary bladder. She was preoperatively stabilized by colloids, crystalloids and blood products, and vitamin K was administered. Her hemoglobin level preoperatively was 7.5g/dl, RBS 2.46x10^6, INR 3.06, aPTT 49s and PT 22s. During the surgery two liters of coagulum was evacuated and ligation of the artery was performed. The patient received 2pacs of RBS and 2pacs of fresh frozen plasma during the surgery, and additional one more RBS and FFP and also cryoprecipitate 10 doses in ICU. She was extubated after few hours and transferred to the ward next day, in stable condition.
Discussion: Bleeding in the abdominal wall can often be misdiagnosed. Every older patient with rapid onset abdominal pain and tenderness should be suspected, especially if taking anticoagulants. Situations in which spontaneous bleeding can occur are intensive coughing, vomiting, defecation and during labor, by increasing the intraabdominal pressure and rupture of epigastric vessels[1]. Other conditions include Hemophilia and Von Willebrand disease and overdose with anticoagulants. CT scan confirms the diagnosis by extravasation of contrast from epigastric artery.
References:
1. Masanori Shimodaira et al: An oblique muscle hematoma as a rare cause of severe abdominal pain: case report; BMC Research Notes 2013,6:18
Learning points: Hematomas in the abdominal wall can often mimic various surgical conditions, but when we have an elder patient taking anticoagulants with rapid onset tenderness and pain, we should always suspect this type of bleeding.

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09AP01-7
A case of Fournier's Gangrene in a 52 years old female

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Background: Fournier's Gangrene(FG) is a necroting infection of perineum and genitals, more common in male(M) than females(F).Sorensen et al. identified in a retrospective review 1641 M with FG and only 39 F[1].
Case report:52 yo F, heavy smoker, EOPC, obese(BMI 34) arrived at emergency with septic shock. She showed an ulcerated gluteus abscess with eschar from right inguinal region to half thigh wide. She was sick for one month and had diarrhoea in the last ten days. She felt mild pain, only took paracetamol. CT-scan showed oedematous soft adipose tissue, gaseous bubbles in the right gluteus from skin to muscles deep, from ischio-rectal fossa until suprapubic region. She entered the ICU intubated: fluid resuscitation, antibiotic therapy with piperacillina/tazobactam, metronidazole, vancomicin maximum dose started. Laboratory risk indicator for necrotizing fasciitis (LRINEC) was 9[2].The patient entered the operating room:she underwent aggressive fasciotomy, debridement of infected tissue followed by positioning of VAC(KCI[Acelity Company],San Antonio, Tex).A posterior anal fistula was found, draining and seton was inserted. The drape of VAC System was sealed over the wound and periwound skin, continuous NPWT was applied at -125mmHg. She underwent 17 VAC therapy changes. After 15 days the anal fistula was treated by a mucosal anorectal advanced flap closure. She was treated with hyperbaric oxygen therapy only one time: no anaerobic bacteria infection but E.coli was found in wound swab and biopsy samples. At first inflammatory indices and fever decreased then they increased again with WBC, procalcitonine, fever. We changed antibiotic: ceftazole/tazobactam+daptomycine(maximum dose).After 45 days she was discharged from ICU and scheduled for reconstructive surgery and bowel recanalization.
Discussion: Early recognition of FG, aggressive surgery with debridement, antibiotic broad spectrum therapy, resuscitation are a challenge in this life-treating disease. LRINEC and clinical presentation are useful for disagnosis. Risk factors are in this case: obesity, recent infection.
Learning point: Surgery is mandatory. Ceftolozano-tazobactam and daptomicina can be useful in treating Gram- infection and Gram+ suprainfection. Multiple reconstructive surgeries are possible for managing tissues losses due to subsequent necrosectomy. Trasversostomy is safer than sigmoidostomy when FG is extend to the lower abdominal wall.
References:
1. Sorensen et al. Urol Int. 2016 2.Wong CH et al. Crit Care Med 2004

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09AP01-8
Stevens-Johnson syndrome and toxic epidermal necrolysis – A retrospective analysis of the last eight years.

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Background and Goal of Study: Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are severe muco-cutaneous reactions, usually to drugs, characterized by blistering and epithelial sloughing. They describe phenotypes within a severity spectrum, in which SJS is the less extensive form and TEN is the more extensive, which may be accompanied by multi-organ failure. The incidence is approximately one to two cases per million per year. Skin management may involve a conservative and/or surgical approach and no active therapeutic regime with unequivocal benefit exists. The overall mortality is about 22%. Survivors of the acute illness often develop significant long-term sequelae. The aim of this study was to analyse our experience treating SJS/TEN patients.
Materials and Methods: A retrospective study was carried out by analysing the medical records of consecutive SJS/TEN patients admitted at our Burn Unit from January 2011 to December 2018. A descriptive analysis was performed to determine the demographic data, aetiology and severity index (SCORTEN). Comparisons were analysed with chisquare calculations. A p value inferior to 0,05 was considered statistically significant.
Results and Discussion: Thirty patients were admitted, 12 males (40%) and 18 females (60%) with a median age of 65 years, which 77% had TEN, 10% SJS and 13% overlap syndrome. The overall median length of stay in hospital was 21 days. The median percentage of body surface area involved was 50%. In 37% of patients the aetiology agent stayed uncertain. The most common drugs involved in idiosyncratic reaction induced STS/TEN were allopurinol (23%), beta-lactam (7%), NSAIDs (7%) and phenytoin (7%). The treatment with acetylcysteine was used in 63%, intravenous immunoglobulins in 37% and systemic steroids in 50% of patients. All of them went to conservative treatment measures, 17% to plasmapheresis and 20% to surgical cleaning. The most prevalent complications were infectious (70%), cardiovascular (53%) and respiratory (40%). One case of disseminated intravascular coagulation occurred. Our series showed an overall in hospital mortality of 47%, which was higher than the expected mortality based on SCORTEN (33%).
Conclusions: Due to the high risk of mortality, management of SJS/TEN requires rapid diagnosis, evaluation of the prognosis, identification and interruption of the culprit agent, and specialized supportive care, ideally in an intensive care unit in order to achieve the best outcome.

09AP01-9
Who deserves a Stevens-Johnson syndrome at ninety-year-old?

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Background: Stevens-Johnson syndrome (SJS) is an acute life-threatening mucocutaneous reaction, characterized by extensive necrosis and detachment of the epidermis from the skin.1 The overall incidence is five cases per million per year.2 The mortality is less than 10%.1 We report a case of SJS in an elderly patient due to metamizole.
Case Report: An 90-year-old female came to our urgency department (UD) with a maculopapular rash over 15% of corporal surface area for the past 4 days since she started taking metamizole for treatment of fever and myalgias due to a flu-like syndrome. Diagnosis of SJS was made by plastic surgeons at the UD. Metamizole was withdrawn on the same day and the patient had completely recovered in 10 days. Our therapeutic strategy involved fluid therapy management, analgesic and sedative medications, peptic ulcer prevention, as well as early oral feeding and mobilization and regular cleaning of the skin lesions with application of greasy emollient and topical antimicrobial agent.
Discussion: SJS is a drug-induced phenomenon1, in which the identification of the causative agent may be straightforward as in here where a single drug is implicated, but difficulties are posed when the patient has been exposed to multiple drugs. A latent period between the initial drug intake and onset of SJS always occurs, from 5 to 28 days1, which fits to our scenario. SCORTEN should be calculated within the first 24h1, highlighting the standard of practice at our unit. All patients should be submitted to blood analysis, chest x-ray, tissue biopsy, swabs from lesional skin and organized photographs to show type and lesion extent.1 Yet we didn´t perform a tissue biopsy. Skin management may involve a conservative and/or surgical approach and no therapeutic regime with unequivocal benefit exists.1 We adopt a conservative approach, based on the specialist multi-disciplinary team's daily review.
References:
1. D. Creamer, S.A. Walsh, P. Dziewulski, L.S. Exton, H.Y. Lee, J.K.G. Dart et al. UK guidelines for the management of Stevens-Johnson syndrome/toxic epidermal necrolysis in adults 2016. Journal of Plastic, Reconstructive & Aesthetic Surgery; 2016, (69):119-153.
Learning points: Due to high risk of mortality, management of SJS requires rapid diagnosis, evaluation of the prognosis, identification and interruption of the culprit agent, and specialized supportive care, ideally in an intensive care unit, in order to achieve the best outcome for these patients.

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09AP01-10
Role of platelet and reticulocyte (RET) parameters, measured by new haematological analyser Sysmex XN 2000 and Procalcitonin (PCT) for early diagnosis of sepsis during postoperative period.

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Background and Goal of Study: This study was aimed to investigate the role of platelet and reticulocyte (RET) parameters, measured by new haematological analyser Sysmex XN 2000 and PCT, for early diagnosis of sepsis during postoperative intensive care unit (PICU) stay during the postoperative period in scheduled and urgent surgery. The early diagnosis of sepsis and the establishment of appropriate and timely treatment may both considerably improve the outcome.
Materials and Methods: The study population consisted of 74 adult patients admitted to PICU of Complejo Asistencial de Salamanca between September and December 2018. The inclusion criteria was age ≥18 years and the days after and before ICU admission, all patients were monitored by routine blood tests. The clinical monitoring also entailed the diagnosis of sepsis according to the International Sepsis Definitions Conference guidelines - SOFA score. The study population consisted of 74 ICU patients, 43 of whom were operated of mayor abdominal surgery and 31 patients needed a surgery with suspected infection. All of them we have anthropometric variables, clinical (SOFa, post-surgical complications and so on) and analytical (platelets count (PTL), mean platelet volumen (MVP), percent fraction of immature platelets (IFP%), absolute value IFP, immature reticulocyte fractions (IRF), Ratio VMP/Plaq y PCT, before surgery (M0) and then, at first 24 hours postoperative period (M1). Significance level 0.05. SPSS 21 Program.
Results and Discussion: 24 patients developed sepsis during ICU stay. Septic patients (SP) were 48 (43) years old versus 65 (29) no septic patients (NSP). The MVP value M0 was 10,9 (4,4) in SP versus 9,5 (3,4) in NSP (p= 0,02). IFP value M0 was 5,5% (6) in SP versus 3,55% (p=0,022) NSP. Value IPF M1 was 4,5 (4) in SP 3,6 (3,5) in NSP (p=0,45). The VMP Area under the curve (ROC) for M0 WAS 0.723 (P = 0.008) (VALUE 8.15; SENSITIVITY: 0.93 / SPECIFICITY 0.72); IPF M0 was 0.68 (p = 0.045) and for PCT M0 was 0.74 (p = 0.005) between one group and another. For IPF M1 it was 0.65 (p = 0.05) and for PCT M1 of 0.40 (p = 0.009).
Conclusions: The value of VCM and IPF before surgery and 24 hours later in IFP value can be a useful data for the diagnosis of early sepsis in the perioperative context, with an accuracy slightly lower than procalcitonin, waiting for work with a greater number of cases than the confirm in a more definitive way.

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09AP02-1
Multiorgan failure in autoimmune disease - Case report

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Background: Celiac disease is a complex, multifactorial pathology caused by different factors, such as nutrition, immunological response and genetic factors. Increased levels of celiac disease autoantibodies are often seen in renal disease (1).
Case report: Female, 25 years old, with symptoms of diarrhea, frequent painful urination, high fever and abdominal pain, was admitted to the Intensive Care Unit after she was examinated by abdominal surgeon. After admission at Intensive Care Unit patient was tachydispnoic, tachycardic, pale and with abdominal pain. Chest scan showed pleural effusion and infiltration on both sides. Surgery was performed Laparatomia explorativa. Because of respiratory insufficiency the patient was placed on mechanical ventilation. That day was performed CT scan of the pulmonary artery and the mesenteric blood vessels and abdominal CT scan which showed pyelonephritis at right side, hepatosplenomegalia, signs of periportal oedema and distension of intestines. Urologist made the nephrostom to the right. In the next three days after the controlled abdominal CT scan urologist indicated an operative procedure: Relaparatomia mediana superior et inferior, Nephrectomio l.dex. Patient was further tachycardic, highly febrile, with distend abdomen. Hormone of thyreoid glandulae was done and showed Hypothyroidism subclinical. On 24th of August surgeon indicated an emergency surgical procedure Relaparatomio mediana sup et inf, Adhesyolisis, Gastroentero and enteroentero anastomosis, Coecostomio, Biopsio hepatis because of Suboclussio and Stenosis duodeni. Patient was confirmed with a diagnosis of Celiac disease and her condition improved after correction of appropriate therapy and introduction of gluten-free food. The patient was moved to the Surgery Clinic hemodynamic and respiratory stable.
Discussion: Our case report demonstrates a significantly increased risk of kidney disease among patients with celiac disease. These findings may influence clinical management and primary prevention of kidney diseases in patients with celiac disesase.
References:
1. Del Prete E, Facchiano A, Liò P. Bioinformatics methodologies for coeliac disease and its comorbidities. Minerva Medica 2018 April; 109(2):126-40v
Learning points: Celiac disease may be associated with worse clinical outcome of the renal disease. In the majority of causes the condition may be clinically silent and found only by active case-finding in celiac disease risk groups.

09AP02-2
Epidemiology and mortality of candidemia in high risk surgical patients.

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Background and Goal of Study: Candida bloodstream infections represent an important problem in Intensive Care Units (ICUs). The epidemiology of candidemia is changing with an increase in the proportion of Candida (C.) non-albicans.The aim of this study was to evaluate the epidemiology of IC, the antifungal treatment and mortality in high risk surgical patients.
Materials and Methods: A retrospective review of consecutive adult surgical patients with candidemia between June 1, 2014 and April 30, 2016, was conducted.
Results and Discussion: During this period, a total of 20 cases of Candidemia were identified; 8 women (44%) and 12 men (56%), with a mean age of 75 years (range 68-83). Candidemia occurred a median of 8.2 days after ICU admission. Patients with candidemia had mean ICU stays of 25 days.Fluconazole was the empirical treatment most commonly introduced (65%), followed by anidulafungin (30%) and voriconazole (5%).The most frequently identified species was C. albicans (55%), followed by C. glabrata (44%) and C. krusie (11%). After identification of the causative species and susceptibility testing results, treatment was modified in 4 patients (20%).Overall mortality was 45%, and 3 (30%) of 9 deaths occurred within 48 hours of the detection of candidemia. Mortality was associated with higher APACHE II scores (25 for nonsurvivors vs. 16 for survivors), the presence of a rapidly fatal underlying illness, and sustained positivity of blood cultures.
Conclusions:
-Mortality of invasive candidiasis in ICU remains high.
-Non-albicans Candida species reach almost half of the Candida isolates
-An early fatal outcome promoted by candidemia may be prevented with empirical antifungal therapy.
-All updates to international guidelines recommend echinocandins as an empirical treatment in patients with a high risk of serious sepsis or septic shock.

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09AP02-3
Efficacy of anidulafungin in 60 patients with invasive candidasis

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Background and Goal of Study: Invasive candidiasis (IC) is a frequent and life-threatening infection in critically ill patients. The aim of this study was to evaluate the the efficacy of anidulafungin for the treatment of candidaemia and invasive candidiasis in high- risk surgical patients.
Materials and Methods: A retrospective review of consecutive adult surgical patients with abdominal septic shock between June 1, 2016 and April 30, 2018, was conducted. Preventive anidulafungin therapy was given until resolution of the surgical condition. Mortality was evaluated at end of hospital stay and 30 days
Results and Discussion: During this period, a total of 60 cases of IC were identified;23 women (38%) and 37 men (62%), with a mean age of 66 years (range 35-85). All cases of IC were patients with secondary peritonitis and severe sepsis or septic shock. The most common baseline Candida species were Candida albicans (56%), C. parapsilosis (35%), C. glabrata(16%), C. krusei (8%), and C. tropicalis (5%). Median duration of anidulafungin iv treatment was 14 days. Adverse events (AEs) were consistent with the known AE profile for anidulafungin. In 15% of the isolates, the causative Candida was less susceptible or resistant to fluconazole. All-cause mortality was 26% at the end of hospital and 6% on day 28. However, it was 44 % in patients with candidemia and 80% in patients with Candida Krusei.
Conclusions: Non-albicans Candida species reach almost half of the Candida isolates. Anidulafungin is effective for treatment of candidaemia and invasive candidiasis in a broad patient population. Mortality of invasive candidiasis in ICU remains high and adequate antifungal therapy is necessary to lead a goof outcome.

09AP02-4
The challenge of differential diagnosis of shock in the context of a patient with multiple trauma – case report

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Background: Shock is a frequent clinical situation in the intensive care, which is actually an inadequate tissue perfusion, with a multiple possible ethiologies and with an impact on hemodynamic status and organ functions. In trauma patients, it is important because is the second most common cause of death, after the brain injury. There can be all the possible reasons, separately or even co-exist - from losing blood, particularities of neurologic injuries, hypoxemia, obstructive forms, cardiac injury.
Case Report: This is a case of a 67 years old female patient, with a multiple trauma, victim of a car accident (pedestrian), with complex traumatic lesions – fractures of vertebra (T3-T4), extremities, pelvic, thorax, head injury. On the clinical examination in the ICU, the patient was pale, with cold extremities, hypotensive, initial tachycardia, low urinary output, high lactate, severe anemia, hypoxemia, hypercarbia. The life support was immediately started, concomitant with the complex and invasive monitoring for the diagnosis of the shock – specific invasive hemodynamic monitoring (transpulmonary thermodilution and transesophageal echocardiography), thromboelastometry and serial imagistic exams
Discussion: In ICU was initiated a volume challenge, transfusion and coagulation factors administration, vasopressor support, controlled ventilation. Initially, the hemodynamic status of the patient was hyperdynamic, with increased need of vasopressor, even after the correction of the hemoglobin, lactate and oxygenation. Therefore, it was initiated the cortico-therapy. After 24h, there is an improvement in the hemodynamic status, clinical signs and lab results. This response to the treatment was a statement for the diagnosis of neurogenic shock. In conclusion, we were confronted with a complex heterogenic case, with intricate signs of traumatic, hypovolemic and neurogenic shock, which needed complex monitoring and treatment

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09AP02-5
The risk of clostridium difficile infections in hepatic patients from intensive care

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Background and Goal of Study: The chronic hepatitis are complex diseases which affect the whole body. The hepatic patient requires numerous hospitalizations due to complications, so is at risk for Clostridium difficile infection (CDI). There are few data about the incidence of CDI in hepatic patients in Intensive Care and about the predisposing risk factors.
The present study aimed to evaluate the incidence of CDI in hepatic patients (aggravated chronic hepatitis, decompensated liver cirrhosis, hepatic encefalopaty, hepatocelular carcinoma) who spent minimum three days in the Intensive Care Unit (ICU) and of the associated risk factors.
Materials and Methods: This retrospective study included 113 hepatic patients (medium age 60.65 years) admitted with severe diarrhea in the ICU of the County Clinical Emergency Hospital of Craiova, Romania for hidric re-equilibration and stabilization. We extracted from patients' electronic records the demographic, clinical and laboratory data. All patients were tested for CDI by fecal CDI immunochromatographic test for GDH and toxins A and B. The ascitis fluid was microbiologically tested using the automated system Vitek2 (Biomerieux). The risk factors for CDI were evaluated by chi squared test, multivariate logistic regression and survival analysis.
Results and Discussion: The CDI test was positive for 38 patients (33.68%). This is not surprising as cirrhotic patients have an increased risk for bacterial infections. From the positive patients 71.05% were positive both for Toxin A and Toxin B, 23.68% only for Toxin A and 5.26% only for Toxin B. The incidence of CDI didn't differed significantly between the men and women (Risk Ratio - RR=0.88). The greatest risk for CDI had the patients with hepatic cancer (Odds Ratio - OR=2.41), hepatic encefalopaty (OR=1.50), cirrhosis with ascitis (OR=1.29), cardiovascular disease (OR=1.27) and diabetes (OR=2.26). The CDI was more frequent in patients hospitalized during the previous month (RR=1.22). We isolated from ascitic fluid: Escherichia coli, Klebsiella, Proteus, Enterococcus, Acinetobacter, Methicillin-Resistant Staphylococcus aureus and Streptococcus. The survival analysis showed that only hepatic cancer and diabetes influenced the risk of CDI (log-rank test P=0.007 and 0.013, respectively).
Conclusions: CDI should be suspected in all hospitalized cirrhotic patients with diarrhoea.

09AP02-6
Ventilator Associated Pneumonia Characteristics in a Burn Intensive Care Unit

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Background and Goal of Study: Ventilator-associated pneumonia (VAP) is a frequent complication among acute burn patients but the diagnosis still remains a major challenge. Although Clinical Pulmonary Infection Score has been used successfully in medical and surgical patients, the systemic inflammation in this population limits its utility. Invasive cultures, although imperfect, may still be the most reliable diagnostic tool for VAP diagnosis and non-bronchoscopic alveolar lavage is a reliable alternative. The goal of our study was to review the incidence of VAP in our burn intensive care unit (BICU) from January 2017 to June 2018.
Materials and Methods: We retrospectively identified all patients that were mechanically ventilated and developed VAP based on invasive cultures. Data collected included age, total body surface area (TBSA), Baux score, diagnosis of inhalation injury, mechanism of injury, BICU stay, development of VAP, identified bacteria and mortality.
Results and Discussion: In the eighteen months of analysis, a total of 40 burn patients required invasive mechanical ventilation, and 19 (47,5%) developed VAP. The most common isolated bacteria were *Pseudomonas aeruginosa* (n=6, 31,6%) and *Klebsiella pneumoniae* (n=6, 31,6%). More rarely, other isolated strains included *Methicillin-susceptible Staphylococcus aureus*, *Enterococcus faecium*, *Enterobacter cloacae*, *Acinetobacter baumannii* and *Serratia marcescens*. The mean age (52,4 ± 18,9 years), mean length of BICU stay (37,8 ± 27,3 days), TBSA (23,9 ± 19.2%) and Baux score (76,4 ± 22,8) of the patients with VAP were higher than the non-VAP age (51 ± 18,9 years), mean length of BICU stay (36,6 ± 28 days), TBSA (22,7 ± 19,6%) and Baux score (73,7 ± 23,1). The most common mechanism of burn injury was by flame (n=17, 89,5%) and inhalation injury was present in 13 (68,4%) of the VAP patients, though only in 10 (47,6%) of non-VAP patients. Mortality occurred in 6 (31,6%) VAP patients and in only 1 (4,8%) non-VAP patient.
Conclusions: Burn patients with VAP had larger burn injuries, more inhalation injuries, prolonged mechanical ventilation and longer BICU stay. Mortality was also higher in burn patients who developed VAP. The diagnosis was based on invasive cultures but the true incidence of burn respiratory infections remains to be determined.

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09AP02-7
Systemic pharmacokinetics and safety of high-dose nebulized colistimethate sodium in critically ill patients with nosocomial pneumonia

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Background and Goal of Study: Nebulized colistin is a rescue therapy for Extremely Drug Resistant (XDR) Pseudomonas pneumonia treatment. Nebulized colistimethate sodium (CMS), the prodrug, aims to achieve high antibiotic concentrations at the focus of infection while minimizing systemic toxicity. However, little is known about the pharmacokinetics (PK) and safety of high CMS nebulized doses. The objective was to evaluate the safety and the plasmatic levels of formed colistin in critically ill patients treated (empiric and/or directed) with high doses nebulized CMS.
Materials and Methods: Prospective observational, single-center, PK study was performed in critically ill patients admitted to the surgical intensive care unit of a third-level academic hospital from January 2017 until April 2018. Patients were adults with nosocomial pneumonia treated with high-dose nebulized CMS (3 MIU/8h or 5 MUI/8h) for at least 72 hours. Therapeutic drug monitoring of formed colistin concentrations in plasma at 1h and 8h after CMS nebulization was performed. Variables analysed were: CMS data (dose and PK), clinical data (severity status at admission, renal function, pulmonary diseases), mechanical ventilation, type of nebulizer and adverse events potentially related to CMS (bronchospasm, neurotoxicity and nephrotoxicity).
Results and Discussion: 27 patients were included: 15 in the 3 MIU/8h group and 12 in the 5 MIU/8h group. Median (interquartile range) concentrations of colistin in plasma at 1h and 8h after CMS administration were 0.20 (0.11-0.24) and 0.17 (0.11-0.32) µg/ml in the 3MIU/8h group, and 0.24 (0.12-0.44) and 0.23 (0.11-0.44) µg/ml in the 5MIU/8h, without statistical differences between groups. Plasma colistin concentrations were undetectable (< 0.1 mg/L) in 8 (53.3%) of patients in the 3 MIU/8h group and in 7 (58.3%) of patients in the 5 MIU/8h group. Nebulized CMS therapy was well tolerated in all patients and neither bronchospasm nor clinical features suggestive of neurotoxicity were observed. Renal impairment was observed in 3 patients in each group, both probably not related to CMS treatment.
Conclusions: The systemic absorption of high doses of nebulized CMS was minimal and the tolerability was excellent. These results support the idea of the absence of systemic toxicity after the administration of nebulized CMS, even at very high doses.

09AP02-8
Critical Care and early diagnosis of severe Pneumocystis jirovecii infection-an emerging threat to patients with Rheumatoid arthritis

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Background: Pneumocystis jirovecii(known as Pneumocystis carinii) is an important opportunistic fungal pathogen in humans who have depressed immune function [1].The onset of PCP in RA patients often presents with abrupt severe oxygenation impairment and this complication is potentially life threatening.
Case Report: A 45 years old man with history of RA from 5 years ago, for the last five months, has been taking Tocilizumab. The patient has been admitted to the ICU with hypoxemic respiratory insufficiency, symptoms such as fever, non-productive cough, orthopnea, peripheral cyanosis. The patient was intubated, sedated and mechanically ventilated. The rheumatologist warned of possible complications from the biological treatment Tocilizumab. A diagnosis of PCP was detected by chest X-ray which has shown that patient had an interstitial pneumonia and chest CT there are diffuse zones of consolidation with multiple lung cavitations and positivity for PCP in the sputum and bronchoalveolar lavage fluid by PCR. The patient received trimethoprim (20 mg/kg per days)sulfamethoxazole for 7 days and methylprednisolone for 3 days. Acute circulatory failure the patient demanded continuous infusion of vasopressive agents. Prone position was applied four times during the mechanical ventilation. After 72 hours on assisted ventilation, gas exchange improved, patient was extubated, seven days later patient was discharged home.
Discussion: Early diagnosis of PCP remains a challenge to the intensivist. Little is known about the most severe forms of Pneumocystis jiroveci pneumonia in patients with RA who receiving immunosuppressive treatment with Tocilizumab. PCP induced acute respiratory failure remains a leading cause of ICU admission in patients with RA, patients need mechanical ventilation and prophylaxis with trimethoprim-sulfamethoxazole ,which generally is associated with a very high 'in-hospital' mortality. Atypical infection, such as Pneumocystis pneumonia, tuberculosis, and fungi, should be considered in all rheumatological patients on treatment who present to intensive care. Intensivists should be aware of the rare but specific rheumatological emergencies.
References:
1. Stringer JR, Beard CB, Miller RF. Spelling Pneumocystis jirovecii, Emerg Infect Dis , 2009, vol. 15 pg. 506
Learning points: The sequelae of the immunosuppressive medications used to treat RA, can also cause catastrophic complications and can pose many diagnostic and therapeutic challenges to the intensivist.

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09AP02-9
ABT-491, a platelet activating factor receptor antagonist has a synergistic effect with epinephrine in a model of lethal ovalbumin-induced anaphylactic shock

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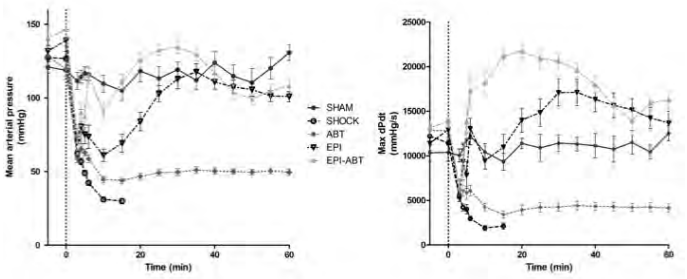
Background and Goal of Study: Anaphylaxis is a severe life threatening systemic hypersensitivity reaction. Epinephrine is the first line recommended treatment. High doses of epinephrine are associated with cardiac complications (arrhythmia, stress cardiomyopathy) and significant morbidity. Platelet activating factor (PAF) is secreted during anaphylactic shock (AS) and could represent a new therapeutic target. The aim of our study was to assess the effect of ABT-491, a PAF-receptor inhibitor, on hemodynamic and epinephrine consumption during AS.
Materials and Methods: This was an experimental study on ovalbumin-sensitized brown Norway rats. Shock was induced with 1mg intravenous ovalbumin. Rats were randomly assigned in 5 groups: SHAM (vehicle only), SHOCK (no treatment), ABT (ABT-491 1mg/kg), EPI (epinephrine 5µg in bolus than 10µg/kg/min in continuous infusion followed by a reduction protocol) and EPI-ABT (both treatments). Mean arterial pressure (MAP) and maximal dPdt were recorded continuously. Treatments were injected 3 minutes after shock induction.
Results and Discussion: Fifty rats were assigned in five groups (n=10 per group). Ovalbumin injection resulted in a severe decrease in MAP and maximal dPdt in all shocked groups (Figure 1). All rats from the SHOCK group died within 20 minutes whilst all rats from the ABT group survived until the end of the experiment. Total epinephrine consumption was significantly lower in the EPI-ABT group compared to EPI alone (314 ± 67 µg/kg vs 475 ± 69 µg/kg, p<0.001). EPI injection resulted in a significant increase in MAP and maximal dPdt. Time to reach a MAP target of 100 mmHg was significantly shorter with EPI-ABT than with EPI alone (13±5 min vs. 23±7 min, p<0.001).

Conclusions: ABT-491 had a synergistic effect with epinephrine and allowed a significant reduction in epinephrine consumption. ABT-491 also enhanced the effect of epinephrine on cardiac function with a significant and early improvement in maximal dP/dt. Its use during AS could reduce epinephrine-related complications.
Figure 1: Time course of MAP and maximal dPdt in SHAM, SHOCK, ABT, EPI and EPI-ABT groups (n=10 per groups)



09AP03-1
Stimulation of angiotensin type 2 receptor attenuates organ injury in rats with polymicrobial sepsis.

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Background and Goal of Study: Sepsis may be complicated by a variety of conditions such as septic shock, vascular hyporeactivity to vasopressors, and immune disturbance. These conditions can contribute to poor organ perfusion and multiple organ dysfunction syndrome, which is associated with high mortality even after advanced therapy. Angiotensin II, the biologically active component of renin-angiotensin system, acts through two receptor subtypes, angiotensin II receptor type 1 receptor (AT1R) and 2 receptor (AT2R). AT2R activation counteracts most effects of AT1R by inhibiting cell proliferation and differentiation, promoting vasodilation, and reducing inflammation and oxidative stress. In vitro study, selective AT2R stimulation attenuated the expression of TNFα, IL-6, and IL-10 after lipopolysaccharide challenge in human monocytes. However, data on regulative properties of this receptor on the sepsis response are poor. The purpose of the present study was to evaluate the effect of AT2R agonist on hemodynamics and organ function in rats with sepsis induced by cecal ligation and puncture (CLP).
Materials and Methods: The Wistar rats are treated with CLP to induce sepsis. In this study, 50 μg/kg of CGP-42112 (CGP, a selective AT2R agonist) was intravenously infused at the 3 hours after the procedure of CLP. After 24-hour hemodynamic observation, the lungs, livers and kidney were harvested. Then we measure the arterial blood pressure, heart rate, and organ function index of lung, liver and kidney. In additional, we also record the survival rate in each group.
Results and Discussion: Our results revealed that CGP could significantly increase the survival of sepsis at 24 hours after CLP, compared to the CLP alone group. CGP attenuated CLP-induced decreased arterial pressure, vascular hyporeactivity to norepinephrine and organ dysfunction, indicated by diminished biochemical variables and fewer histological changes. In addition, reduced blood flow in tongue in CLP rats was increased by CGP. Moreover, nuclear NFκB expression in liver and plasma nitrate/nitrite levels were significantly lower in the CGP-treated CLP rats.
Conclusions: CGP prevented circulatory failure and attenuated multiple organ dysfunction in septic rats induced by CLP. These beneficial effects of CGP may be attributed to its anti-inflammation by reducing liver NFκB expression and plasma nitrate/nitrite levels. Therefore, an AT2R agonist could be a potential therapeutic adjuvant in sepsis.

09AP03-2
Microcirculatory Impairment and Metabolic Dysregulation of Coronary Blood Flow in a pig model of Sepsis.

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Background and Goal of Study: In normal conditions, coronary blood flow (CBF) can triple when required. This maximal increase is the coronary flow reserve (CFR) and occurs mainly in microcirculation. Microcirculation damage and endothelial dysfunction have already been described in sepsis, but their involvement in coronary circulation still needs to be investigated. We hypothesized that this metabolic control of CBF is impaired in sepsis. The present study aimed to assess microcirculatory and endothelial vasomotor function in an experimental model of faecal peritonitis sepsis in pigs.
Materials and Methods: Pigs were randomised either in Septic- or Sham-group. Measurements were recorded at baseline and 12 hours after peritonitis induction. After anaesthesia induction, a pressure/flow wire (Volcano ComboWire®) was placed in the mid-portion of the left anterior descending coronary artery under fluoroscopy guidance. Intracoronary distal pressure (Pd), baseline average peak flow velocity (bAPV) and peak average peak flow velocity (pAPV) during maximal dilatation were recorded and coronary flow velocity reserve (CFVR=pAPV/bAPV) and hyperaemic microvascular resistance (HMR=Pd/pAPV) to flow were calculated. Hyperaemia was obtained by intracoronary bolus of 3 mL adenosine (90 μg) and 3 mL bradykinin (10-6M) to test respectively the microcirculatory endothelium-independent and endothelium-dependant vasomotor response. Results are presented as mean ± SD. Statistical analysis were obtained using a two-factor ANOVA for repeated measurements followed by Tukey-Kramer's test.
Results and Discussion: In Sham-group (n=7), all coronary flow velocity-derived indices remained constant. In Septic-group (n=7), Pd and bAPV remained constant but after 12 hours of sepsis, CFVR significantly decreased compared to baseline (2.0 ± 0.3 vs. 3.3 ± 0.6, p<0.001), related to a significant decrease of pAPV (42.2 ± 12.1 vs. 63.8 ± 20.3 cm/sec., p=0.01) when maximal vasodilatation was achieved using adenosine. Similarly, HMR was significantly increased with sepsis (1.9 ± 0.5 vs 1.3 ± 0.4 mmHg/cm/sec., p=0.01). Same results were found when hyperaemia was induced by bradykinin to test endothelial function, with no difference compared to adenosine.
Conclusions: Faecal peritonitis sepsis decreased coronary flow reserve and increased microvascular resistance to flow during maximal vascular dilatation in pigs. This microcirculatory impairment was not related to endothelial dysfunction.

09AP03-3
Antibiotic Resistance in Patients with Infected Necrotizing Pancreatitis: what Can We Change?

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Background and Goal of Study: Infected necrotizing pancreatitis (INP) is associated with a high mortality and morbidity. As our own experience shows, the prophylactic use of antibiotics (AB) in acute pancreatitis (AP) only leads to the formation of resistant of microorganisms; therefore the purpose of antimicrobial agents is recommended only with documentary confirmation of infection. We analyzed the microbiological landscape of pathogens in patients with INP and to assess their sensitivity and resistance to the antimicrobial agents.
Materials and Methods: In 2016-2017, 25 patients with INP (males - n = 16 (64%), females - n = 9 (36%), age 52±12 years)) were treated: Ranson scale 3.3 ± 2.3, the length of stay in ICU - 12 ± 2.3 days, in the hospital - 31,1 ± 3,7 days. During the entire period of treatment, 178 crops were performed for all patients (drainages - n=98, urine - n=42, tracheal aspirates - n=38); which were repeated every 3-4 days for the purpose of control agent and antibiotics sensitivity. Starting empirical antibiotic therapy (AT) was performed with the purpose of cephalosporin's III generation.
Results and Discussion: among the main microbiological agents in patients with INP the leading place is occupied by enterobacteria and gram-negative microorganisms. Due to their low sensitivity to beta-lactams, aminoglycosides, fluorinated quinolones, the spectrum in the choice of AT is narrowed, requiring clinicians to use expensive AB (meropenem, colistin, taigecycline, vancomycin). The received sensitivity of the main pathogens to cephalosporin's suggests a possible absolute displacement of them in the cases of INP, despite their known activity in relation to the listed pathogens.
Conclusions: Resistance to antimicrobial drugs jeopardizes effective prevention and treatment of a growing range of bacterial infections. Clear criteria for the appointment of AT in patients with AP must be observed, since the inappropriate use of antimicrobial drugs for the purpose of prevention sharply reduces the medical spectrum of antimicrobial agents, thus forming intrahospital resistivity that affects the length of stay of patients in a hospital, and also significantly more expensive medical treatment.

09AP03-4
Epidemiology and prognostic utility of cellular components of hematological system in sepsis

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Background and Goal of Study: The enormous morbidity associated with sepsis and consequent organ failure necessitates resuscitation and treatment at the earliest. Equally important, is the prediction of outcome at admission in order to differentiate patients with more severe disease and direct therapies accordingly. The goal of our study was to look for reliable, affordable, and timely available prognostication markers of sepsis amongst the various hematological variables at hand in a low resource setting.
Materials and Methods: In this observational prospective study, 130 adult patients admitted with sepsis to a mixed medical cum surgical ICU were recruited. The hematological variables under study were total leucocyte count, differential leucocyte count, absolute leucocyte count, platelet count, platelet distribution width, neutrophil to lymphocyte ratio and platelet to lymphocyte ratio which were noted at day 1 (within 24 hours) and day 3 (after 72 hours) of admission. Based on day 28 status, patients were divided into 2 groups namely survivors (n=58) and non survivors (n=71). The variables were compared between two groups and using a binary regression linear model, these variables were evaluated as markers for day 28 mortality.
Results and Discussion: Thrombocytopenia on day 1 and low eosinophil count on day 3 can predict day 28 mortality (p=0.02 and p= 0.04, respectively). Although some of the variables under study were significantly different (p <0.05) between survivors and non survivors on day 1 or day 3 or both, there was no correlation between them and mortality at day 28. Thrombocytopenia in sepsis, which occurs due to multiple immune and non-immune mechanism, underlines deterioration of function of the overall hematological system and is already a part of SOFA score. Eosinopenia on day 3 possibly denoted continued depression of bone marrow due to infectious assault. Both platelet and eosinophil count are widely available and low cost lab parameters. Our study was limited by the fact that day 1 blood samples were occasionally obtained after fluid resuscitation which may have altered the lab results.
Conclusions: Thrombocytopenia on day 1 and eosinopenia on day 3 may be predictive of day 28 mortality in sepsis. Further multicenter studies are needed to substantiate these findings.

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09AP03-5
The effect of recombinant thrombomodulin on patients with sepsis: retrospective cohort study, pilot analysis

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Background and Goal of Study: Recombinant thrombomodulin (rTM) has been expected as an effective therapeutic agent for sepsis-induced disseminated intravascular coagulation (DIC). In animal experiments, it is suggested that rTM protects vascular endothelial cells and expected to avoid organ microvascular damage, however, this has not been clarified yet. A sequential organization failure assessment (SOFA) score is generally used as an index for evaluating multiple organ failure (MOF). Recent studies have revealed that the trajectory from baseline score (i.e. ΔSOFA) during ICU stay is related to patient severity and mortality. Thus, we investigate the effect of rTM on patients with sepsis in our hospital and its influence on multiple organ dysfunction and the contribution of rTM to improving patient severity.
Materials and Methods: A retrospective cohort study on rTM administration for patients with sepsis who entered the ICU from April to September 2017. The primary end point was change in SOFA score (ΔSOFA) from ICU admission at day7. The secondary endpoints were as follows: the incidence of DIC, DIC score at ICU admission and day7, 28-day mortality and in-hospital mortality. Student's t test or Mann-Whitney tests were used to compare continuous variables, Pearson chi-square test was used to compare categorical variable.
Results and Discussion: 20 patients were included in the period. rTM was administered to 10 subjects (rTM group) and was not to the remaining 10 subjects (Control group). The age was 67.9±18.7 vs. 78.8±12.1, the SOFA score was 11.6±0.6 vs. 7.4±4.4 (p<0.05) at ICU admission, 9.1±5.8 vs. 6.0±4.3 (p=N.S.) at day7. ΔSOFA was 2.2±3.2 vs. 2.3±4.2 (p=N.S.). DIC incidence were 5 patients vs. 2 patients at ICU admission, 4 patients vs. 5 patients at day7, the DIC score was 4.1±2.6 vs. 1.8±1.8 (p<0.05), 3.1±2.4 vs. 3.8±1.6 (p=N.S.) at day7. 28-day mortality was 50% vs. 10%, in-hospital mortality was 60% vs. 40%. The mean age in the rTM group was slightly lower than in the control group. ΔSOFA did not show any statistical difference. In the rTM group, the incidence of DIC was suppressed while the incidence increased in the control group. Although the mortality rate was high in the rTM group, this result may be due to the severity of the illness.
Conclusion: Although rTM inhibited the incidence of DIC, does not affect a lot for ΔSOFA. Further studies are needed for the effect on MOF.

09AP03-6
Experience in using terlipressin in refractory septic shock.

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Background: Septic shock is the most common cause of death in intensive care units. The mortality rate ranges from 40 to 60%. As practice shows, to achieve adequate blood pressure and tissue perfusion in patients with refractory septic shock, it is not enough just to infuse crystalloids and vasoactive drugs. However, in recent years, the use of terlipressin has become a very promising treatment for refractory shock.(1)
Case Report: We present a case of a 55-year-old male diagnosed with penetrating gunshot wound in the abdominal cavity with damage to the duodenum. Retroperitoneal phlegmon. Extended peritonitis. Emerging necrosis of ascending colon. Septic shock. Pneumonia. The patient condition was critical, hemodynamics was unstable, against the background of norepinephrine titration of 3 μg/kg/min, MAP was 45 mmHg, blood lactate was 17 mmol/L. The patient was brought to the operating room, sanitation of the abdominal cavity, a revision, a right-sided hemicolectomy were conducted, and VAC dressing was applied. After 6 hours from the moment of admission, the patient was still in septic shock resistant to therapy it was decided to administer terlipressin 1 mg IV bolus every 4 hours, hydrocortisone 100 mg IV bolus every 8 hours. The administration of terlipressin and hydrocortisone was discontinued 24 hours after the start, positive dynamics in the clinical picture, stabilization of shock and hemodynamic markers, reduction of dosage norepinephrine to 0.05 μg/ kg/min, of lactate level to 1.6 mmol/L were noted. On the 7th day, the patient was transferred to the surgical department for further treatment, rehabilitation and recovery for reconstructive surgery.
Discussion: Currently, there is a tendency of de-catecholamination of patients, since catecholamines have a detrimental effect on the immune function, they stimulate bacterial growth, and cause myocardial damage. This clinical example and the literature review show the benefits of using terlipressin in combination with norepinephrine in refractory septic shock.
References: Russell JA. Vasopressin in vasodilatory and septic shock. Curr Opin Crit Care. 2007;13:383–391.
Learning points: The use of terlipressin reduces the need for norepinephrine, thereby reducing the adverse effects of high doses of catecholamines and reducing the mortality in patients with septic shock.

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09AP03-7
Prediction of mortality in adult patients with sepsis, using six novel biomarkers: a systematic review and meta-analysis.

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Background and Goal of Study: Sepsis requires rapid recognition and urgent treatment. But at the same time, the use of biomarkers to help identify patients with a high risk of mortality is appealing. The aim of our systematic review and meta-analysis was to assess the prognostic value of angiopoietin-1 (Ang-1) and 2 (Ang-2), high mobility group box 1 (HMGB1), soluble receptor for advanced glycation endproducts (sRAGE), soluble triggering receptor expressed on myeloid cells 1 (sTREM1), and soluble urokinase-type plasminogen activator receptor (suPAR) for all-cause mortality in adult patients with sepsis.
Materials and Methods: The systematic review focused exclusively on observational studies of adult patients with sepsis, any randomized trials were excluded. For the meta-analysis, only studies which provide biomarker concentrations within 24h of admission in sepsis survivors and non-survivors were included. For pooling of the results, reported means with standard deviations (SD) were used for calculations. Results are presented as forest plots of pooled mean differences (MD) between non-survivors and survivors with 95% confidence interval for each of the six biomarkers. Studies not included in the quantitative analysis are narratively summarized.
Results and Discussion: The qualitative analysis was performed with 44 studies of which 28 were part of the meta-analysis. The pooled mean differences in biomarker concentration (non-survivors – survivors), measured at onset of sepsis, are listed as follows:

1. Ang-1: −2.9 ng/ml (95%CI: −4.1 to −1.7, p<0.01)
2. Ang-2: 4.9 ng/ml (95%CI: 2.6 to 7.1, p<0.01)
3. HMGB1: 1.2 ng/ml (95%CI: 0.0 to 2.4, p=0.05)
4. sRAGE: 1002.8 pg/ml (95%CI: 628.2 to 1377.3, p<0.01)
5. sTREM-1: 86.8 pg/ml (95%CI: 2.4 to 171.1, p=0.04)
6. suPAR: 5.2 ng/ml (95%CI: 4.5 to 6.0, p<0.01)

ROC analyses for the prediction of mortality according to baseline (≤24h of admission) biomarker concentration further support the utility of Ang-1, Ang-2, and suPAR, with AUCs of 0.620 to 0.778, 0.632 to 0.960, and 0.670 to 0.788, respectively. The other biomarkers had lower AUCs: 0.570 to 0.610 for HMGB1, and 0.444 to 0.827 for sTREM-1. For sRAGE, we found a single AUC of 0.660.
Conclusions: Ang-1, Ang-2, and suPAR provide beneficial prognostic information about mortality in adult patients with sepsis. The further development of standardized assays and the assessment of their performance when included in panels with other biomarkers may be recommended.

09AP03-8
The relationship of endothelial glycocalyx degradation and sepsis–induced pulmonary edema.

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Background and Goal of Study: Pulmonary endothelial dysfunction plays a major role in septis-induced lung injury. Sepsis-associated endothelial glycocalyx (EG) degradation results in release of inflammatory mediators, expression of adhesion molecules and alteration of the alveolar-capillary barrier followed by increased permeability, impairment of alveolar fluid clearance and pulmonary edema. The aim of our study was to assess the relationship of EG with severity of pulmonary edema in patients with septic shock.
Materials and Methods: We enrolled 24 ICU patients with diagnosis of septic shock into a single-centre prospective observational study. The components of EG including Heparan Sulfate Proteoglycan (HSPG) and Syndecan-1 (S1) were assessed (ELISA Kits for HSPG, SDC 1, USA) at the start of study, at 2 hrs after the fluid load test (FLT) and at 24 hrs after FLT. The hemodynamic and volumetric variables, blood gases and biochemical parameters were measured at all three stages of the study. The statistical analysis was performed using Wilcoxon rank test and ANOVA, for correlation analysis we used Spearman's rho. Data are presented as median (25th–75th percentiles). p values < 0.05 were regarded as statistically significant.
Results and Discussion: The concentration of HSPG at 24 hrs after FLT correlated with the values of extravascular lung water index (EVLWI) immediately after FLT (rho = 0.66, p = 0.006) and at 1 (rho = 0.71, p = 0.004), 2 (rho = 0.78, p = 0.002), and 6 hrs (rho = 0.73, p = 0.004) after FLT. The concentration of S1 at 24 hrs after FLT correlated with pulmonary vascular permeability index (PVPI) at 6 hrs (rho = 0.54, p = 0.02) after FLT.
Conclusions: After fluid load in septic shock, the accumulation of extravascular lung water during capillary leak syndrome is associated with subsequent degradation of EG components
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09AP03-9
LCN2 gene expression levels correlate with organ failure and septic shock development in infected surgical patients

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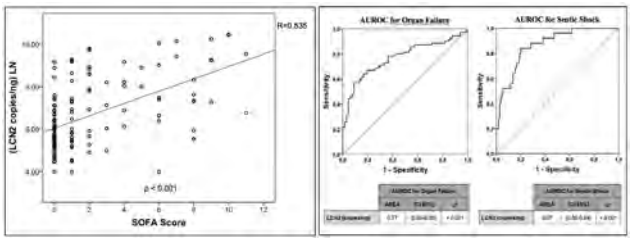
Background and Goal of Study: Sepsis is a leading cause of morbidity and mortality in surgical patients. The presence of an organ dysfunction caused by a dysregulated host response to infection is now considered a central event in the pathogenesis. Sepsis represents the major cause of death among critically ill patients, constituting an important public health problem. The aim of this study is to devise a "molecular equivalent" to Sequential Organ Failure Assessment (SOFA) score, which could identify organ failure and septic shock in an easier, faster and more objective manner, based on the evaluation of Lipocalin-2 (LCN2/NGAL) gene expression levels by using droplet digital PCR (ddPCR).
Materials and Methods: Gene expression levels of LCN2 were quantified by ddPCR in blood from 139 surgical patients with a diagnosis of infection. Spearman analysis was used to evaluate if LCN2 correlated in a significant manner with SOFA score. Area under the receiver operating curve (AUROC) and multivariate regression analyses were employed to test the ability of LCN2 to identify organ failure and septic shock.
Results and Discussion: Spearman analysis evidenced that there was a positive, significant correlation between LCN2 gene expression levels and SOFA score (Figure 1). AUROCs analyses showed that LCN2 presents a good diagnostic accuracy to detect both organ failure and septic shock (Figure 2).



In the multivariate regression analysis, patients showing LCN2 gene expression levels over the Optimal Operating Points (OOPs), identified in the AUROCs, revealed a higher risk of developing both organ failure (Table 1) and septic shock (Table 2).

	Multivariate analysis			Multivariate analysis for OOP		
	OR	[CI 95%]	p	OR	[CI 95%]	p
Age	1.01	[0.99-1.03]	0.249	1.01	[0.99-1.04]	0.178
Cancer	0.57	[0.12-2.69]	0.480	0.93	[0.22-4.06]	0.928
Immunosuppression	5.80	[0.64-52.29]	0.117	6.42	[0.72-57.18]	0.096
Abdomen focus	0.26	[0.09-0.79]	0.014	0.33	[0.12-0.94]	0.037
Surgical focus	0.95	[0.25-3.68]	0.941	1.28	[0.35-4.62]	0.708
LCN2 (copies/ng) Ln	1.91	[1.36-2.68]	< 0.001	-	-	-
LCN2 OOP (640 copies/ng)	-	-	-	5.55	[2.28-13.51]	< 0.001

Table 1. Multivariate analysis for evaluating the risk of organ failure based on the LCN2 gene expression levels.

	Multivariate analysis			Multivariate analysis for OOP		
	OR	[CI 95%]	p	OR	[CI 95%]	p
Age	1.03	[0.96-1.11]	0.382	1.02	[0.95-1.09]	0.649
Chronic cardiac disease	0.87	[0.10-7.33]	0.896	1.56	[0.20-12.08]	0.668
Cancer	3.38	[0.25-45.01]	0.356	8.70	[0.74-102.63]	0.086
Hypertension	12.68	[1.27-130.50]	0.031	6.98	[0.83-58.41]	0.073
SOFA Score	1.95	[1.38-2.74]	< 0.001	2.10	[1.46-3.03]	< 0.001
LCN2 (copies/ng) Ln	2.72	[1.21-6.11]	0.015	-	-	-
LCN2 OOP (1464 copies/ng)	-	-	-	13.34	[1.71-104.31]	0.014

Table 2. Multivariate analysis for evaluating the risk of organ failure based on the LCN2 gene expression levels.

Conclusions: Quantifying LCN2 gene expression levels by ddPCR is a promising strategy to enhance organ failure detection and septic shock identification in surgical patients with infection.

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09AP03-10
Effects of dexmedetomidine on intrapulmonary oxygenation and gas exchange in patients with sepsis undergoing abdominal cleaning focus of infection

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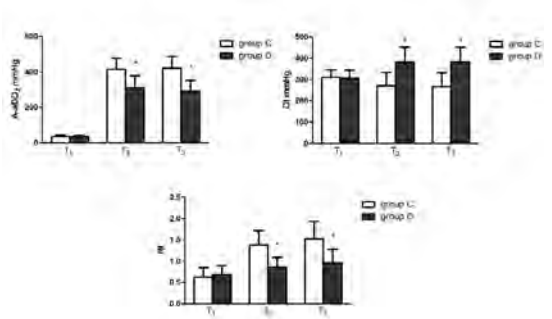
Background and Goal of Study: Acute lung injury (ALI) is a frequent complication of sepsis. Dexmedetomidine has been proven to attenuate sepsis-induced acute lung injury. In the present study, we investigated the effects of dexmedetomidine on A-aDO_2, OI and RI in patient with sepsis undergoing abdominal cleaning focus of infection.
Materials and Methods: Fifty patients (male 27 and female 23, BMI 18~30kg•m^{-2}, ASA III-IV, aged 18~65 years old) with sepsis requiring abdominal cleaning focus of infection under general anesthesia were involved. Patients were randomly divided into Dexmedetomidine group (group D, n=25) and control group (group C, n=25). In group D, patients received a loading infusion of Dexmedetomidine (1μg•kg^{-1}) intravenously for 20min before induction of anesthesia and followed by a maintenance infusion [0.5μg•□kg•h□$^{-1}$] until the end of the surgery. In group C, the patients received matching placebo (equal volume of normal saline). Arterial blood samples were sampled before anesthesia 20 min (T_1), after irrigation of the abdominal cavity 5 min (T_2) and at the end of surgery (T_3) for the PO_2, PCO_2, A-aDO_2, OI and RI by using blood gas analyzer.
Results and Discussion: There was no statistical significance on A-aDO_2, OI and RI at T_1 between the two groups. Comparing with T_1, the A-aDO_2 and RI were significantly increased in the two groups at T_2 and T_3, but the increase was significantly greater in group C ($P<0.05$). OI was significantly increased in group D than that in group C at T_2 and T_3 ($P<0.05$). These results demonstrated that Dexmedetomidine can improve A-aDO_2, OI and RI in patient with sepsis undergoing abdominal cleaning focus of infection.
Conclusions: Dexmedetomidine can improve the intrapulmonary oxygenation and gas exchange in patients with sepsis undergoing abdominal cleaning focus of infection, which maybe has the effect of lung protection.



09AP04-1
The influence of infusion therapy of different composition on the dynamics of cerebral circulation in patients with acute ischemic stroke.

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Background and Goal of Study: Taking into account the multifaceted nature of the pathogenesis of ischemic damage to the brain, the pharmacological stroke correction should simultaneously include the effect on the main pathogenetic links of ischemia, which can be ensured by conducting adequate infusion therapy. Infusion therapy is a fundamental component of intensive care of patients with acute ischemic stroke (AIS). The question of infusion therapy in patients with AIS is still not resolved in particular, such as: optimal composition, volume, choice and dose of drugs, qualitative composition of solutions. The goal of the work was a characteristic of the effect of 0.9% NaCl, HES 130, HAES-LX-5% and mannitol 15%, on the state of cerebral hemodynamics in patients with acute ischemic stroke.
Materials and Methods: The study included 100 patients with AIS. As the investigated solutions were used: isosmolar 0.9% NaCl, hyperosmolar mannitol 15%, colloid-isoosmolar HES 130, colloid-hyperosmolar HAES-LX-5%. The control group received only 0.9% NaCl for 7 days of observation compared with groups: 0.9% NaCl+HES 130, 0.9% NaCl+HAES-LX-5%, 0.9% NaCl+mannitol 15%. Evaluation of cerebral hemodynamic was performed using doppler ultrasound of cerebral arteries. On the basis of the analysis of the obtained volumetric blood flow parameters in the internal carotid and vertebral arteries, we evaluated the total cerebral blood flow (CBF) and hemispheric cerebral blood flow (specific volume velocity of blood flow per 100 grams of brain substance - CBF/100g).
Results and Discussion: The study of the dynamics of specific volume velocity of blood flow per 100 g of brain substance indicates that in the group of 0.9% NaCl and 0.9% NaCl+mannitol is the tendency to decrease the blood flow of the brain during 7 days of treatment, respectively: 2.8% and 7.5%. In patients with HES 130 solution cerebral blood flow increases by 14.2%, whereas when applied HAES-LX-5% during 7 days, it increases by 43.2% and this increase is become statistically significant (p=0.004).
Conclusions: The analysis of the data of treatment the patients with AIS showed the best effect (p=0.004) of improvement of the cerebral circulation in the use of the polyfunctional infusion solution HAES-LX-5% unlike the 0.9% NaCl group and group of 0.9% NaCl+mannitol where was a decrease of the dynamics of cerebral blood flow, which could lead to hypoperfusion of the head the brain.

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09AP04-2
Uncommon finding in a patient with intracranial hemorrhage

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Background: Acute subarachnoid hemorrhage (SAH) is a devastating disease with a poor prognosis. It can also associate with Takotsubo cardiomyopathy, sometimes leading to serious difficulties in diagnostic and treatment management. We present a rare case of stress cardiomyopathy after SAH.
Case Report: A 29 year old woman presented with severe coma (CGS 3) that appeared suddenly during exertion. The patient was perfectly healthy before and she had no signs of trauma or intoxication. The physical exam showed a mild sinus tachycardia and nonreactive pupils. The ECG showed mild ST segment elevation and deep T negative waves. The emergency noncontrast head CT scan revealed acute SAH complicated with intraventricular bleeding. An echocardiogram was performed which showed severe wall motion abnormalities. The patient had akinesia on all basal segments with hyperkinesia of the apex and an ejection fraction of 25%. After 6 hours of intensive care treatment, brain herniation occurred and the patient was determined to be brain dead. With the family's approval, the patient's organs were harvested for transplantation.
Discussion: During SAH, a large amount of circulating cathecolamines are produced, and in 4-15% (1) of the cases, stress cardiomyopathy (Takotsubo) appears. The usual Takotsubo pattern is apical akinesia and ballooning with basal hiperkinesia. The wall motion pattern in our case report is a rarely described condition named inverted Takotsubo. It is specific to young women and it has similar prognosis. (2) Early diagnosis of the syndrome is of major importance because it can usually be confounded with an acute coronary syndrome. This will lead to delaying SAH treatment and also to the initiation of antithrombotic therapy, usually with deleterious effects. In our case, the clinical suspicion of acute coronary syndrome was low because of the patient's presentation and lack of comorbidities.
References:
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Learning points: Cardiac abnormalities suggestive for stress cardiomyopathy are rare but important findings in patients presenting with intracranial hemorhage. Doctors should be aware of this complication which can lead to poor treatment and outcome.

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09AP04-3
Intracranial hypertension in traumatic brain injured patients treated with barbiturate coma: a single centre retrospective analysis.

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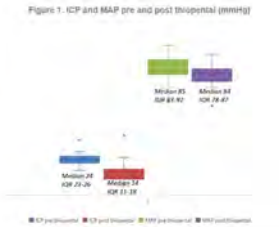
Background and goal of study: Despite the lack of evidence for barbiturates in traumatic brain injury (TBI) related intracranial hypertension, the 4th edition guidelines of the brain trauma foundation still advocate the use of barbiturates to control refractory elevated intracranial pressure (ICP), defined as prolonged ICP above 22 mmHg. Data from literature and guidelines are discordant, therefore we performed a single centre retrospective analysis to evaluate the outcome of TBI patients treated with barbiturates.
Materials and Methods: In this retrospective analysis, we used CTCue® software to search our electronic records in a 3-year time window from October 2015 until November 2018. We identified a total of 15 brain injured patients with intracranial hypertension treated with barbiturates (thiopental). Using pre-defined questions, we performed a clinical chart review to determine patient characteristics (age, GCS and APACHE on admission) and outcome parameters (ICP and mean arterial pressure (MAP) pre and post thiopental, morbidity defined according to modified Rankin Scale (mRS) and mortality at ICU discharge). Modified Rankin scale (mRS) was estimated from primary clinician and physical therapist notes.
Results and Discussion: Patient characteristics are shown in table 1. The administration of thiopental lowered median ICP (pre 24 mmHg, post 14mmHg; p<.0008) without significantly affecting median MAP (pre 85mmHg, post 84mmHg; p=0.62) as illustrated in figure 1.

Table 1. Patient characteristics

Sex	Male n=10/15 (66%)	Female n=5/15 (34%)
	Median	Interquartile range
Age (years)	38	26-56
GCS	4	3-10
APACHE	17	13-19
Days in ICU	25	17-37



Depth of thiopental induced coma was measured -using continuous EEG type bispectral index monitoring- in all patients. Four patients died while in ICU (two patients due to protracted shock, 1 patient due to brain death and 1 patient after withdrawal of care due to futility). In the group that left the ICU alive, 5 patients had good neurological outcome (mRS 1-2) and 6 patients had poor outcome (mRS 3-5).
Conclusions: Thiopental lowers ICP in TBI patients with refractory intracranial hypertension, however, with only one in three patients surviving critical care with good neurological recovery, the use of thiopental needs to be questioned and should be element of new randomized controlled trials.

09AP04-4
Diagnostic and prognostic significance of purine metabolic disorders in acute brain ischemia

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Background and Goal of Study: It has been established that hypoxanthine, xanthine and uric acid (UA) are present in the brain, their content changes after ischemia, UA is the final product of degradation of purines in the brain, xanthine oxidase (XO) is also present in the brain, catalyzes the oxidation of hypoxanthine to xanthine, and then to UA, and can be a source of free radicals, inhibition of XO and exogenous administration of UA are accompanied by explicit anti-ischemic and neuroprotective effects in the experiment, whereas endogenous increased production, with "by-product" synthesis of XO free radicals oxygen reflects the severity of ischemic and reperfusion injury. Our attention was drawn to the comparative evaluation of the prognostic value of impairments of purine metabolism.
Materials and Methods: We examined 402 patients in the 1st 7-10 days of cerebral ischemic stroke at the age of 30-87 years. Patients, in addition to conventional laboratory parameters, determined the blood levels of guanine, hypoxanthine, adenine, xanthine and uric acid by direct spectrophotometry. Evaluated the effects of the conservation of coma and death following the onset of which drugs are widely used in intensive neurology.
Results and Discussion: The most adverse prognostic factors associated with prolongation sopor or coma are: laboratory - hyperuricemia and hyperHYPOXANTHINemia, The most favorable prognostic factor, "countering" the preservat ion of a coma and the coming of death in cerebral ischemic stroke is the use of antiplatelet agents. Hyperuricemia most researchers viewed as an unfavorable prognostic factor, although intravenous injection of uric acid in acute cerebral ischemia can improve the results of thrombolytic therapy. Prognostic value of supranormal blood hypoxanthine level in contrast to the hyperuricemia has been insufficiently studied.
Conclusions: Launched from the development of acute cerebral ischemia, dynamic control of the blood levels of uric acid and hypoxanthine to predict its course and outcome.

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09AP04-5
Prognostic value of purines in blood and cerebrospinal fluid at brain stroke

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Background and Goal of Study: Diagnostic and prognostic value of blood uric acid levels in stroke studied relatively well. The importance of other oxypurine hypoxanthine and xanthine, both in the blood and in the cerebrospinal fluid was investigated insufficiently. The purpose of research - to compare the value of the level of hypoxanthine, xanthine, uric acid in blood and in the cerebrospinal fluid.
Materials and Methods: In 626 adult neuro-ICU patients in the acute period of cerebral ischemic and haemorrhagic stroke, along with conventional clinical, instrumental and laboratory tests, the samples of cerebrospinal fluid and venous blood on the 1st, 3rd, 7th day the onset of illness was performed spectrophotometric determination of the concentration of hypoxanthine, xanthine and uric acid.
Results and Discussion: Using the dihydropyridines and antiplatelet agents in patients with ischemic stroke, in patients with beta-blockers in hemorrhagic stroke is advisable only for elevated level of hypoxanthine in the cerebrospinal fluid. Beta-blockers in patients with ischemic stroke and hemorrhagic stroke can be used only if the elevated level of xanthine in the cerebrospinal fluid. Xanthines (aminophylline, pentoxyphylline, caffeine) in patients with ischemic stroke, and hemostatic agents in hemorrhagic stroke can be used only if patient has 1st dayelevated level of hypoxanthine in the blood. Use of antiplatelet agents is advisable for any stroke in the presence of the 1st day elevated level of xanthine in the blood, dihydropyridines advisable to use in hemorrhagic stroke, regardless of the 1st day elevated levels of xanthine in the blood, in ischemic without this. It is advisable to use a xanthines (aminophylline, pentoxiphylline, caffeine) in ischemic stroke, regardless of the 1st day elevated level of xanthine in the blood. For better survival in ischemic stroke with hyperuricemia also not using magnesium sulfate, in hemorrhagic stroke with hyperuricemia using beta-blockers.
Conclusion: Among all oxypurines, the level of xanthine in the blood, and not the level of uric acid, is of greatest diagnostic and prognostic value.

09AP04-7
Is fulminant otogenic meningoencephalitis still possible in the general ICU?

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Background: Acute bacterial meningitis (ABM) is a life threatening disease with mortality rate reaching 20%. ABM accounts for 76% of complication of otitis media. We present, a case of severe otogenic meningoencephalitis complicated by epileptic seizures and cerebral venous sinus thrombosis.
Case Report: 57-year old female patient, with medical history of diabetes and hypertension, was admitted at the Neurology Department. Patient was found unconscious at home, presenting with seizures. On admission to hospital she was in deep stupor, insensitive to pain stimulus, GCS=6. Microbiological tests of ear secretions were performed (after myringotomy) and Streptococcus pneumoniae was isolated. Treatment was started with ceftazidime and vancomycine. Computerized tomography (CT) and venography of the head revealed right mastoid and tympanic cavity filled with homogenously shaded cellular system. On the 2nd day right mastoidectomy was performed and patient was transferred to the ICU. On admission at the ICU the patient was intubated, mechanically ventilated, tachycardic, febrile (T 38.1 C), with normal blood pressure, SAPS 58. Blood values were: leucocytes (WBC) 20 x 10^9/L, CRP 433.5 mg/L. Metronidazole was added to ceftazidime and vancomycine treatment, and the inflammatory markers were soon significantly improving; WBC 9.6 x 10^9/L, CRP 51.5 mg/L. However, patient had frequent seizures, resistant to treatment with levetiracetam, and then thiopental and lacosamide therapy was initiated. Control MRI and CT scans revealed homogenously shaded cellular system in left mastoid, and the same day left mastoidectomy followed. Seizures stopped after surgery. On day 30, hemodynamically stable but unconscious patient, breathing spontaneously with mild improvement in CT and MRI scans, GCS 9, was transferred to the Infectology Department (SAPS 34). There, after a month, the patient died, without any changes in clinical status.
Discussion: Our opinion is that due to severity of reported and similar cases, interdisciplinary approach is essential during the treatment. All decisions should be considered and defined by the team consisting of ENT surgeon, ICU physician, neurologist and radiologist to ensure best possible outcome.
Learning points: 1) early surgical treatment is recommended in otogenic ABM 2) interdisciplinary approach is strongly suggested 3) otogenic ABM is still possible in ICUs, especially caused by Streptococcus pneumoniae, with poor outcome as described above.

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09AP04-8
Endocrine consequences of an acute stress induced by acetyl cholinesterase inhibition – experimental study in weanling rats.

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Hormonal stress response is implicated in obtaining allostasis. Although cortisol was the most studied hormone implicated in acute stress, the other endocrine axes also play a crucial role.
In order to observe the effects of acute acetyl cholinesterase inhibition on the main hormonal axes, we performed a prospective experimental study on weanling rats. This study included eight Wistar rats of the same age, gender and weight that were subjected to chlorpyrifos exposure. They were first tested for baseline levels of cholinesterase, cortisol, free triiodothyronine (fT3), thyroxine (fT4), thyroid stimulating hormone (TSH) and prolactin. Secondly, 0.1mg/kg chlorpyrifos was administered by oral gavage in order to induce acute acetyl cholinesterase inhibition. Next samples were taken to determine the level of cholinesterase and the above mentioned parameters. Venous blood samples were drawn in fasting rats two hours after organophosphate (OP) poisoning. Protocol procedures were performed under general anesthesia, according to international guidelines.
The statistical analysis was performed using the SPSS statistical software, version 20.0, setting a standardized significant P value at 0.05.
Levels of cholinesterase were significantly decreased after exposure to chlorpyrifos, having a baseline mean value of 1471.6±389.79 U/L compared to 12.75±7.36 U/L after poisoning ($p<0.001$). Cortisol levels were significantly higher after clorpyrifos administration (358.75±43 vs 241.2±35 nmol/l) with a p value lower than 0.01. Although prolactin had a growing trend (450.25±24.65 vs 423±43.4 ul/ml), the results were not statistically significant. Both fT3 and fT4 were significantly higher after intoxication. Surprisingly TSH level almost doubled after acetyl cholinesterase inhibition with high statistical significance $p<0.001$. Moreover, we found out that cholinesterase level was proportional with TSH level ($r=0.78$ $p=0.02$) and fT4 level was inversely correlated to the level of cortisol($r= -0.83$ $p=0.01$).

This study demonstrates that besides glucocorticoids, the other axes are also affected in acute stress. Acute acetyl cholinesterase inhibition can induce high levels of cortisol, fT3, fT4 and TSH. There was no significant connection between prolactin levels and the other affected hormones. In patients going through stressful events, intoxications, surgery or sepsis, endocrine dysfunctions should be considered.

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09AP05-1
"Acute adrenal insufficiency management in a patient with pituitary apoplexy in Intensive Care Unit: a case report"

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Background: Pituitary apoplexy (PA) is a medical emergency with incidence in pituitary adenomas of 2-7% (1). PA usually occurs in the fifth or sixth decade, predominantly in males. Anterior pituitary hormone deficiencies occur in nearly 80% of patients, while ACTH deficiency is life-threatening condition which demands treatment in ICU (2).
Case Report: We present a 55 year old male admitted in ICU with GCS 7 and respiratory insufficiency because of suspected pituitary apoplexy. The patient was intubated, sedated and mechanically ventilated. Because of hemodynamic instability he was treated with continous inotrpic support with noradrenaline and continous infusion of Hydrocortisone 200mg/24h. CT and MRI scanes revealed pituitary adenoma with intratumorous hemorrhage. Laboratory results reveled hyponatremia and hyperkalemia. Hormonal status has shown deficiency of STH, ACTH, TSH, LH and FSH. On the 19th day after admission transnasal, transphenoidal tumorectomy was done. The patient has developed significant polyuria resistant on therapy and has died on the 34th day of ICU admission.
Discussion: All patients with suspected pituitary apoplexy should undergo urgent MRI, which provides a diagnosis in more than 90% of patients. CT scan provide a conclusive diagnosis in 21% to 28% of the cases. Early onset of glucocorticoid replacement therapy is recommended with dexamethasone 8-16 mg daily or hydrocortisone 200 mg intravenously for 24 hours (2).
References:

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2. Andrea Glezer, Marcello D. Bronstein - Pituitary apoplexy: pathophysiology, diagnosis and management Arch. Endocrinol. Metab. vol.59 no.3 São Paulo June 2015

Learning points: Urgent hormonal replacement therapy with glucocorticoids should be started due to prevention of acute adrenal insufficiency. Early surgical treatment before the 8th day of admission and correction of electrolyte disturbances are essential.

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09AP05-2
Structure and outcomes of accidental hypothermia upon admission to ICU: a multicenter retrospective study

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Background and goal of study: Accidental hypothermia (AH) is defined as a decrease in core temperature <35°C, occurs in different categories of patients and results in a number of complications. However, the prevalence and nosological structure of AH can vary greatly in different regions, and there is no standardized approach to manage hypothermia. The aim of our study was to assess structure and outcomes of AH in patients from Russian ICUs.
Material and methods: We conducted a retrospective study of ICU charts from 6 adult ICUs of Russian Federation. All patients with ICU admission in 2017 were examined. The patients with body temperature < 35°C on ICU admission underwent further analysis of comorbidities, hemodynamics and laboratory data, duration of ICU stay, and mortality. Additionally, we have registered the methods of temperature monitoring and rewarming.
Results: Upon arrival to ICU, AH was observed in 137 patients (92 males and 45 females) (2.39% from all admissions). The mean age of patients was 57.7±15 years. The median body temperature on ICU admission was 33.6 (32.9-34.3)°C. We observed mild (32-35°C), moderate (28-32°C) and severe (<28°C) hypothermia in 113 (82.5%), 13 (9.5%), and 11 (8%) patients, respectively. In medical patients (n=40, 29.2%), the body temperature on admission was significantly lower than in postoperative (n=97, 70.8%) patients: 31.7 (27-34) vs. 33.9 (33.2-34.4)°C (P<0.01). The median lactate concentration on ICU admission was 2 (1.3-4.1) mmol/l, INR was 1.2 (1.08-1.47). Vasopressors were used in 61 (44.5%) patients. The overall mortality rate was 20.4%. The most frequent site for temperature measurement was axillary (75.2%). Other sites included nasopharyngeal (5.8%), rectal (13.1%), esophageal (3.6%), and tympanic (2.2%). The passive rewarming was used in all patients, the internal warming by infusion of warm fluids - in 11 (8%) patients. The rewarming during 24 hrs was accompanied by attenuation of arterial hypotension and bradycardia, development of hyperglycemia, increased leukocytes and INR, and reduced hemoglobin and platelets.
Conclusions: Accidental hypothermia on ICU admission occurs in 2.39% of patients, is accompanied by mortality rate of 20.4% and requires complex monitoring and correction of metabolic and coagulation abnormalities in parallel with rewarming.

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09AP05-3
Automatic prediction model with facial recognition and machine learning of patient's image in ICU patients.

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Background and Goal of Study: An appropriate sedation has benefits for patients in intensive care units (ICU), such as shortening the ICU stay or mechanical ventilation. The inadequate sedation could be associated with increasing the high-risk behaviour such like accidental extubation. However, it is difficult to continue observing patients on the bedside, due to the limited number of medical staffs. Nowadays information and communication technology could have a potential to automate some part of daily practice. In this study, we collected the face and motion data for machine learning by the monitoring camera, and aimed to construct the prediction model to recognize the high-risk behaviour.
Materials and Methods: We prospectively collected data of postoperative patients who were admitted to ICU in Yokohama City University Hospital from June to October 2018. Face and body motion data were recorded as video clip by a monitoring camera (Mobotix Indoor Dome v25, Konica Minolta) mounted on the celling. First, for face recognition, we chose some of well-recorded clips, which can clearly recognize patient's face. The machine learning was done with convolutional neural network, a method for deep learning. Then, the machine learning to recognize the body movement approaching the face were performed. Those were analysed from the pixel shift in a video clip, whose frame rate was 4 per second, and number of pixels was 1,000,000. By integrating these models, a model to alert against high-risk behaviour, especially around the subject's face, were constructed.
Results and Discussion: We obtained the video data from 24 subjects during the study period. The mean age of the subjects was 67, and the number of males was 18. To create the prototype model, we decided to extract the well depicted images that subjects face and body were oriented straight to the camera, such as supine and sitting position. The videos taken at night were also excluded, because of more image noises than videos at day time. Finally, about 300 hours of image data were used for the analysis. Under this condition, most of the movement approaching the face was able to recognize.
Conclusion: Our prediction model was able to recognize the high-risk behaviours with high success rate. Our approach has the possibility as a continuous monitor for patient's safety. However, algorithm improvement that can correspond to various conditions would be necessary, because our model was based on some specific condition.

09AP05-4
Prognostic Factors In Critically Ill Cancer Patients Admitted To The Intensive Care Unit: Results Of A Prospective Clinical Registry.

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Background and objective: Accurate prognostication is needed when cancer patients are admitted to the ICU to ensure appropriate treatment decisions. Moreover, there is an increase in critically ill patients with various types of malignancy at any stage requiring intensive care. Cancer treatment near the end-of-life has become more aggressive and intensive care unit (ICU) mortality of cancer patients has improved in recent years. However, patients with hematological or advanced-stage solid malignancies are still frequently denied admission to ICUs, even if some of them may survive. We aimed to identify factors predicting the mortality in cancer patients admitted to the ICU.
Methods: The study is a retrospective review of a prospective collected data of critical care registry of all patients admitted to the ICU of a 500-bed hospital between May 2015 and May 20108.
Results: This study is one of the largest single-centre studies in the literature of ICU patients with solid and haematological malignancies, where we included 398 (81.2%) patients with solid tumours and 179 (18.8%) patients with haematological malignancies. The main findings of this study were: Overall ICU mortality rate for all cancer patients was 38.3% (n=221) while the overall hospital mortality is 43.8%. The ICU mortality rates were more in patients with haematological malignancies than solid tumours yet the comparison failed to reach the significance level (41.3% vs 36.9%; p=.314). We found ,however, the most common reason for ICU admission was the sepsis and septic shock in both haematological and solid malignancies patients (62% and 59.8% respectively) while the second most common cause was the respiratory failure (55.3% and 56.8%).Furthermore, high SOFA score on admission to the ICU; odds ratio (OR) is 1.125 (1.060 â€“ 1.195), the need for mechanical ventilation; OR is 3.097 (1.578 â€“ 6.075), vasopressors; OR is 2.896 (1.704 â€“ 4.923), and renal replacement therapy; OR is 1.972 (1.093 â€“ 3.560) in addition to the patients who developed acute cardiac dysfunction; OR is 3.327 (1.029 â€“ 10.753); were independent risk factors for mortality in our population.
Conclusion: Mortality was lower than previous studies. High SOFA score on admission to the ICU, mechanical ventilation; vasopressors support, renal replacement therapy and acute cardiac dysfunction were independent risk factors for mortality in our population.

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09AP05-5
Rare case of postpartum complications in a patient with Kasabach Meritt syndrome

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Background: Kasabach Meritt syndrome (KMS) is a rare lifethreatening complication of haemangiomas, leading to thrombocytopenic and comsumptive coagulopathy.The condition occurs almost exclusively in infants and children. This is the fourth described case of KMS. 1 2 3
Case Report: A 29 years old primipara with KMS underwent urgent Caesarian section because of preeclampsia. After the surgery the patient presented with haemostatic abnormalities, bleeding from the operative site and big heamatomas. She was admitted to ICU because of acute respiratory failure and heamodynamic instability. She received 8 erythrocyte concentrates, 6 FFPs, 4 grams fibrinogen. After the admission she received O2 via nasal catether. The diffuse bleeding persisted. After medical concilium between the intensivists, obstetricians and heamatologists, to the treatment so far were added 20% human alumin, recombinant factor VII and thrombocytes. The patient and her haemolytic parameters improved and she was discharged after 10 days.
Discussion: Acute bleeding and coagulopathy are complications, related to KMS. The hormonal alterations and increase in blood volume in pregnancy may affect the pre-existing lesions, triggering episodes of acute DIC. Securing haemostasis, monitoring and managing of the coagulopathy are vital. Deciding between the treatment options depends on the clinical case and effect.
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Learning points: This is the forth described case of KMS during pregnancy. We described the condition and the successful treatment.

09AP05-6
Metabolic alkalosis due to hyperaldosteronism in premature neonate

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Background: Metabolic alkalosis (MA) is rare in newborns. It increases hemoglobin O_2 affinity, which makes it difficult to release O_2 in tissues. Causes of MA in neonates include endocrine, gastrointestinal, renal, metabolic disorders, maternal diseases and external influences.
Case Report: A newborn, 29 w.g., was admitted to NICU with neonate respiratory distress syndrome. She received surfactant and mechanical ventilation. First 3 days serum Na^+ was 148-152mmol/L, after correction it became normal. The baby was euvolemic. Acid-base balance was stable in 6 days of life. On the 7th day MA was found, with normal CO_2 level and without gastrointestinal losses. pH 7,52, $PaCO_2$ 43,7mmHg, $HCO3^-$ 35,4mmol/L, BE 11mmol/L; Na^+ 138mmol/L, K^+ 3,3mmol/L, Cl^- 92mmol/L, Ca^{2+} 1,48mmol/L; lactate 1,2mmol/L. MA remained after K^+ and Cl^- correction. Then we found the increased serum aldosterone 76,3ng/dL, and spironolactone was administered. In 2 days acid-base balance became normal and remained stable. After 5 days later the patient was extubated, non-invasive ventilation with further weaning was provided.
Discussion: MA in this newborn manifested on 7th day of life. Tight bond of O_2 with hemoglobin impairs O_2 delivery to tissues. Due to the law of electroneutrality in MA, H^+ released from cells in exchange for K^+ from the extracellular space, that leads to hypokalemia. In our case slight hypokalemia was corrected by infusion therapy. Chloride-responsive MA occurs due to the losses of chlorides, and it disappears when serum Cl^- is corrected. The correction of Cl^- in our case did not improve acid-base balance. We suggested that MA was chloride-resistant. One of the reasons of this condition can be hyperaldosteronism. Aldosterone acts on the distal renal tubules, causing Na^+ retention and increasing the excretion of K^+ and H^+. This is followed by hypernatremia, hypokalemia and MA, which we observed in our patient. Spironolactone competitively inhibits the binding of aldosterone to receptors, increases water excretion but saves K^+ and H^+ ions, which is important for blood acid-base rebalancing. The baby had positive dynamics after spironolactone administration, but it needs to find the cause of aldosterone rising.
Learning points: Early identifying of causes of MA is important, since aggravation of MA is associated with the risk of cardiac depression and muscle weakness which prolongs the duration of mechanical ventilation, ICU hospitalization, and increases the treatment costs.

09AP05-7
Improving standards of clinical documentation to enhance patient care and inter-team communication by moving towards electronic documentation: A quality improvement project.

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Background and Goal of Study: Medical records are fundamental part of a doctor's duties in providing patient care. Its clarity, accuracy and legibility are paramount for effective communication. Various methods has been adopted by healthcare industry, of which electronic record keeping is the biggest evolution of current century. In this quality improvement project we looked at the outcomes of changes implicated from handwritten to electronic ITU discharge summaries. We analysed the outcomes in term of record availability, accuracy and better communication.
Materials and Methods: We performed a retrospective analysis of paper discharge summaries between Jan to Mar 2018. We analysed 19 different parameters to score discharge summaries. We implicated changes to complete all summaries electronically and analysed the outcome. We used 30 discharge summaries from each period to analyse changes. We used MedCalc for statistical analysis to compare outcomes.
Results and Discussion: Table: Analysis of outcome parameters and significance of changes

Parameters	Pre analysis (n=30)	1mo post changes (n=30)	2m post changes (n=30)	3m post changes (n=30)	Sig
Diagnosis	9	30	27	30	0.005
Admission details	7	30	29	30	0.005
Summary of stay	13	30	29	30	0.005
On-going issues	7	30	27	30	0.005
Additional clinical information	9	30	29	27	0.005
Future investigation	5	30	27	30	0.005
On going Rx and drugs	9	30	29	30	0.005
Therapies	7	30	25	24	0.005
Nutritional plan	5	30	29	30	0.005
Readmission status	5	30	29	25	0.005
Rehabilitation	5	30	27	24	0.005
Limitation in Rx	5	27	24	26	0.005
Invasive lines in-situ	9	30	22	25	0.005
Communication needs	9	12	24	24	0.005

Conclusions: We concluded that electronic documentation is far superior in record keeping in ITU.

09AP05-8
Retrospective evaluation of early onset pulse steroid therapy on clinical outcome in critically ill adult patients.

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Background and Goal of Study: Pulse steroid therapy is a treatment used in critically ill patients diagnosed with alveolar hemorrhage, vasculitis, encephalitis, auto-immune diseases etc. Our aim was to assess the effects of early onset pulse steroid therapy on clinical outcome in critically ill adult patients retrospectively.
Materials and Methods: Demographic data of patients, comorbid diseases, diagnosis on admission to Intensive Care Unit(ICU), pulse steroid therapy indications (alveolar hemorrhage, vasculitis, encephalitis) duration between onset of symptoms and initiation of pulse steroid therapy, observed effects on clinical data of steroid therapy and final outcome has been evaluated.
Results and Discussion: 34 patients were enrolled and 31 patients were included in the study. Median age of patients was 45.94+- 17.08 years. 17 of patients were female(54.8%). Most common diagnosis on admission to ICU was Acute Respiratory Distress Syndrome (ARDS) (n:17, 54.8%) other patients had autoimmune encephalitis and vasculitis. APACHE-II median score of patients was 16.71+-5.42. Time between onset of symptoms and initiation of pulse steroid therapy was 6.10+-11.53 days. 28 patients received invasive mechanical ventilation therapy and 3 patients received oxygen therapy with regular mask. Average duration of stay in mechanical ventilation support was 30.19+-35.43 days and 41.9% (n=13) of patients survived after the pulse steroid therapy. There was no statistically significant difference in age, APACHE-II scores and duration of mechanical ventilation between survived and deceased patients. Time between onset of symptoms and initiation of pulse steroid therapy was significantly shorter in surviving patients (p=0.032) (3.77+-3.17 days in surviving group and 7.78+-14.84 days in non-survivng group). There was no statistically significant difference in both groups for PaO2, PCO2, P/F ratio, peak inspiratory pressure and median airway pressure (p>0.05) but PEEP levels significantly decreased following initiation of pulse steroid therapy (p<0.05). Cytopenia was observed in 10 patients(32.3%) and antibiotherapy of 26 patients during the course of the therapy.
Conclusions: In our study, we concluded if pulse steroid treatment is considered, early intiation of treatment may positively affect mortality in critical ill adult patients.

09AP05-9
Comparison Between Leadership Expectations and Reality in the Context of an Intensive Care Unit

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Background and Goal of Study: Intensive care units (ICUs) constitute a significant source of expenditure for hospitals, and healthcare managers are seeking ways to improve the performance. Performance improvement in ICU focuses either on improving clinical processes or developing medical technology. To date, very little research focused on the leadership dimension in the ICU, and no published studies have empirically investigated the patterns of leadership in the setting of an adult ICU, and its role in the management of ICU team dynamics with the goal of improving performance. Aim of this study is to explore what is thought to be an ideal leadership attitude from the perspective of team members (nurses and junior doctors), and compare the results with the attitudes and behaviours of actual team leaders (ICU consultants). The results of the surveys will be compared and analysed to explore possible areas for training of junior doctors.
Materials and Methods: This was a qualitative cross-sectional survey of nurses, non-Consultant Anaesthesiologists and Consultant Anaesthesiologists in a University Hospital, using two validated questionnaires. The questionnaires explored propensity towards four different leadership styles[1] and leadership behaviours[2].
Results and Discussion: In Path-Goal theory, nurses and junior doctors rated high for all of directive, participative and achievement-oriented leadership styles of an ideal leader. Supportive leadership was rated in the average range. Consultants rated themselves consistently lower in all leadership styles when compared to average scores of staff, with the supportive leadership style being rated the lowest. In Behavioural theory, task orientation was rated very high by junior doctors, high by nurses and moderately high by consultants, whereas relationship orientation was rated very high by junior doctors, high by nurses and moderately low by consultants.
Conclusions: Results of this research show that there is disparity between expectation of followers and reality of leadership in ICU. This gap could be bridged if clinical leaders are given the knowledge and education on leadership principles, which is lacking in current medical training.
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09AP05-10
Total plasma exchange in hypertriglyceridemia-induced acute pancreatitis: case report.

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Background: Hypertriglyceridemia (HTG) is one of many possible causes of pancreatitis and in non-pregnant population it is responsible for 1-14% of all cases[1]. Total plasma exchange (TPE) can be used as treatment modality in severe HTG. Despite published case reports, its benefits has not been clearly demonstrated and randomised control trials are lacking. We present yet another case of HTG-related acute pancreatitis successfully treated with TPE.
Case Report: A 42-year old caucasian male was admitted to ICU with pancreatitis, sepsis, hypoxic respiratory failure and acute kidney injury. Hyperglycaemia and HTG were presented on admission. The initial levels of triglycerides measured in the ICU was 1121 mg/dL; levels measured 24 hours before admission were 1400 mg/dL. TPE was started on the 2nd day of admission with 4% albumin (TPE2000 filter set, Baxter's Prisma Flex machine). Immediately after TPE was completed, CRRT was started (CVVHDF Ci-Ca, oXiris filter set). For the next 2 days patient demonstrated exacarbation of respiratory insufficiency, but avoided intubation. Statins, fibrates and omega-3 fatty acids supplementation was also used in the treatment. TG levels were reduced to 250 mg/dL and there was only a slight rebound.
Discussion: As HTG is associated with elevated blood viscosity[2] - theoretically performing early TPE could reduce the additional workload on the heart and improve its function, which could be crucial for older population with CVD. The patient did not require catecholamines during treatment. During the rise in levels of TG, lab results came in suboptimal - almost all blood samples were commented as „lipemic sample, repeat". Extra workup was needed to determine patient's blood group. Lowering TG levels helped with getting accurate lab results. Performing TPE in HTG on PrismaFlex machine has its quirks - as soon as the procedure is started, the blood detector starts alarming about the non-existent blood in the effluent and we came up with a few solutions.
References:
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09AP06-1
Impact of arterial extension lines on pulse contour derived stroke volume calculation

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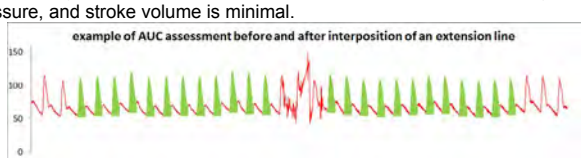
Background: Pulse contour analysis of arterial pressure signals permits minimally invasive assessment haemodynamic parameters such as stroke volume. The calculation, however, relies on a precise analysis of the waveform, and its accuracy may be vulnerable to artefacts introduced by changes in impedance characteristics due to extension lines. The aim of this study was to assess the impact of dedicated and non-dedicated extension lines on the area under the curve of the systolic part of the pressure waveform (AUC), on the systolic (SP) and diastolic (DP) blood pressure and on the Pulsioflex-derived stroke volume (SV).
Methods: After ethics committee approval, arterial pressure waveforms and Pulsioflex (Maquet, Rastatt, Germany) output of ten patients under general anaesthesia were recorded. Two types of extension lines were evaluated: a non-dedicated "perfusor" polyethylene line (B.Braun, Melsungen, Germany) of 150cm, and a dedicated arterial pressure line (150cm). Over a period of 10 seconds before and after interposition of the extension line, the AUC - determined using dedicated software - and the SV was recorded. The AUC, Diastolic (DP) and systolic (SP) pressure and SV were compared using an unpaired T-test (significance level $p<0.05$).
Results and Discussion: After interposition of the non-dedicated extension line the mean(SD) DP remained 54(8) mmHg, the SP changed from 99(17) to 104(17) mmHg, the SV remained 76(11) ml, and the AUC remained 6.3(2.1) s.mmHg. After interposition of the dedicated extension line, the mean(SD) DP remained 54(8) mmHg, the SP changed from 107(11) to 104(13) mmHg, the SV changed from 74(12) to 77(20) ml and the AUC changed from 6.9(1.8) to 6.7(1.7) s.mmHg. None of the changes was statistically significant.
Conclusion: While the use of extension lines should be limited, the impact on the accuracy of waveform-derived measurement of diastolic and systolic blood pressure, and stroke volume is minimal.



09AP06-2
Comparison between jugular and femoral central venous catheter transpulmonary thermodilution with the VolumeView™ system: preliminary evaluation in an experimental porcine model

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Background and goal of study: Hemodynamic optimization remains the cornerstone of resuscitation in major surgery and in the critical ill. Transpulmonary thermodilution (TPTD) is established for the measurement of cardiac index (CI), global end-diastolic volume index (GEDI) and extra-vascular lung water index (ELWI). Usually is performed by injection via jugular (J) or subclavian vein. However, in some circumstances, the central venous (CV) catheter has to be inserted in the inferior vena cava. We aim to compare the influence of the venous catheter site on TPTD measurements.
Material and Methods: Large-White pigs were anesthetized with thiopental and sevoflurane and mechanically ventilated in a volume-controlled mode with a tidal volume of 10 ml/kg. A VolumeView™ catheter (Edwards Lifeciences) was inserted through the femoral artery and connected to the EV1000™monitoring system. The animals were instrumented with the same type central J and femoral (F) venous catheter used for cold indicator injections and for CV pressure monitoring. TPTD measurements were performed via J or F access using a crossover design in a random order. We compared TPTD derived parameters via J access with F access; two TPTDs per pig, one TPTD per pig via F venous access and one TPTD per pig via J venous access. Each TPTD measurement represents the mean of three consecutive TPTD indicator injections. 15mL cold saline 0.9% were injected through the distal lumen of the catheter. Measurement procedures were performed within a time interval of 5-10 minutes. We compared CI, GEDVI, EVLWI, pulmonary vascular permeability index (PVPI) and global ejection fraction (GEF) obtained by F as well as by J-TPTD. Statistics: Mann-Whitney-test. P-value <0.05.
Results and Discussion: 8 animals were studied. We compared 16 TPTD measurements. There were no differences in CI between both F-CI(2.42±0.66) vs. J-CI (2.42±0.63 ml.min.m2, p=1) However, F-GEDVI (506.4±89 ml.m2) was significantly higher than J-GEDVI (413±104 ml.m2), (Δ22.5%), p=0.0001; similarly F-EVLWI was higher than J-EVLWI (7.93±1.9 vs. 7.1±1.8)(Δ12%), p=0.0001. Femoral TPTD-derived values as PVPI (F-PVPI 3.3±0.84 vs. J-PVPI 3.9±1.14; p=0,02,Δ-18%) and GEF (F-GEF 21±54.8 vs J-GEF 25.8±7%, p=0,0001,Δ19%) were significantly lower than those for jugular indicator injection.
Conclusions: Femoral access for indicator injection results in significantly altered values provided by the VolumeView™ system, particularly for GEDVI, EVLWI PVPI and GEF.

09AP06-3
Agreement of respiratory rate monitoring measured with microwave Doppler sensor

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Background and Goal of Study: Capnography and thoracic impedance are commonly performed to monitor the respiratory rate in the acute care setting; however, they are prone to artefacts and may be uncomfortable for conscious patients. The microwave Doppler sensor is a novel non-contact device that emits microwaves to a patient's body surface, monitors the reflected wave, and identifies respiratory movements. Based on the principle of Doppler shift, it can then calculate the patient's respiratory rate. This study aimed to evaluate the microwave Doppler sensor measuring respiratory rates of conscious, spontaneously breathing patients in intensive care units (ICUs) compared with other conventional methods.
Materials and Methods: This single-center, prospective, observational study was performed at the Yokohama City University Hospital ICU from March to August 2018. We recruited patients who were spontaneously breathing with patent natural airways, who were given oxygen via a facemask, and were continuously monitored with an electrocardiogram (ECG) (IntelliVue®, Philips, Germany). The nurse in charge visually counted chest wall movements for 60 seconds on several occasions for each patient when he/she was stable. At the same time, respiratory rates were measured and recorded using a microwave Doppler sensor mounted on the ceiling over each patient's bed, by capnography using a facemask, and by thoracic impedance. Bland-Altman analysis for repeated measurements was performed to calculate the bias and precision between respiratory rates measured by the various methods, with visual counting as the gold standard.
Results and Discussion: From 52 subjects, 336 (microwave Doppler sensor and visual), 280 (capnography and visual), and 336 (thoracic impedance and visual) paired respiratory rate readings were analyzed. The biases (95% limits of agreements; 1.96 × precision) between visual and the other methods were as follows: microwave Doppler sensor 0.3 ± 2.5 (-4.8 to 5.2) breaths per minute (BPM), capnography -1.1 ± 2.6 (-6.2 to 4.0) BPM, and thoracic impedance 0.2 ± 1.9 (-3.5 to 3.9) BPM.
Conclusion: In clinical practice, the microwave Doppler sensor was comparable with both capnography and thoracic impedance using ECG leads. Further research is necessary to evaluate the feasibility of the microwave Doppler sensor as a respiratory rate monitor for a prolonged period of time, e.g., overnight.

09AP06-4
A Simulated Study of Pressure Indicator for Preventing Inadvertent Arterial Placement of CVC.

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Background and Goal: Previous studies have shown that 0.8% of CVC attempts resulted in arterial punctures that were not recognized by color and pulsatility of blood. On the other hand, ultrasound guidance cannot completely eliminate arterial placement of catheter, because it can only provide 2D image and may be interfered by the bone, especially for the subclavian approach. Pressure measurement has been suggested as a more reliable method, but concerns still exist regarding the violation of the sterile field. The aim of this study was to evaluate the feasibility of distinguishing artery from vein by the modified EpiFaith syringe (MEFS), a pressure indicator for epidural space localization.
Materials and Methods:
Preparation of MEFS
The spring was replaced to provide 50 mmHg of pressure when the colored ring (CR) is just covered.
Test condition
Blood samples were simulated by glucose solution with absolute viscosities of 2 and 6 mPa-s. Different pressures were applied to simulate the artery and vein (Fig. 1A), and 18 and 20 G needles were used.

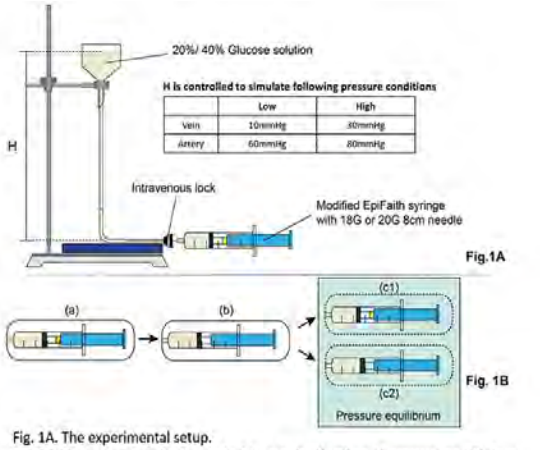

Fig. 1A. The experimental setup.
Fig. 1B. The process of simulation test to acquire the time of pressure equilibrium..

Test process (Fig. 1B)
a Pull the plunger to reflux the simulated blood.
b Push the plunger to cover the CR.
c Record the pressure equilibrium.
Results: The device exhibited an obviously different behavior when engaged to the simulated vein and artery. In all artery groups, the CR remained covered and was even pushed back when the arterial pressure was 80 mmHg. However, all CRs appeared in vein groups. Although the moving speed was influenced by viscosity and needle gage, the CR appearance could be easily identified within 15 s.

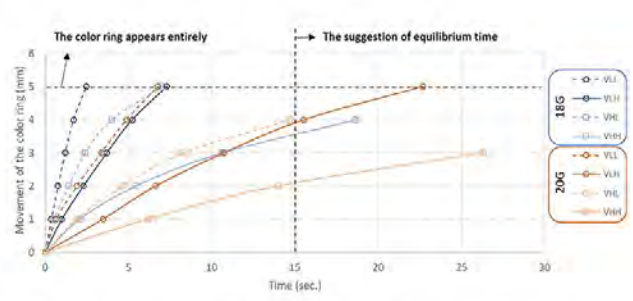

Fig. 2. The relationship between the movement of indicator and time.
VLL : simulated vein with 10mmHg, and low viscosity; VLH: simulated vein with 10mmHg, and high viscosity. VHL: simulated vein with 30mmHg, and low viscosity; VHH: simulated vein with 30mmHg, and high viscosity.

Conclusions: Although this is only a simulation study, the tested pressures and viscosities cover most of the situations in clinical applications. The results indicate the feasibility of using MEFS on CVC. We further suggest a 15s waiting time of pressure equilibrium for faithful identification.

09AP06-5
A case of successful intensive care in a child with a severe burn injury

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Background and Goal of Study: To present a case of successful treatment of a child with severe combined thermal trauma, burn shock, sepsis caused by gram-negative microflora.
Clinical case: Patient K., 14 years old boy, was taken to Dep. of Anaesthesiology and Intensive Care of the Regional burn center on 21 October 2016 by Ambulance from the place of injury (he was burned on the railway carriage by flames of the voltaic arc and after that was fallen from the it) with the diagnosis: Combined trauma. Thermal burn III st. of a head, a neck, a trunk, upper and lower extremities, genitals with an area of 85% of the body surface. Brain injury. Brain concussion. A laceration of the left parietal region. Burn shock. Intensive treatment included together use of mechanical ventilation, active surgery, infusion therapy, antibacterial therapy, assessment of the phage discharge of wound detachable and biological fluids, being on the air-fluidized bed, personified bandaging tactics, adequate nutritional support, a complex of early modern rehabilitation therapy. During 70 days of intensive treatment 50% of the skin was restored with auto- and gomo transplants, about 15% of wounds were spontaneously epithelized (a total of 65% was restored from 85% of the surface of the skin). However, during January and February 2017, secondary lysis of grafts (transplant rejection syndrome) occurred in an area of up to 25% of the body surface on the background of sepsis, multiple organ and nutritional insufficiency. Taking into account the negative dynamics in the wound status, together with the combustiologists, a decision was made to implement a radical change in the dressing technology: the child was given general hygienic baths every other day, followed by bandaging of the burn and donor wounds with a 5% solution of potassium permanganate. Against this background, active marginal epithelization began in the area of previously lysed grafts. Under general anesthesia 102 interventions were performed, of which 15 operations (6 necracetomies and 9 autodermoplasty) and 87 bandagings. By the time of discharge the total bed-day was 390, of which 375 days the child underwent complex intensive therapy.
Conclusion: Successful treatment of a child with a large area of deep skin burns was possible due to the treatment in a specialized center on the basis of a multidisciplinary clinic in cooperation.

09AP06-6
Monitoring resuscitation of severe burn patient with Input/Output ratio

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Background and Goal of Study: Resuscitation fluid rates following burn injury are guided by a weight/burn size formula (Parkland formula) and then are titrated to urine output and in all the studies resuscitation is reported only as volume of resuscitation. The aim of this study is to present data for resuscitation of a cohort group of patients in the 48 hours after the burn injury applying an input and output ratio (I/O) which takes in consideration not only the volume received but also the physiologic response.
Materials and Methods: A prospective cohort study was performed among 50 patients admitted in the ICU, with major and moderate burns. The inclusion criteria were burned patients admitted within 24 hours of burn in ICU of the Service of Burns in UHC"Mother Teresa" and survived on the first two days .Resuscitation was performed with Lactated Ringer according Parkland formula for adults and Galveston formula for children and was titrated to a urine output of 30-50 ml/h. Patients were divided in groups according I/O rate in: Expected group (I/O between 0.166-0.334), Over-responders group (I/O <0.166) and Under-responders ((I/O > 0.334). Statistical significance was set at $p<0.05$.
Results and Discussion: After 24 h we have calculated the rate and have noticed that in the expected group there were 7 patients (14%), in the over-responders group there were 43 patients (86%) while there were no patients in under-responders group. Regression of I by O for two groups was with strong R2 and with statistical significance (Figure 1). After 48 h all the patients were over-responders (I/O rate < 0.166) and population follows a normal distribution. Also regression of I/O ratio of the 24 hours by regression of I/O ratio of the 48 hours revealed an adjusted R2 of 0.169 indicating not a strong correlation but with statistical significance (p= 0.003). Variability in I/O ratio in 48 h increases with increasing I/O ratio in 24 (Figure 2).
Conclusions: I/O ratio as a novel calculation identify three unique groups of patients and helps for the prediction of fluids in the second 24 hours after burn. It should be use as another tool in the armamentarium of burn physicians in assessing adequacity of resuscitation.

09AP06-7
A wearable patch to assess changes in carotid blood velocity during passive leg raising

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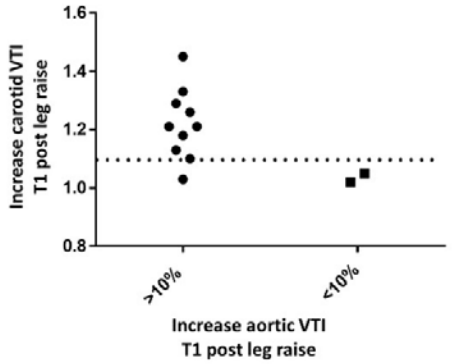
Background and Goal of Study: We tested a wearable Doppler patch for the continuous monitoring of carotid blood velocity and a software enabling the automatic measurement of the velocity time integral (VTI). We investigated the relationship between changes in carotid VTI monitored by the patch and changes in aortic VTI measured by a conventional echocardiography-Doppler device during a transient increase in cardiac preload.
Materials and Methods: A passive leg raising (PLR) maneuver was used to induce reversible changes in cardiac preload in 15 healthy volunteers. Changes in VTI were simultaneously recorded at the carotid (adhesive patch) and at the aortic level (suprasternal Doppler with classical echocardiography device) during the maneuver.
Results and Discussion: Changes in carotid VTI (patch) were recorded in all subjects, but in 3 subjects we failed to measure aortic VTI (echo). In the 12 remaining subjects, simultaneous recordings of aortic and carotid VTI were averaged and compared at 3 different time intervals: 20 to 30 s (T1), 50 to 60s (T2), and 80 to 90s (T3). The PLR maneuver induced a significant increase in aortic and carotid VTI at T1 (+25% and +19%, respectively), T2 (+27% and +16%) and T3 (+28% and +16%). Maximum changes in carotid VTI were therefore observed at T1. At T1, a rise in aortic VTI ≥10% was observed in 10 subjects (potential fluid responders). Nine of these patients also experienced a rise in carotid VTI ≥10% (figure 1).
Conclusion: Monitoring changes in carotid blood velocity is possible with a wearable adhesive patch. Carotid VTI peaks quickly after starting the PLR maneuver and the percent changes in VTI are lower at the carotid than at the aortic level. Both cerebral autoregulation and the laminar blood flow in the carotid artery (vs plug flow in the aorta) may explain these findings. Further studies are needed to clarify whether acute changes in carotid VTI may facilitate the detection of preload responsiveness and help rationalize fluid therapy in surgical and critically ill patients.
Figure 1: Individual changes in carotid VTI vs changes in aortic VTI (> or <10%).



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09AP06-8
The difference in recovery between oxygenation and ventilation after neuraxial and paravertebral blocks in trauma patients with multiple rib fractures: Monitored by Electrical Impedance Tomography.

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Background: Neuraxial and paravertebral blocks in trauma patients with multiple rib fractures (MRF) have been reported to improve lung mechanics and reduce the necessity for tracheal intubation.[1)] We report the effect of neuraxial blocks on improvement of ventilation evaluated by Electrical Impedance Tomography (EIT) and oxygenation in 3 cases with MRF.
Case Report: Case 1: A 60-years-old man with MRF of right ribs (T5-T11), pneumohemothorax and lung contusions presented severe chest pain and had difficulty in expectorating sputum. Numeric rating score (NRS) for pain at rest was 5 and on movement was 10. On day 4 after admission, oxygenation deteriorated with oxygen saturation of pulse oximetry (SpO_2) < 90% on 4 L/min O_2. EIT monitoring revealed inhomogeneous ventilation, 93% of tidal breath distributed to the left lung, whereas only 7% to the right lung. We performed right paravertebral block (PVB) at T8 and T11 levels. One hour later, NRS decreased to 0, enabling him to cough efficiently and SpO_2 gradually increased to 97%. In contrast, the distribution of ventilation remained uneven until on day 5.Case 2: An 80-years-old woman with MRF of left ribs (T1-T10), pneumohemothorax and lung contusions underwent epidural nerve block (ENB) at T9/10 level for severe chest pain on day 2 after admission. Two hours after ENB, SpO_2 improved from 87% to 97% on 4 L/min O_2. However, uneven distribution of ventilation (right: 92%, left: 8%) did not improve until discharge from the hospital. Case 3: An 83-years-old man with MRF of right ribs (T3-T9) and lung contusions. NRS on movement was 10 and inhomogeneous distribution of ventilation (right: 18%, left: 82%) was detected at admission. After 15 minutes of ENB at T6/7 level, NRS decreased to 2 followed by decrease in respiratory rate. However, uneven distribution of ventilation remained (right: 39%, left: 61%) on day 6.
Discussion: In all cases, neuraxial or paravertebral block reduced the pain scores and improved oxygenation shortly after blocks, whereas ventilation remained inhomogeneous for a long period. The difference might have been resulted from reduction in ipsilateral regional lung compliance due to persist lung contusions.
References:
1.Carrier FM, et al. Can J Anaesth. 2009;56:230-242
Learning points: Pain management would facilitate the improvement of oxygenation, but not the recovery in ventilation in trauma patients with MRF.

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09AP06-9
MMP2 concentration in serum correlates with the outcome of antibiotic therapy in patients with ventilator-associated pneumonia

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Background and Goal of Study: Ventilator-associated pneumonia (VAP) is the leading cause of healthcare-associated infections in intensive care unit (ICU). The main problems in the management of VAP are the initial empirical approach to antibiotic therapy, which could be inefficient due to bacterial multi-drug resistance, as well as the lack of biomarkers, which would allow to rapidly evaluate the effectiveness of the therapy chosen. Matrix metalloproteinase-2 (MMP2) is an enzyme, that plays a role in inflammation, destruction, regeneration and remodeling of tissue. MMP2 may play a significant role in the pathogenesis of severe sepsis and increased serum levels may correlate to the severity of organ dysfunction [1]. The aim of the present study was to determine whether plasma concentrations of MMP2 of patients with VAP could correlate to the effectiveness of antibiotic therapy.
Materials and Methods: The study included 60 patients from 18-85 years old, with brain injury or cerebrovascular accidents, who were mechanically ventilated for over 3 days and were diagnosed with VAP. Plasma samples were taken on the 1stday of antibiotic therapy (or change of antimicrobial drug), before administration, and also on the 3rdday of therapy. The samples were then analyzed with the Bio-plex kit to obtain concentrations of MMP2. Retrospectively, the patients were placed into three groups: 1. “white group” – patients with clinical and laboratory signs of improvement; 2. “grey group” – patients with no signs of improvement; 3. “red group” – patients with signs of deterioration. The dynamics of MMP2 concentrations were then analyzed using the Mann-Whitney U-test and ROC analysis for the evaluation of prognostic value.
Results and Discussion: The obtained results showed differences in mean absolute delta in the “white” (+1550pg/ml), “grey”(+567pg/ml) and “red” (-1777,3pg/ml) groups. In pair-wise comparison, the data were significantly different between the “white” and “grey” groups (Mann-Whitney, p= 0,048); “white” and “red” groups (p= 0,001). ROC analysis showed that MMP2 could be a good prognostic factor for VAP with a positive outcome of AUC=0,835.
Conclusions: MMP2 could be a promising biomarker of antibiotic therapy effectiveness in patients with ventilator-associated pneumonia.
References:
Gäddnäs FP, et al. Matrix-metalloproteinase-2, 8 and 9 in serum and skin blister fluid in patients with severe sepsis.Crit Care.2010;14(2).

09AP07-1
Routine blood tests after elective cardiac surgery: an evaluation of the impact of reducing the number of routine tests in a large London teaching hospital

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Background and Goal of Study: Analysis of routine blood tests in critical care following elective cardiac surgery revealed little change in the number of tests over the years. Motivated by the desire to consider change in routine practice, it was decided to see whether less blood tests could be performed without loss of patient safety. Specifically, the aims were:

- To ensure patient safety during the change process;
- To measure Compliance with new protocol;
- To identify Cost savings as a result of change.

Materials and Methods: Prior to the change, routine blood tests were ordered as a bundle under an electronic system. This bundle was reviewed by an expert group and clinicians were encouraged to select only the recommended blood tests from the bundle, in the day of admission and the following day (Day 0 and 1). Albumin, bilirubin, alkaline phosphatase, alanine transaminase, calcium, phosphate, c reactive protein, troponin and n-terminal pro b-type natriuretic peptide were removed in the new protocol. It was decided not to change the bundle until there is sufficient evidence of efficacy, safety, and cost. Information regarding the change was disseminated through teaching, reminders, and posters. The blood results of all elective cardiac surgical patients were then reviewed for a period of 3 months. Patients with prolonged stay and requiring re-sternotomy have been excluded.
Results and Discussion: There were no patients who came to harm as the result of change in the process. During the 3-month period there were 231 patients admitted post elective cardiac surgery. 27 patients were excluded as not suitable for the study (24 patients with prolonged stay, 3 patients requiring re-sternotomy). The compliance rate with the new policy was 32.3% (66 patients) on Day 0 and 13.2 % (27 patients) on Day 1. Cost of the routine blood tests requested is £31.76 per day per patient, whereas with the new policy it is £10.87 on Day 0 and £11.57 on Day 1. The total cost for the patients, where the new policy was followed, was 1/3 compared to the old policy (£1.027 vs £2.953).
Conclusions: Performing fewer routine blood tests after elective cardiac surgery did not compromise patient's safety. In order to improve the compliance, the new protocol has now been included in the patient's care pathway. If the new policy is applied to all the eligible patients (estimated 816 per year) the annual cost will amount to £18.311, compared with the current expenditure of £51.832.

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09AP07-2
Readmissions to the Cardiothoracic Intensive Care Unit at St George's Hospital, London

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Background and Goal of Study: Patients readmitted to the Cardiothoracic Intensive Care Unit (CTICU) after cardiac surgery have worse outcomes, higher mortality and increased hospital length of stay(1). Our CTICU unit currently admits mix of cardiac surgical and general intensive care patients. The aim of this audit was to assess the incidence, the reason, the total hospital length of stay, the mortality of all CTITU readmissions, and whether these could have been prevented.
Materials and Methods: CTICU readmissions between 30/01/17 and 3/01/18 were reviewed. Discharge summaries, pre-discharge observations and blood tests were examined. In addition ward medical review were noted.
Results and Discussion: Over 1 year, out of 1670 discharges, 1.4% of the patients were readmitted to CTICU within 48 hours. Compared with non-readmitted patients, patients readmitted to CTICU had a higher hospital length of stay (average 30.6 days vs 7.8 days) and in-hospital mortality(33.3% vs 13.3%). Readmitted patients came from cardiac surgery(45.8%), cardiology (33.3%), vascular surgery(8.3%), thoracic surgery(4.2%), infective diseases(4.2%) and nephrology (4.2%). The causes were respiratory failure(41,6%), shock (cardiogenic 8,3%, septic 4.1%), post-surgery (12.5%, including 1 emergency resternotomy), cardiac arrest (12.5%), reduced GCS (8.3%), renal replacement therapy(8.3%),dyselectrolytemia(4.1%). Only one patient was discharged prematurely, with a serum potassium level of 6mmol/L, and readmitted with a hyperkalemia of 6.5 mmol/L. Only 54% of the patients who were stepped down to the ward were reviewed by the medical/surgical team after CTICU discharge. This shows lack of compliance with existing policy of reviewing CTICU discharges on admission to the wards. Considering this as surrogate of medical input to patients ward care we suggest that this may have been suboptimal.
Conclusions: In CTICU, readmissions rate was 1.4%. The main reason for the readmission was respiratory failure. Readmitted patients had longer hospital stay and higher mortality. Only one patient was discharged from CTICU prematurely. Deficiencies in ward care were identified and ward staff education and ward support by Critical Care Outreach Team are suggested.
References:

1. Thomson R, Fletcher N. Readmission to the Intensive Care Unit Following Cardiac Surgery: A Derived and Validated Risk Prediction Model in 4,869 Patients. J Cardiothorac Vasc Anesth 2018, Volume 32, Issue 6, Pages 2685–2691.

09AP07-3
Role of genetic polymorphisms of cardiac adrenoceptors in neurogenic stress cardiomyopathy (NSC) after subarachnoid hemorrhage (SAH)

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Background and Goal of Study: In the acute phase of SAH, patients may develop NSC, expressed as cardiac necrosis markers elevation, ECG alterations and left ventricular wall motion abnormalities (WMA). A catecholamine storm induced by SAH is central in the pathogenesis. It has been hypothesized that cardiac responsiveness to catecholamines may be affected by genetic polymorphisms of the adrenoceptors. The aim of this pilot study was to evaluate whether polymorphisms of adrenergic receptors and related proteins may be associated with an increased risk of cardiac injury after SAH.
Materials and Methods: Adult SAH patients (World Federation of Neurosurgical Societies score IV-V) admitted to ICU were enrolled. Exclusion criteria: admission >48hrs, previous myocardial infarction, prior LVEF<40%, pregnancy. Alterations in myocardial necrosis markers, ECG and WMA were evaluated daily during the first 5 days. Four polymorphisms were analyzed and correlated with cardiac abnormalities: Catecol-Ossi-Methyl Transferase (COMT) rs4680, endothelial Nitric Oxide Synthase (eNOS) rs20707144, β2 adrenergic receptor (ADRB2) rs1042713, ADRB2 rs1042714.
Results and Discussion: Twenty-seven patients were enrolled in this pilot study: 85% female, 65±10 yrs. Hospital mortality was 14%. Troponin T was elevated in 16 patients (59%), with values decreasing from 0.2±0.4 to 0.1±0.1 ng/ml (DAY0-4). ECG alterations occurred in 20 patients (74%) and decreased from 63 to 37%. Eight patients (30%) had WMA, with a median wall motion index score of 1.11 (IQR 1-1.45). The AA genotype of COMT rs4680 polymorphism was more common in patients with WMA (p=0.042). The AA genotype is in fact associated with a lower activity of the COMT enzyme, involved in catecholamine degradation, thus it will result in a higher catecholamine concentration which may be responsible for cardiac injury. TT genotype of polymorphism eNOS rs20707144 was more common in patients with ECG abnormalities. The AA genotype of polymorphism ADRB2 rs1042713 was more common in patients with WMA. The CC genotype of polymorphism ADRB2 rs1042714 was more frequent in patients with impaired ECG. These last results did not reach statistical significance due to small sample size.
Conclusions: These preliminary results show a possible association between NSC and specific genetic polymorphisms. Larger studies are needed to confirm these results.
Acknowledgements: We thank Professors Amoroso and Deaglio for their comments on genetic study results.

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09AP07-4
Ivabradine reduces major adverse cardiovascular events in the acute care setting - A systematic review with meta-analysis

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Background and Goal of Study: Ivabradine (IVA) is a selective bradycardic agent without an impact on contractility or vascular tone, authorised for heart rate (HR) control in patients with chronic heart diseases. We examined whether IVA could decrease major cardiovascular events (MACE) in acute critically-ill patients, without significant side-effects.
Materials and Methods: We searched in Pubmed, Embase, Web of Science and CENTRAL (last update 11.2018) for studies comparing IVA with any control in acute critically-ill adult patients, or patients at risk of critical illness. Trial quality was assessed using the Cochrane risk of bias tool and data on HR, MACE, mortality and side effects were extracted. Random-effects meta-analysis were performed if at least 3 trials or 100 patients were available. Results are reported as Weighted Mean Difference (WMD) or Odds Ratio (OR), and 95% Confidence interval (CI). Registration: Prospero CRD42018086109.
Results and Discussion: We identified 5856 references. We retrieved 14 studies [1 non-randomised controlled trial (non-RCT) +13 RCTs] in the following settings: acute heart failure (2 RCTs), acute coronary syndrome (8 RCTs), cardiac surgery (1 non-RCT, 2 RCTs) and multiple organ dysfunction syndrome (1 RCT). Compared with placebo or standard care IVA reduced HR (7 RCTs, n=424, WMD -9.12 bpm, 95%CI [-13.60 - -4.63], p<0.001, I^2 = 69%). Compared with b-blockers, HR was similar (1 non-RCT, 2 RCTs, n=1081, WMD -0.86 bpm, 95% CI [-1.43 - -0.28], p=0.004, I^2 =43%). IVA decreased the risk of MACE (2 RCTs, n=471, OR 0.19, 95%CI [0.06 - 0.53], p=0.002, I^2 =10%). IVA had no effect on mortality (9 RCTs, n=1667, OR 1.03, 95%CI [0.55 - 1.93], p=0.91, I^2 = 0%). IVA was not associated with atrial fibrillation (1 non-RCT, 2 RCTs, n=945, OR: 1.37 95%CI [0.84 - 2.26], p=0.21, I^2 =0%) or bradycardia (5 RCTs, n=434, OR 1.20, 95%CI [0.6 - 2.38],

p=0.61, I² =0%). Visual disturbances occurred in 5/311 patients with IVA and 0/313 controls (3 RCTs, n=624, OR 4.32, 95%CI [0.72 - 26.02], p=0.11, I² =0%). Trial quality was low and the risk of bias was high.
Conclusions: IVA effectively and safely decreases HR with a protective effect on the occurrence of MACE in the acute care setting. The quality of the evidence for the use of IVA is weak and further well-designed RCTs are needed.

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09AP07-5
Standard coagulation monitoring and rotational thromboelastometry guided therapeutic decisions in the critically ill patients

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Background and Goal of Study: Coagulation disorders in the critically ill patients are multifactorial and sometimes hard to manage. Standard coagulation (SC) monitoring have indicated coagulation disorders more often than rotational thromboelastometry (ROTEM). An aim of the study was to compare SC and ROTEM based coagulation profile, and therapeutic decisions based on specific coagulation monitoring technique.
Materials and Methods: After ethical committee approval was obtained, we have analyzed medical charts from 108 patients hospitalized in the ICU in the tertiary hospital. We have analyzed differences in the coagulation profile between SC and ROTEM and correlation with clinical outcomes. We further have compared therapeutic decisions such as blood components transfusion and start of anticoagulation therapy based on SC and ROTEM profile. Analysis of data was performed using Mann-Whitney test, Chi square test and Pearson correlation.
Results and Discussion: Mean patient age was 62±15Yrs, and 84% of patients were surgical. A total of 86 patients have abnormal SC or platelet count. The most common disorder in the ROTEM was prolonged clotting time (CT) in EXTEM (59 patients) and CT-INTEM, and hypercoagulability measured by high maximum clot firmness in 23 patients. Prolonged CT-INTEM was observed in non-survivors (P=0.015). Blood components were not given in 21 patients based on ROTEM results (P<0.05). In 9 patients with prolonged SC low molecular weight heparin (LMWH) was initiated based on ROTEM results. However, in 8 patients' therapeutic decisions were based on clinical parameters. In 5 patients coagulation disorder was not confirmed with SC and ROTEM monitoring and supplemental tests were issued.
Conclusions: Coagulation profile in the ICU patients was more impaired based on the SC versus ROTEM. ROTEM allowed more restrictive transfusion policy and helped in therapeutic decisions such as initiation of LMWH or vitamin K. Therapeutic decisions regarding coagulation therapy must include both clinical parameters and coagulation tests.
References:
Ellenberger C. et. aAl. BMC Anesthesiol. 201724;17(1):146.
Acknowledgements: study was supported by VIF2016-14.

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09AP07-6
Post-intensive care syndrome in patients after open heart surgery, preliminary data

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Background: The survival of critically ill patients has improved due to critical care and mortality alone is not sufficient to represent outcome. The postoperative health related quality of life (HRQoL) after cardiac surgery needs to be studied. HRQoL is worse in patients who have been treated in ICU compared to general population. In 2010 post-intensive care syndrome (PICS) was described as "new or worsening impairments in physical, cognitive, or mental health status arising after critical illness and persisting beyond acute care hospitalization". The goal of the study is to evaluate post-intensive care syndrome effect on quality of life after open heart surgery.
Materials, Methods: Twenty patients undergoing coronary artery bypass and/or valve surgery were enrolled in case series study in a tertiary care hospital. Epidemiological data and length of stay in hospital were obtained from medical record. To evaluate HRQoL a 36-Item Short Form Survey (SF-36) v1 was used four weeks post-operatively. It examines eight subgroups scoring 0 (worst) to 100 (best): general health (GH), physical (PF) and social (SF) functioning, limitation of role by physical (RP) and emotional (RE) problems, bodily pain (BP), vitality (VT) and mental health (MH). All patients were interviewed during phone call, and prior that a verbal consent is received. Patients who spent more than 24 hours in ICU after elective surgery in adult population were included, excluding those who were in ICU prior to surgery. Descriptive statistics with Microsoft excel version 1812.
Results, Discussion: Twenty patients were included in November 2018. Male, female (n=2;8) average age 63.8 (42;81) and BMI 28.6 (19.5; 39.4), ejection fraction prior operation 58%, length of stay in hospital 12.8 (9;18), in ICU after operation 1.5 days (1;3). SF-36 subscale average and SD were following: GH 61.5 (16.74); PF 53 (22.38); SF 72.5 (17.5); RP 40 (30); RE 66.69 (25.82); BP 69.75 (14.47); VT 54 (12.61); MH 71.2 (7.33). Two patients use NSAIDS due to pain and recommendation to approach GP was given. When comparing to literature the results show less than 10 to 40 points on individual subscales.1 Physicians should engage with patients beyond saving their lives. Effort in forming a management plan can improve long-term QoL of the ICU survivors and their families.
Conclusion: PICS affects physical, cognitive, mental health of patients one month after open heart surgery.
1.scholarworks.waldenu.edu/jsbhs/vol4/iss1/2

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09AP07-7
A Postoperative Thrombotic Thrombocytopenic Purpura: an unusual case

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Background: Thrombotic thrombocytopenic purpura (TTP) classically presents with a triad of thrombocytopenia, microangiopathic haemolytic anaemia (MAHA), and fluctuating neurological symptoms. Therapeutic plasma exchange (TPE) has dramatically improved mortality of TTP from 90% to about 20%. We discuss a case of PTT that presented after surgery and was successfully treated with TPE.
Case Report: A 64-year-old woman with an autoimmune hepatitis came to the emergency room complaining of vomiting, fever and abdominal pain. A CT scan revealed perforated diverticulitis and the patient underwent segmental large bowel resection. The clinical picture worsened in the early hours of hospitalization, with purple and widespread impairment of consciousness culminating in a grand mal seizure. The initial suspect was septic shock with disseminated intravascular coagulation. Thrombocytopenia persisted over the first 48 hours after surgery in spite of another transfusion of platelets, with worsening awareness, neurological deficit and acute renal failure. Review of the peripheral blood smear only showed 1–2 schistocytes per high power field. We suspect diagnosis of thrombotic thrombocytopenic purpura (TTP), and plasmapheresis was started. After 6 days of TPE, her clinical condition rapidly improved, and the LDH and platelet count normalized (196,000/mm3) andthe patient was transferred to the medical ward. Histopatological findings were compatible with thrombotic microangiopathy.
Discussion: TTP must be considered a medical emergency. Platelet transfusions are contraindicated, as they can cause serious clinical deterioration. The most important aspect of recognizing postoperative TTP is a high index of suspicion when a postsurgical patient presents with unexplained progressive anaemia, thrombocytopenia, and progressive neurological or mental changes.However, to give the benefit of exchange plasmapheresis, which is a life-saving treatment for TTP, MAHA and unexplained postoperative thrombocytopenia should be sufficient criteria for presumptive diagnosis of TTP and enough features to initiate the treatment.
References:
Joly BS, et al. Thrombotic thrombocytopenic purpura. Blood. 2017 May 25;129(21):2836-2846
Learning points: TTP can cause unexplained anaemia, thrombocytopenia and mental changes. Early recognition of the disease is of paramount importance for a favourable outcome. Exchange plasmapheresis is recognized as a primary treatment for TTP patients and improved outcome.

09AP07-8
Severe bleeding due to drug effects in critically ill patient resolved with stepwise clinical approach and point of care coagulation monitoring

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Background: Coagulation disorders in critically ill patients are complex. The drugs applied can interfere and impair coagulation cascade. Point of care (POC) coagulation assays, like rotational thromboelastometry (ROTEM) may resolve difficult therapeutic situations in the intensive care unit (ICU).
Case Report: A male patient, 73 years, BMI 47, was admitted to ICU with massive haematuria, which started after the low molecular weight heparin (LMWH) was introduced for treatment of pulmonary embolism. His medical therapy consisted of antibiotics, furosemide and analgosedation. His clinical status deteriorated with heart failure, and sepsis, whereas bleeding was not controlled. LMWH was stopped immediately. Two days later, he was subjected to surgical haemostasis with local haemostatic agents, which was not effective. His standard coagulation profile was normal, with fibrinogen 5.3 g/L, platelet 105 x109/L, and ROTEM showed prolonged EXTEMCT (83 s) and FIBTEM MCF was 37 mm. He received total dose of 20 units of packed red blood cells, 10 units of fresh frozen plasma, and platelets, with maintained normal calcium concentration, temperature, and pH values. We revised his medical therapy and suspected possible influence of amiodarone, which we used to control chronic atrial fibrillation and pantoprazole on platelet aggregation. Multiplate analysis of platelet function test (PFT) was insufficient with collagen (22 U), and ADP (26 U). We have stopped amiodarone and pantoprazole, platelet aggregation increased whereas haematuria stopped within two days. Control laboratory PFT showed platelet aggregation with collagen 90[U], ADP 112[U]. LMWH was safely continued.
Discussion: Standard laboratory tests are unreliable in massive bleeding and may result in inappropriate therapeutic decisions. Point of care haemostatic assays, ROTEM and PFT should be incorporated in the coagulation assessment. We detected impaired platelet aggregation, and suspected drug effects. Stepwise approach with assessment of clinical parameters, present therapy, and combination of POC tests are key to optimal therapeutic management and achieving adequate haemostasis.
References:
Sahud MA. Et al. Br J Haematol. 2013;163(2):260-7.
Learning points: Coagulation disorders in ICU patients are complex and multifactorial. Multiple drug effects on the coagulation should be considered. Combination of point of care haemostatic assays facilitates diagnostics optimization of therapy in active bleeding patients.

09AP07-9
Preliminary analysis for predicting temperature rising post cardiac surgery with cardiopulmonary bypass. A single center retrospective study.

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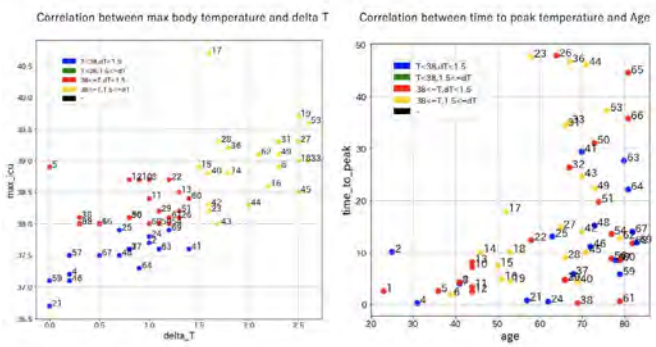
Background and Goal of Study: Hemodynamic stability post cardiac surgery is essential treatment in the intensive care unit (ICU). Before termination of cardiopulmonary bypass (CPB), patients are rewarmed, then body temperature (BT) is going to rise. But due to the transfer from the operation room to the ICU, BT is decrease and the peripheral vascular resistance is increased. Patients are rewarmed after admission to the ICU, the BT is going to rise again. The BT rising post cardiac surgery in the ICU causes fluctuation of hemodynamics by telangiectasia. However, there has been no study predicting BT rising in the ICU of the cardiac surgical patients with CPB. If the predictors of BT rising in the ICU is elucidated, we can predict postoperative transition of hemodynamics, and it will make a significant contribution to the Intensive care management. Our aim of the present study is to determine the predictors of BT rising in the ICU post cardiac surgery with CPB.
Materials and Methods: We retrospectively collected cardiac patients' data from electronic health records from June 2017 to July 2018 at our institution. Background, operation data, drug, vital data were collected and excluded the patients who have insufficient data. The collected data were cleaned and analyzed by data scientist. We assessed difference of the peak BT between during surgery and the ICU. This difference was defined Delta temperature (Dt), and the patients were classified into the three groups, a high risk, a medium risk and a low risk group with Dt and BT.
Results and Discussion: The 59 patients were analyzed, [sex:male 41, female 18; age, 63.2 years], and the 21 patients were allocated to the high risk, 19 to medium, and 15 to low risk, respectively. According to the analysis of three groups, the patients less than 50 years old get the peak BT within 10 hours after admission to the ICU, and there is a large variation in the time to the peak BT of the patients more than 50 years old.



Conclusions: We analyzed the post cardiac surgical patients with CPB and defined the classification according to the transition of perioperative BT.

09AP07-10
Hanta hemorrhagic fever with renal syndrome: a case report

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Background: Hantaviruses are associated with a primary rodent reservoir and human infections occur after the inhalation of the aerosolized virus that's excreted in rodent urine and feces. Hantaviruses cause two forms of human disease: hemorrhagic fever with renal syndrome (HFRS) and hantavirus pulmonary syndrome.
Case Report: A 23 year old patient was admitted to the medicine ward presented with a history of high-grade fever for 7 days, abdominal pain and nausea. A CT showed ascitic fluid in the abdominal cavity, so an emergency abdominal surgery was made.Later the patient was admitted in the ICU and was put on a mechanical ventilation. A heteroanamnesis revealed that the patient is a forest worker which doesn't exclude a possible contact with rodents. Investigations revealed high blood infection parameters (CRP,WBC), trombocitopenia, prolonged activated partial thromboplastin time, hypoalbuminaemia and hypoproteinemia and elevated levels of AST, elevated serum creatinine and urea levels. Blood culture and urine culture were both sterile. He was initially given empirical antibiotic treatment (imipenem and meteronidazole),also renal doses of dopamine were given. Because of a consistent oliguria and decreased renal function,3 session of haemodialysis were made. Convalescent sample showed high levels of anti-hantavirus IgG on day 5.On day 10 the patient was discharged with recovered renal function.
Discussion:The clinical course of HFRS is characterized by fever, hypotension, hemorrhage, and acute kidney injury. Laboratory findings are anemia, leukocytosis, thrombocytopenia, elevated liver enzymes, serum creatinine, as well as proteinuria and hematuria. The disease typically progresses through five phases: febrile, hypotensive shock, oliguric, polyuric, and convalescent. The diagnosis of HFRS is based on exposure history, typical clinical manifestations, and serum test results (IgM/IgG antibodies against hantavirus).Maintaining fluid and electrolyte balance is a crucial treatment method. Platelet transfusions can be used in severe cases with thrombocytopenia. Intermittent hemodialysis (IHD) is the first choice for AKI.
References:
1.Hong Jiang,Hong Du, Li M. Wang, Ping Z. Wang, and Xue F. Bai, Hemorrhagic Fever with Renal Syndrome: Pathogenesis and Clinical Picture. Front Cell Infect Microbiol.2016;6:1
Learning points: The earlier the detection of HFRS, the admission to ICU and the supportive treatment, the greater the reduction of mortality rate.

09AP08-1
Connexin 32 deficiency protects the liver against ischemia/reperfusion injury

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Background and Goal of Study: Hepatic ischemia/reperfusion (I/R) injury is a common complication in the clinical setting. Our previous study has shown that connexin 32 (Cx32) plays a major role in renal I/R injury; however, the role of Cx32 in hepatic I/R injury remains unknown.
Materials and Methods: Liver tissue and serum samples from patients undergoing orthotopic liver transplantation (OLT) were used to evaluate the function of Cx32 in OLT post-reperfusion injury. Then, partial hepatic ischemia was established in global Cx32 knockout (KO) mice and wild-type mice followed by reperfusion. Hepatic injury markers, such as histology, serum aminotransferase level, and hepatocyte apoptosis were examined. Cx32 small interfering RNA and the p53 inhibitor, pifithrin-α, were used to examine the relationship between Cx32 and the p53/puma pathways in the BRL-3A hypoxia/reoxygenation (H/R) model. The molecular mechanisms of Cx32 function were explored in vivo and in vitro.
Results and Discussion: Corresponding to liver damage, Cx32 was significantly induced both during OLT in human patients and partial hepatic I/R in mice. Cx32 KO mice exhibited less liver injury than controls, with lower pathological scores and serum transaminase levels. Cx32 deficiency significantly suppressed the p53/puma pathways and hepatocyte apoptosis. Similar results were observed in the BRL-3A H/R model. Propofol protected against OLT post-reperfusion injury and hepatocyte apoptosis by inhibiting Cx32.
Conclusions: Cx32 is a crucial regulator in hepatic I/R injury through the modulation of hepatocyte apoptosis and damage, largely via the p53/puma signaling pathway.

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09AP08-2
L-ornithine-L-aspartate (LOLA) infusion for prevention of overt hepatic encephalopathy after variceal bleeding episode: a randomized controlled trial.

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Background and Goal of Study: variceal bleeding is a common reason for ICU admission, mostly occurring in patients with advanced liver disease. Development of bleeding episode leads to further decrease of liver function and development of overt hepatic encephalopathy (OHE), which leads to increase in morbidity, mortality and lengths of ICU stay [1]. We hypothesized that early use of intravenous LOLA may decrease the incidence of hepatic encephalopathy episodes.
Materials and Methods: trial has been conducted for 9 months in a 9-bed mixed ICU. We included patients, having a history of liver cirrhosis and admitted to ICU due to episode of variceal bleeding. Patients were randomized into two groups: L (LOLA) and C (control). L group received 20 grams of LOLA daily (10 grams in 500 ml of normal saline q12h) from day 1to end of ICU stay, but at least 5 days; C group received same amount of normal saline. We assessed frequency of OHE episodes according to West-Haven criteria (primary endpoint), length of ICU stay, and mortality (secondary endpoints). Study had been approved with Institutional Review Board. Binary outcomes were assessed with Chi-square test. The relative risk (RR) was calculated according to Altman, 1991. Results were considered significant at p<.05.
Results and Discussion: 49 patients were included into trial. 25 patients were assigned to L group and 24—to C group. The basal characteristics (including age, gender, MELD score) were similar between groups. 11 (45,83%) patients in C group and 4 (16%) patients in L group developed OHE (p= .0387, RR= 0.3491, 95% CI 0.1287 to 0.9470, NNT 3,352). In-study mortality was 12% for L group and 16,67% for C group (P = .6428). Mean LOS was 9,47 days for L group and 13,34 for C group (p=.5718).
Conclusions: we found evidence that therapy with LOLA decreases frequency of OHE in patients with acute variceal bleeding and liver cirrhosis. However, no significant improvement in mortality or ICU LOS was detected. Additional trials are required to determine LOLA role in treatment.
References:
1. Amodio P, Del Piccolo F, Petteno E, et al. Prevalence and prognostic value of quantified electroencephalogram (EEG) alterations in cirrhotic patients. J Hepatol. 2001;35:37-45.

09AP08-3
Prediction of hepatic encephalopathy after liver resections

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Background and Goal of Study: Hepatic encephalopathy (HE) is defined as “brain dysfunction caused by liver insufficiency and/or porto-systemic shunting manifesting as a wide spectrum of neurological or psychiatric abnormalities ranging from subclinical alterations to coma”. Registration of the direct-current potential (DCP) in a forehead-palm lead [1] allow the clinicians to identify three different functional state of the human body. The purpose of the study is to determine relationship between direct current potential level and the type and the incidence of hepatic encephalopathy.
Materials and Methods: A retrospective study of the perioperative period after liver resections in 245 patients was performed. The median age was 59.0 (54,0-68,0) years. All patients were divided into 3 groups according to the level of direct current potential (DCP) that was measured 12-24 hours before surgery: low negative level of DCP (< - 14 mV) (n = 89), average level of DCP (-15 - (-29) mV) (n = 72), high level of DCP (> -30 mV) (n = 84). 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. For statistical analysis AUROC (Area Under Receiver Operator Curve) was performed. Postoperatively psychometric tests with standart monitoring were performed.
Results and Discussion: Minimal hepatic encephalopathy (MHE) is a highly prevalent asymptomatic disturbance in patients with liver diseases. Overall incidence of HE was 46%. The maximum frequency of HE (24.0%) was observed at low negative values of DCP (< -14 mV) with AUROC - 0.81 (95% CI 0.79-0.84) for incident HE; with prevalence of overt HE. At high level of DCP (> -30 mV) postoperative HE was observed in 16 %; AUROC was 0.83 (95% CI 0.79-0.86) for incident HE; with prevalence of minimal HE (MHE). At average level of DCP (-15 - (-29) mV) postoperative HE was observed in 6,0%; AUROC was 0.75 (95% CI 0.72-0.78) for incident HE.
Conclusions: The DCP monitoring allows to predict the incidence and type of HE in patients with low negative and high level of direct current potential registered before the surgery.
References:
Zabolotskikh I., Musaeva T., Kulinich O. Individual approach to perioperative fluid therapy based on the direct current potential method in patients after major abdominal surgery. EJA. 2015. T. 32. №S53. C. 260.

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09AP08-4
Study of Perioperative complications in Hepatic Resection Surgery

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Background and Goal of Study: Hepatic resection is the treatment of various liver diseases such as malignant tumors and hepatic metastasis. Due to the multiple advances in the surgical and anesthesic techniques and postoperative care, there has been an increase in the frequency and magnitude of these operations. Despite technical advances and high experience in liver resection, it is still burned by relatively high rates of postoperative morbidity and mortality. Most of the complications are related with the surgical techniques, anesthesia, preparation, preoperative evaluation, observation and postoperative management. Know and predict the different complications, just as its management, is essential to increase clinical safety in this patients.
Materials and Methods: Descriptive, observational and retrospective study. We are analyzing the different complications produced in the hepatic resection postoperative in 70 patients, at the University Hospital of Pontevedra, between January 2015 and December 2016.
Results and Discussion: In our study the most frequents complications are respiratory failure and acute kidney injury. The length of stay in Critical Care Unit-CCU- longer than 48 hours is related to a higher probability of death per year. Infectious complications in CCU is associated with a higher risk of death per year.
Conclusion: In order to relate the prevalence and risk factors of hepatic resection and use that information to improve the prevention and postoperative management, our study showed that there are an important way to the improvement of clinical practice in this type of procedures.
References:
Bredr LC, Peres LAB.Risk factors for acute kidney injury after partial hepatectomy. World Journal of Hepatology 2017 05/22:9(18):815-22

09AP08-5
Analysis of incidence and risk factors of liver disfunction associated to parenteral nutrition in critically ill patients

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Background and Goal of Study: Total parenteral nutrition (TPN) has significantly reduced postoperative morbidity and mortality in critically ill patients. However, liver dysfunction (LD) associated with TPN is its most frequent metabolic complication. The objective of our study was to estimate the incidence of LD associated with TPN in our Critical Care Unit and to identify risk factors related to LD in critically ill patients who require TPN.
Materials and Methods: A descriptive, retrospective, observational study from January 2016 to June 2017, including critical patients who required TPN for a period longer than 7 days. LD was determined by alteration of one or more of these parameters in two consecutive tests: gamma-glutamyl-transferase (GGT)>50 IU/l, alkaline phosphatase>280 IU/l, aspartate aminotransferase (AST)>40 IU/l, alanine aminotransferase (ALT)>42 IU/l, bilirubin>1.2 mg/dl. Three LD patterns were defined according to analytical alterations: cholestasis, necrosis or mixed. Normal ranges of nutrients provided in the TPN were established according to ESPEN guidelines. The univariate statistical analysis was realized by using ANOVA test for quantitative variables and Chi-square test for qualitative ones. SPSS 20.0 was used.
Results and Discussion: Data were collected from 44 patients, 24 women (54.5%), mean age 69.34 years (29-89), SOFA 12.83±6.94, APACHE II 4.56±4.01. Cause of TPN: digestive surgery 26 (66.7%), intolerance to oral or enteral nutrition 13 (33.3%). Length of stay in Unit 12.9 days (7-35). 6 (13.6%) patients received caloric overload (>25kcal/kg/day) in TPN, and 4 (9.1%) excess of proteins (prots>1.5 g/kg/day). In 31 (70.5%) the protein intake was deficient (prots<1.3 g/kg/day) and 2 (4.5%) did not present a non-protein energy to nitrogen ratio (kcal:g N) <160. 39 (88.6%) presented LD: 27 (69.2%) cholestasis, 5 (12.8%) hepatic necrosis and 7 (18.0%) mixed. Most frequent findings were GGT (52.3%) and AST (50.0%) elevations. No differences were found between the patients who developed LD in terms of demographic factors, comorbidities, SOFA scale (p=0.853), APACHE II (p=0.701), intake of prots/kg/day (p=0.914), kcal/kg/day (p=0.739) or ratio kcal:g N (p=0.433).
Conclusions: The incidence of LD in our study is high, being cholestasis the most frequent etiology. In more than 2/3 of these TPN there was a protein deficit. Risk factors related to the composition of TPN, demographic or comorbidity did not influence the development of LD.

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09AP08-6
Left ventricular assist device (LVAD) and invasive multi-drug resistant organisms (MDRO) related infections: a new challenge?

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Background and Goal of Study: Infections continue to represent an important cause of morbidity and mortality after LVAD implantation. A major role in these setting seems to be attributable to spread of MDRO.
Materials and Methods: We retrospectively evaluated the incidence and timing of systemic infections occurred during the admission for LVAD-implantation in the period 2015-2017.
Results and Discussion: Thirty patients (25 males; 58+10 years) were included. Standard pre-operative prophylaxis (cefazolin/vancomycin) was given to 22 while 8 were treated before surgery for confirmed or suspected infections. 13 had previous microbiological isolates, 3 were colonized. 21 underwent antibiotic therapy during the 30-days before surgery (8 with ³2 drugs and 5 with carbapenems). Among them, 12 (57%) developed an MDRO infection after LVAD implantation. 14 developed a systemic infection after LVAD implantation (polymicrobial in 10), and 46 different agents caused 36 infections. MDRO caused 22 (61%) systemic infections (8 polymicrobial - 36%). 9 patients died during the follow-up (30%) mainly in the MDRO group (8 cases, 89%). 4 deaths occurred in intensive care unit (ICU), due to MDRO-related septic shock. In our setting, a number of known risk factors for MDRO infections seems present (invasive devices, prolonged length of stay). In a low colonized population, the high incidence of pre-VAD infections, mainly due to Gram+ bacteria, led to an intense antibiotic use possibly associated with MDRO selection. Post-VAD infections, mainly due to Gram- bacteria, seems to be systemic and particularly severe possibly explaining the high mortality induced by septic shock.
Conclusions: Management of invasive MDRO infections is crucial in LVADs recipients. A detailed knowledge of colonizations, infections and antibiotic therapies before surgery, represents an important guide to improve early detection of post-implantation infections and optimize antimicrobial therapies.
Acknowledgment: Clinical microbiological laboratory and cardiosurgical ward and cardio-ICU personnel
References:
J Heart Lung Transplant 2015;34:1495-1504
Tex Heart Inst J 2015;42(6):522-7

STUDY RESULTS - Patients' characteristics	Population (n=30)
IABP - ECMO before LVAD [n (%)]	9 (30) – 5 (17)
H-LOS before LVAD [median, IQR]	17 (11-27)
H-LOS after LVAD [median, IQR]	25 (17-35)
Death in ICU - after ICU discharge	3 (10) - 6 (20)
Death caused by septic shock	4 (44)
Colonizations Pre L-VAD	3
INFECTIONS PRE L-VAD	**Pathogens (n)**
Urinary tract (n 5)	G+ (1), G– (3), Fungi (1) – **MDRO (0)**
Bacteremia (n 7)	G+ (5), G– (2), Fungi (0) – **MDRO (5)**
Pneumonia (n 2)	G+ (1), G– (1), Fungi (0) – **MDRO (1)**
Endocarditis (ICD lead) (n 1)	G+ (1), G– (0), Fungi (0) – **MDRO (0)**
Cutaneous wound and other (n 1)	G+ (1), G– (1), Fungi (0) – **MDRO (1)**
INFECTIONS POST L-VAD	**Pathogens (n)**
VARI (n 9)	G+ (1), G– (11), Fungi (1) – **MDRO (6)**
Bacteremia (n 23)	G+ (8), G– (19), Fungi (1) – **MDRO (18)**
Urinary tract (n 3)	G+ (0), G– (3), Fungi (1) – **MDRO (1)**
Drive-Line (n 1)	G+ (1), G– (0), Fungi (0) – **MDRO (0)**

IABP: Intra-Aortic Balloon Pump; ECMO: Extra Corporeal Membrane Oxygenation; H-LOS: Hospital Length of Stay; IQR: Inter Quartile Range; n: number; G+: Gram-positive; G-: Gram-negative; ICD: Implantable Cardioverter Defibrillator; VARI: Ventilator Associated Respiratory Infection.

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09AP08-7
The impact of terlipressin infusion on incidence of acute kidney injury (AKI) monitored by Neutrophil Gelatinase Associated Lipocalin (NGAL) in cirrhotic decompensated liver disease. A case control clinical trial.

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Background & Goal of Study: Acute Kidney Injury (AKI) is common in decompensated critically ill cirrhotic patients. Aim is to assess the prophylactic role of terlipressin infusion (TpI) in improving renal function & its impact on plasma Neutrophil Gelatinase Associated Lipocalin(NGAL) & Modified End stage Liver Disease (MELD) score.
Methods: Following local ethical committee approval & PACTR 201704002184280. Decompensated liver (GIT bleeding, spontaneous bacterial peritonitis & hepatic enchalopathy II-IV) patients (n=50) admitted to intensive care unit (ICU) at Misr university for Science and Technology teaching hospital between 2017 & 2018 were enrolled in the study. TpI was administrated with an initial loading dose of 1 mg followed by 1mg diluted in 5% dextrose at a rate of 8-10 ml/h for 24 h with a total dose of 5mg/24h. Creatinine (mg/dl), bilirubin (mg/dl) & international normalization ratio (INR) were measured at (T0) baseline, (T1) 24H after TpI & during ICU stay (T1-T5).Heart rate (HR)beat/minute, urine output (UOP)ml/day, non-invasive mean blood pressure (MAP)mmHg, glomerular filtration rate (GFR)ml/min, central venous pressure(CVP)cmH_2O & serum NGAL ng/dl were assessed at T0 & T1.MELD score changes at T0,T1 & T5 were reported. Incidence of AKI was reported & classification was done according to AKIN.[(1)]
Results: Data presented as median & [IQR]. Age 59[53-62]y & weight 87[79-92] kg. Comparing HR & MAP at T0 vs.T1 showed no change with p=0.4 & p=0.8 respectively, while there was significant increase in UOP & GFR. There was improvement in UOP at T0 vs.T1 (1250 [950-1500] vs 1925 [1600-2350]ml/day, p<0.001) & an increase in GFR at T0 vs.T1 (77.86 [63.36-87.57] vs. 78.3 [70-100] ml/min p=0.00).There was a significant CVP change at T2(12[9-14] mmH_2O p=0.001),while no significant change at creatinine & bilirubin (T0-T5) p=0.14,p=0.96 respectively was detected. Reduction in NGAL at T0 vs T1(205[178-270] vs 191 [170-264]ng/dl, p<0.001) was detected. There was significant decrease (T0-T5) in INR & MELD score (1.4[1.2-2] p=0.007, 16 [15-22] p=0.003 respectively). AKI was incident in 6%(3/50).
Conclusions: TpI in liver decompensated patients lead to an increase in renal GFR & an immediate improvement in UOP. The association of an early reduction in NGAL denotes a decline in AKI incidence. More studies are needed to monitor the response of NGAL when TpI used in hepatic patients for longer periods.
References:
www.akinet.org

09AP08-8
Undiagnosed Wilson's disease on the background of acute hepatic failure in an eighteen year old man

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In this report we would like to present the case of an eighteen year old young man who was transported to our hospital and later admitted to our infectology ward relatively in stable condition with nonspecific symptoms of nausea, vomiting, abdominant discomfort and mild jaundice. Our patient went through a near-fatal, rapidly progressive, acute hepatic failure within three weeks of admission.
Reviewing the patient relevant past medical history he was hospitalized with Hepatitis-E infection at our infectology ward six months before his current admission. Our patient denied use of any illicit drugs, alcohol or toxins of any kind. Auto-immune disease and immunosuppressive status were also excluded. He was suspected of suffering from hepatic infection again but all blood serology results excluded any acute viral infections. Despite all the negative tests and any therapeutic effort the general state of the patient worsened day by day. Due to the rapid progression of jaundice and disturbances in blood clotting tests plasmapheresis was started early. On the tenth day after his admission because of worsening lab values and the development of cerebral encephalopathy the patient was admitted to our intensive care unit for monitoring and stabilization. Despite early initiation and continuation of plasmapheresis the patient's symptoms not only didn't improve but worsened to a fulminant acute hepatic failure.
During his stay at ICU an ophthalmological exam was carried out which proved the presence of Kayser-Fleischer rings which referred to Wilson's disease but no definitive diagnosis could be made.
While being treated in ICU the Eurotransplant center was contacted in the hope of organizing an emergency liver transplant. On the twentieth day of admission the patient was finally transferred to the Transplant Clinic in Budapest where he underwent a liver transplant without any serious complication. After histopathological examination of the removed liver Wilson's disease was confirmed.
In this report the authors would like to present this rare clinical case of Wilson's disease with an extremely rapidly progressive course to acute hepatic failure, ending in an emergency liver transplantation. We also consider it important to show that such great results can be achieved even in a county hospital with good co-operation and logistics.

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09AP08-9
Acute withdrawal of nicotine and caffeine in the ICU confounding symptoms

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Background and Goal of Study: Nicotine and caffeine are the most common substances that people are addicted to. In Europe up to 27% of the population smokes and more than 50% drink coffee. Admittance to the ICU represents acute arrest of intake and provokes withdrawal symptoms. These can range from mild to severe and can confound clinical diagnosis. Intake of caffeine and nicotine is very often overlooked in the ICU setting.
Materials and Methods: We searched Pubmed for withdrawal symptoms and treatment in the ICU.
Results and Discussion: Most articles focus on opioid and alcohol withdrawal which are more severe. Nicotine was subject to less trials and one metanalysis which showed that acute withdrawal increases agitation in the critically ill significantly and while nicotine withdrawal as a cause for delirium was generally dismissed there was an increased number of tube and line displacements caused by agitation. On the other hand nicotine substitution was shown in some analyses to increase the percentage of delirium cases. While nicotine withdrawal leads to agitation, abrupt caffeine withdrawal leads to drowsiness, nausea, vomiting and headaches. Depending on the clinical context these can be confounded with meningitis, encephalitis, intracranial haemorhage, etc. Headaches and GI upset subside with common medications while the lack of energy does not. Symptoms can last up to 14 days. And there have been studies that link caffeine deprivation with an increased frequence of delirium. Caffeine benzoate has been successfuly applied in post-dural puncture headaches but substitution in the ICU is poorly researched.
Conclusions: Nicotine and caffeine use is often overlooked in the ICU and withdrawal can cause unnecessary suffering to patients and unnecessary instrumental exams. Substitution is still a matter of debate so it is up to the physician's clinical judgement to choose that.
References:
1. Nicotine withdrawal and agitation in ventilated critically ill patients, Olivier Lucidarme,1 Amélie Seguin,2, Crit Care. 2010; 14(2)
2. Substance abuse and withdrawal in the critical care setting. Tetrault JM1, O'Connor PG., Crit Care Clin. 2008 Oct;24(4):767-88
3. Effect of nicotine replacement therapy on mortality, delirium, and duration of therapy in critically ill smokers: a systematic review and meta-analysis. Ng KT1, Gillies M2, Griffith DM3. Anaesth Intensive Care. 2017 Sep;45

09AP08-10
Prediction of effective furosemide bolus administration in critically ill infants

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Background and Goal of Study: Furosemide administration is a common way to manage fluid balance in critically ill patients. However, poor urinary response to furosemide is sometimes experienced. In infants, the association between poor furosemide response and acute kidney injury has been reported(1). This study aimed to determine predictive factors of effective furosemide bolus in critically ill infants.
Methods: This is a single center, retrospective observational study. 23 infants aged under 1 year old and without heart and renal disease who stayed in the Pediatric Intensive Care Unit in Saitama Children's Medical Center during Jun 1 2017 to December 31 2017 were enrolled. Effective furosemide response is defined as urine output more than 20mL/kg in 2 hours after the administration. We compared potential clinical factors between effective and non-effective groups, such as vital signs before administration, laboratory data and settings of mechanical ventilation using Mann-Whitney U test or chai square test as appropriate. Multivariate analysis with random effect model was also performed to find significant predictors for effective furosemide response. Data were shown as median [interquartile range] and $p < 0.05$ was considered statistically significant.
Results and Discussion: The enrolled 23 patients received a total of 102 furosemide administrations, of which 62 (60.8 %) were classified as effective. Compared to the ineffective group, the effective group was associated with lower blood urea nitrogen (BUN) (5 [4-8] vs. 8 [4.5-9] mg/dL, p=0.01) and positive end-expiratory pressure (PEEP) (6.5 [5-7] vs. 7 [6-8] cmH2O, p=0.01), and higher urine output 2 hours before furosemide administration (2.89 [1.51-3.95 vs 1.13 [0.67-2.13] mL/kg/h, p<0.001]. Multivariate analysis showed dose of furosemide per kg body weight (OR 6.6, p=0.004) and urine output 2 hours before administration (OR 0.8, p=0.003) were significant factors.
Conclusion: Dose and higher urine output before administration were significant predictive factors of effective furosemide response in critically ill infants.
References:
(1)Kakajiwala A, et al. Ann Thorac Surgery 2017;104(4):1388-94

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09AP09-1
How to win a battle against status asthmaticus refractory to conventional therapy?

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Background: Status asthmaticus (SA) is a life-threatening condition characterized by progressive respiratory failure unresponsive to standard therapy. Mortality may be high. We present a case refractory to conventional therapy.
Case Report: A 20-year-old male (BM 70 kg), asthmatic since childhood, had a history of sore throat without fever for two days. Initial treatment included inhaled bronchodilators, iv steroids and oxygen inhalation. Antibiotics were started (moxifloxacin and ceftriaxone). After therapeutic failure, he was admitted to the ICU (pH 7.16; pO_2 5.9; pCO_2 11.1; HCO_3 20.5; BE -3.1; SpO_2 69%). He was intubated and mechanically ventilated with PCV, FIO_2=1.0, I:E=1:5, PIP was above 40 cm H_2O, with achieved TV of barely 300-350 ml. Patient was sedated with midazolam and propofol (later dexmedetomidine) and paralyzed with vecuronium. The second day, sevoflurane anesthesia was begun, without any improvement, with worsening hypercapnia and low exhaled TV. After 12 h sevoflurane was excluded and initial therapy was changed. Salbutamol was introduced 5 mg every 20 min/3 times a day, followed by 5 mg every 4 h. Ipratropiume bromide 500 µg was administered every 20 min/3 times, and also followed every 3 h with addition of continuous infusion of iv adrenaline (0,02 µg/kg/min) and bolus of magnesium sulphate (2 g). Flexible bronchoscopy was performed twice a day. Lavage was done and mucus plugs were removed. We also treated his complications of severe asthma (pneumothorax, atelectasis, hypokalemia). The patient's respiratory condition gradually began to improve. He started breathing spontaneously. pH improved from 7.16 to 7.44, PCO_2 changed from 11.1 to 7.0 and PaO_2 improved from 5.9 to 20.0 with (FiO_2 0.5). Peak and plateau airway pressures significantly decreased. He was extubated on day 5 and discharged on day 7 in stable condition.
Reference:
Khan MF, Al Otair HA, Elgishy AF, Alzeer AH. Bronchoscopy as a rescue therapy in patients with status asthmaticus: Saudi J Anaesth. 2013;7(3):327-30.
Discussion: Numerous guidelines are available for managing severe asthma; however, standardized guidelines are lacking for SA resistant to conventional therapy. In our patient each bronchoscopy resulted with significant improvement in clinical condition.
Learning points: Bronchoscopy along with other therapy may strongly facilitate respiratory recovery in patients with resistant SA on mechanical ventilation, so multimodal treatment is strongly recommended.

09AP09-3
Removing patients from mechanical support using neuromuscular stimulation of phrenic nerve.

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Background: Neuromuscular stimulation is used in patients with complete or partial respiratory failure, which are long-term on mechanical ventilation. Phrenic nerve is diaphragmal nerve. It is a nerv that belong to a cervical plexus. It goes through the mediastinum between the pleura and pericard until the diaphgram, and gives motoric inervation for diaphragm. It is necessary for phrenic nerv to be intact, so in the case of trauma or disease the method is contraindicated. Neuromuscular stimulation is under control of specialist anesthesiologist-intensivist.
Case Report: The case of patient M.S., a 24 year-old who has experienced respiratory insufficiency due to excessive sedative and opiate abusiveness, is shown, and approaches neurostimulation of n.phrenicus. During the 24 hours after 3 times the n.phrenicus stimulation is performed, a patient is discharged from mechanical ventilation as well as an improvement in the respiratory function.
Discussion: Stimulation of phrenic nerve from both side is published by Glenn and ass. 1970th year in the treatment of patients with chronic apnea, after injury or diseases of central nervous system. In year 2006. is published case report and commentary of Inspiratory muscle pacing in spinal cord injury by Di Marko AF. In 1996.year is published Electrical stimulation to restore respiration by Cearsy G., Elefteriades J., Di Marko A.
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Learning points: Respiratory insufficiency caused by disorders of respiratory muscle function reduces vitality and pulmonary complication, which is the main cause of mortality and morbidity in most patients with respirator. Electrical activation of the cervical part of the n.phrenicus and consequent stimulation of the diaphgram and intercostal muscles is minimal invasive method. We consider that this method is very simple method for application, the best minimal invasive for patients that can help in their recover, and short hospital stay.

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09AP09-4
Effect of veno-venous Extracorporeal Membrane Oxygenation (vvECMO) on Cerebral Autoregulation (CA) in adult patients with severe Acute Respiratory Distress Syndrome (ARDS). A prospective observational study.

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Background and Goal of Study: vvECMO is a rescue therapy in patients with severe ARDS refractory to conventional treatment. While being a life-saving procedure, ECMO may lead to major neurological complications. Furthermore, exposure to profound hypoxemia and hypercapnia due to severe ARDS may result in cerebral injury before ECMO treatment, or may alter cerebral hemodynamics, such as CA. We hypothesized that patients with severe ARDS requiring ECMO may develop cerebral hemodynamic impairment and that ECMO treatment may restore this dysfunction.
Materials and Methods: We consecutively enrolled adult severe ARDS patients requiring vvECMO. Exclusion criteria were previous neurological disease and conditions interfering with measurement of cerebral blood flow. Transcranial doppler (TCD) measurements of mean blood flow velocity in middle cerebral artery (MCAmfv) and Mxa were performed before ECMO placement, at day 0,1,2,4,7 of ECMO and after its removal. Mxa, representing the correlation coefficient between MCAmfv and MAP, was used as CA index. A Mxa >0.20 indicates impaired CA while ≤0.20 indicates preserved CA. Respiratory and hemodynamic parameters were concurrently measured. Data are expressed as median (IQR).
Results and Discussion: 29 patients were enrolled and monitored with TCD during ECMO treatment. For 9 of them also preECMO TCD measurements were available, the others being centralized to our institution after ECMO placement; age 48 (41-57) yrs; male 62%; pneumonia-related ARDS 93%; APACHE II 27 (23-34); SOFA at admission 14 (11-16); ICU LOS 25 (16-38) days; ECMO treatment 13 (8-17) days, 28days-mortality was 38%. 6 patients developed neurological complications (4 ischemic, 2 hemorrhagic) during treatment. Mxa was 0.25 (-0.12-0.50), 0.14 (0.05-0.21), -0.01 (-0.09-0.09), -0.03 (-0.15-0.07), 0.04 (-0.03-0.24), 0.01 (-0.07-0.09), 0.04 (0-0.18), preECMO, at day 0,1,2,4,7 of ECMO treatment and postECMO, respectively. Concomitant $PaCO_2$ levels (mmHg) were: 54 (44-79), 47 (34-55), 45 (42-56), 44 (39-54), 45 (41-52), 43 (39-52), 44 (41-49). ECMO treatment was followed by improvement in gas exchange and CA, even if changes did not reach statistical significance. During the study period, Mxa was significantly correlated with $PaCO_2$ (p=0.001), hemoglobin (p=0.001) and pH (p<0.0001).
Conclusions: vvECMO treatment, by restoring normal gas exchange, may positively affect CA, when impaired, and this effect is maintained after ECMO removal.

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09AP09-5
Influence of increased intra-abdominal pressure on respiratory and cardiovascular function of patients with acute pancreatitis

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Table. Correlation between the values of IAP and blood pressure

	Systolic pressure		Diastolic pressure	
Values of IAP	r	p	r	p
12-15 mmHg	0.889	0.0001	0.903	0.0001
16-20 mmHg	0.798	0.0001	0.585	0.011
21-25 mmHg	0.936	0.001	0.909	0.005
>25 mmHg	-0.960	0.001	-0.977	0.001

Background: The large number of patients with acute pancreatitis, as part of the pathophysiological mechanisms and the development of complications, develop intra-abdominal hypertension, leading to early damage to organs.
Goal: Early recognition of changes in the basic parameters of the respiratory and cardiovascular function of patients with acute pancreatitis.
Materials and Methods: Measurement of intra-abdominal pressure (IAP) via urinary catheter placed in the urinary bladder was performed every 12 hours in 50 patients who had acute pancreatitis. Based on the measured IAP values, all patients were divided into a group of patients with normal IAP values (n = 15) and with increased values (n = 35). Using clinical parameters, monitoring respiratory and cardiovascular function, the acquired values were compared to IAP in both groups of patients.
Results and Discussion: There was a high statistical difference in the values of partial pressure of oxygen (PaO_2) (p = 0.001), partial pressure of carbon dioxide ($PaCO_2$) (p = 0.0001), respiratory rate (p = 0.0001), heart rate (p = 0.0001), central venous pressure (CVP) (p = 0.001), mean arterial pressure (MAP) (p = 0.001) in two studied groups. With the increase in IAP statistically significantly increase was in heart rate (r = 0.542, p = 0.0001), CVP (r = 0.721, p = 0.0001), respiratory rate (r = 0.482, p = 0.004) and $PaCO_2$ (r = 0.355, p = 0.0001), the need for mechanical ventilation and an growth in peak inspiratory pressure (r = 0.784, p = 0.0001), while increasing the IAP, values of PaO_2 (r = -0.263, p = 0.003), blood oxygen saturation (r = -0.361, p = 0.0001) and MAP (r = -0.76, p = 0.01) began to decrease.
Conclusions: In patients with acute pancreatitis, increased IAP is related to early changes in basic vital parameters, with increase in $PaCO_2$, respiratory rate, peak inspiratory pressure, CVP, heart rate.

09AP09-6
Impact of subject-ventilator asynchrony on regional trans-pulmonary pressures, work of breathing and lung edema in experimental acute lung injury in pigs

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Background and Goal of Study: Spontaneous breathing activity (SB) combined with adequate PEEP can improve respiratory function in mechanically ventilated patients with lung injury; nevertheless, subject-ventilator asynchrony can occur. Asynchrony has been associated with poor outcomes in observational studies, but the mechanisms are unclear. We hypothesized that asynchrony worsens lung damage.
Materials and Methods: In 21 anesthetized pigs, intrapleural pressure sensors were placed in ventral, dorsal-cranial and dorsal-caudal regions of the left hemithorax. Lung injury was induced by saline lung lavage followed by injurious ventilation (ΔP=30 cmH_2O). We randomly assigned animals to one of three groups (n=7/group; 12 hours): 1) SB activity + induced asynchrony (Async); 2) SB activity without induced asynchrony (Sync) and 3) no SB activity, continuous muscle relaxation (Ctrl). All groups were ventilated with biphasic positive airway pressure assist ventilation (BIPAPassist) with low tidal volumes (V_t=6 ml/kg), PEEP=10 cmH_2O, F_IO_2=1.0. Asynchrony was accomplished by random variation of inspiratory time and respiratory rate, as well as end-expiratory hold maneuvers using remote control of the ventilator (Evita XL, Dräger Medical AG, Lübeck, Germany). Respiratory system mechanics, hemodynamics, gas exchange and distribution of ventilation (electrical impedance tomography) were assessed during 12 h. Lung edema was assessed by the wet-to-dry ratio.
Results and Discussion: The asynchrony Index (AIX) (percentage of missed and double triggered breaths) was higher in the Async group (AIX: Async: 15.9±5.7, Sync: 1.6±0.9 %; p<0.001). Oxygenation (PaO2/FIO2) was not different between groups. Respiratory rate (p=0.005), maximal and minimal dorsal-caudal trans-pulmonary pressure (p<0.001 and p=0.014, respectively), and work of breathing (WOB; p=0.004), but not wet-to-dry ratio of lungs (p=0.529), differed between groups.
Conclusions: In this model of acute lung injury, subject-ventilator asynchrony increased regional trans-pulmonary pressures and WOB, but not lung edema.

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09AP09-7
Diaphragm ultrasound, transthyretin and phosphorus levels 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, malnutrition and hypophosphatemia worsens outcomes in mechanically ventilated patients. The aim of this study was to find out whether diaphragm atrophy, severe hypophosphatemia, and low transthyretin level lead to prolonged ventilation. The study hypothesis was that the duration of mechanical ventilation, stay in the intensive care unit, and the frequency of complications in children depend on the degree of diaphragm thickness, transthyretin, and phosphorus level.
Materials and Methods: We examined data of 27 patients at the age 1 month-1 year, who needed invasive mechanical ventilation. In 3 patients ultrasound investigation was impossible. 24 patients were included in the study results analysis. Diaphragm thickness (Tdi) at the end of inspiration, levels of phosphorus and transthyretin were obtained on 1st, 3rd, 5th and then every five days during mechanical ventilation. The primary outcome was the time to liberation from mechanical ventilation. Secondary outcomes were complications: reintubation, tracheostomy, prolonged ventilation, or death (we check for the presence of these adverse events every day from baseline, then on day 28 of hospitalisation and until patient is discharged from the hospital). Statistical Package for the Social Sciences was used and the results were presented using median [IQR], adjusted hazard ratio (HR), duration ratio and odds ratio (OR).
Results and Discussion: 100% of patients at day 1st had severe hypophosphatemia (0.11 [0.18 to 0.06] mmol/l) and low level of transthyretin (104.7 [326.85 to 48.5] ng/ml). The level of phosphorus increased up to 0.68 [0.57 to 0.92] by median day 5 [IQR 5-10] and the level of transthyretin was 234.75 [626.76 to 213.06] by median day 10 [IQR 5-15]. Presence of hypophosphatemia was associated with prolonged ICU admission (duration ratio 1.45, 95%CI 1.15-2.25), and a higher risk of complications (OR 1.72, 95%CI 1.15-2.52). Low level of transthyretin was associated with a lower daily probability of liberation from ventilation (adjusted HR 0.68, 95%CI 0.45-0.82, per 10% decrease). Decreased diaphragm thickness was associated with a lower daily probability of liberation from ventilation (adjusted HR 0.57, 95%CI 0.42-0.65, per 10% decrease).
Conclusions: Low level of transthyretin and decreased diaphragm thickness during mechanical ventilation strongly impacts clinical outcomes.

09AP09-8
Low Tidal Volume Ventilation prevents Ventilation induced Pulmonary Inflammation in a Mouse model of Sepsis

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Background and Goal of Study: Pulmonary inflammation, increased vascular permeability, and pulmonary edema occur in response to primary pulmonary infections like pneumonia, but are also evident in endotoxemia or sepsis, resulting from exposure to microbial products like damage-associated molecular pattern molecules (DAMPs). Mechanical ventilation augments preexisting lung injury and inflammation. The objective of this study was to test the hypothesis that in mice, low tidal volume ventilation exacerbates DAMPS induced, preexisting lung injury and inflammation to a lower extent than high tidal volume ventilation.
Materials and Methods: To evaluate the impact of a low tidal volume ventilation strategy on pulmonary inflammation in sepsis, 10-12-week-old male C57BL6/N-mice were intraperitoneally (i.p.) injected with LPS, CpG-ODN (1668-thioate), a non-CG containing ODN (1612-thioate) or PBS. 60 minutes after injection, mice were ventilated either with low tidal volume (7±1 ml/kg) or high tidal volume (25±1 ml/kg) for 90 minutes. Hemodynamic and ventilatory parameters were recorded and inflammatory markers were analyzed from BAL that was obtained at the end of the experiment.
Results and Discussion: Peak inspiratory airway pressure was significantly increased in high tidal volume ventilated mice at 45 and 90 minutes independent of DAMP injection. Arterial blood pressure declined during mechanical ventilation in all groups with no effect of inflammation. Blood gas analyses showed no pH differences. However, pO2 was lower in low tidal volume ventilated and LPS-injected mice after 45 min. Furthermore, CO2 increased in low tidal ventilated mice that were sham, LPS, and 1612-thioate injected mice after 45 minutes and in 1668-thioate injected animals at 90 minutes, compared to corresponding high tidal volume ventilated groups. BAL protein concentrations were increased in 1668- and 1612-thioate injected and high tidal volume ventilation mice compared to low tidal volume ventilated animals. TNF-a protein concentrations were increased in LPS and 1668-thioate injected and IL-1b protein concentrations increased in LPS injected mice high tidal volume ventilated compared to low tidal volume ventilated and similar injected mice.
Conclusions: In summary, low tidal volume ventilation was sufficient to oxygenate mice. High tidal volume ventilation induced increases of inflammatory mediators in DAMP injected mice, that was absent in low tidal volume ventilated animals.

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09AP09-9
Comparison of the metabolomic signatures of saliva and urine in COPD patients.

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Background and Goal of Study: Acute exacerbations in COPD patients remain a global health problem with 2020 projection to rank fifth in morbidity and third in mortality. In COPD exacerbation, while the microbiome does not change significantly, the metabolome does. The metabolome is the sum of biochemicals in a given sample and provides a comprehensive description of processes occuring with functionally change with disease progression. The COPD metabolome has yet to be characterised and could provide novel insights into the underlying changes in pathology. COPD exacerbations can result in hospital admission and are usually treated with a combination of antibiotics and corticosteroids. We here assess how metabolomic biomarkers in a patients' saliva and urine change during and after COPD exacerbation.
Materials and Methods: Following approval by NHS Research Ethics Committee (Wales REC 7) and trial registration (16/WA/0036), patients were enrolled into the study between February 2016 and December 2017. Samples of saliva and urine were collected from 5 patients with a clinical diagnosis of COPD during and after a period of exacerbation. These samples were assessed by mass spectrometry and key metabolites were defined by multivariate analyses and using R-based Metaboanalyst platform. Signals linked to the prescribed drugs and their metabolites were removed from the analyses.
Results and Discussion: Saliva and urine are easier to collect than sputum or blood, and are noninvasive, making them ideal for monitoring disease status. Principle Component Analyses of both saliva and urine demonstrated clear differences during and after exacerbation. Mapping the main source of variation demonstrated that amino-acid metabolism was increased during exacerbation and decreased afterwards.
Conclusion: Saliva and urine metabolomic profiling may have a significant role in monitoring and diagnosing various stages of COPD. Results from this preliminary study show good clinical correlation and the relative ease in collecting these biofluids may result in swifter intervention and treatment.

09AP09-10
Mechanical ventilation with high positive end-expiratory pressure in patient with acute subarachnoid haemorrhage, elevated intracranial pressure and acute respiratory distress syndrome: a case report

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Background: Acute respiratory distress syndrome is an acute diffuse, inflammatory lung injury, leading to hypoxaemia. Severe ARDS is defined with PaO2/FiO2 ratio<100.Protective lung ventilation, recruitment maneuvers and permissive hypercapnia are the treatment and respiratory management in ARDS patients. Such treatment could be challenging in patient with subarachnoid haemorrhage caused by ruptured cerebral aneurysm and elevated intracranial pressure.
Case Report: A 64-year-old man presented with a high blood pressure, headache, loss of consciousness, vomiting and grand mal seizure due to SAH caused by ruptured aneurysm. Urgent surgery was performed, ventricular ICP monitoring was placed. On the 4th day of the ICU stay SpO2 declined to 76%,arterial pO2 decreased to 13.4 mmHg,PaO2/FiO2 was 44.The chest X-ray showed lung infiltration, more on the left. He was up to then ventilated with PEEP 5 cmH2O,and FiO2 40%.ICP was 22-31 mmHg, and cerebral perfusion pressure was 63-54 mmHg. Ventilation mode was changed to ASV with a gradual increase of PEEP to 22-28 cmH2O,FiO 100%. Arterial pO2 increased up to ¸135 mmHg, and ICP started to decrease to 22 to 14 mmHg, whereas CPP increased to 68-76 mmHg, and PaO2/FiO2 ratio increased to 337,table 1.

Patient data	Before recruitment	After recruitment
FiO2 %	100	40
PEEP (cmH2O)	5	28
pCO2 (mmHg)	51.75	57.75
pO2 (mmHg)	13.4	135
pO2/FiO2	44	337
SpO2 %	76	99
ICP/CPP (mmHg)	31/53	14/76

Discussion: Complex pathophysiology of disfunction of two organs and protective therapy raises the question/dilemma: “to save the lungs or to save the brain”? Recruitment maneuvers in patients with SAH hypothesize ICP increase. We decided to perform gradual recruitment maneuver because better lung function improves blood oxygenation with a greater oxygen delivery to brain.
Learning points: The main objective of intensive care is the treatment of all organs. Human physiology teaches us that all organs need oxygen and the lungs provide to oxygen to all organs. Therefore, we treat the lungs first because only with enough oxygen can we save the brain.

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09AP10-1
Management of delirium in critically ill patients: a retrospective analysis of patient outcome after delirium and a survey on delirium management knowledge

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Background and Goal of Study: Intensive care (ICU) delirium is a common, life-threatening, but potentially preventable clinical syndrome. Delirium is associated with decreased long-term cognitive function. However, its management has only gained broad interest since the Pain, Agitation, and Delirium-management guidelines in 2013.(1) This study aimed to assess the impact of delirium on patient outcome in our population and the knowledge of our healthcare professionals on delirium.
Materials and Methods: All patients admitted to the 36-bed mixed-ICU of ZOL-Genk, a non-academic teaching hospital, from 21-08-2015 until 07-12-2018 were included. Patients who received at any time point during their ICU-stay haloperidol or quetiapine, were deemed to have had delirium. Patients with and without delirium were compared for survival, length of stay (LOS) in ICU and hospital. A survey among ICU healthcare workers (28 staff, 30 trainees and fellows, 105 nurses) of our 36-bed mixed ICU assessed their understanding of the screening and management of ICU delirium. Data are presented as proportions or medians (IQR) and compared by respectively Fisher’s exact or Wilcoxon test.
Results and Discussion: 1521/9203 patients (16%) had delirium, of which 1090 (72%) and 431 (28%) were treated with haloperidol and quetiapine respectively. Mortality was higher in patients with delirium (28%) compared with those without (16%)(p<0.0001). Patients with delirium had a longer LOS in ICU (5d (3-10)) and hospital (19d (11-36)) than patients without (2d (2-4) and 9d (5-15))(both p<0.0001). The survey response rate was 64%, 80% and 53% for staff, trainees and fellows, and nurses, respectively. Only 16/42 (38%) doctors and 18/56 (32%) nurses were familiar with the CAM-ICU score, a validated screening tool for delirium in the ICU. Only 14% of doctors and 23% of nurses were familiar with the pharmacodynamics and pharmacokinetics of haloperidol. However, 74% of doctors and 79% of nurses could clinically identify a hyperactive delirium.
Conclusion: There is a lack of knowledge of the delirium screening tool and the pharmacology of antipsychotics, despite being used in 16% of the patients and the negative impact of delirium on patient outcome. Trainings are needed to familiarise healthcare professionals with the Pain, Agitation, and Delirium-management guidelines as a first step to their implementation in daily practice.
References
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09AP10-2
Knowledge and implementation of the ABCDEF bundle of the Pain-Agitation-Delirium-Immobility-Sleep Disruption guidelines in Belgian intensive care units

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Background and goal of the study: The ABCDEF bundle is an initiative from the Society of Critical Care Medicine (SCCM) and aims to improve patient outcomes after an ICU-stay. Bundle implementation includes Assessing pain, Both spontaneous awakening and breathing trials, Choice of drugs, Delirium monitoring/management, Early exercise/mobility and Family empowerment.[1] The goal of our study was to assess the knowledge and use of the bundle in Belgian ICUs.
Materials and methods: We performed a cross-sectional online survey via SurveyMonkey in November 2018 and asked representative questions about the bundle to intensivists in 60 different ICUs in Belgium including university and non-academic hospitals. One intensivist per ICU was contacted to obtain a reliable indication of the knowledge and use at ICU level.
Results and discussion: We received data from 43/60 (72%) ICUs. 56% of the respondents never heard of the bundle before. A scale to evaluate the patient’s self-report of pain was used in 91% and pre-procedure analgesia for painful procedures was present in 93%. Daily spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT) were performed in respectively 46% and 59% of ICUs, while both SAT and SBT were performed in only 32%. Sedation scales were generally implemented (83%), with the use of targeted sedation in 83% and avoidance of benzodiazepines in 98% of ICUs. Dexmedetomidine is used in 92% for light sedation. Only 54% evaluates delirium with a validated scale, with a daily assessment of 46%. Pharmacological treatment of delirium is the preferred method. Most of the ICUs have a programme for early mobilisation and rehabilitation (85%), however scales for measuring ICU-acquired weakness are not used in 73%. Family empowerment is implemented by daily talks (78%) and shared end-of-life decisions (97%), yet 68% of ICUs do not allow presence of family in resuscitation situations and the visiting time is limited to less than 2 hours in 93% of the ICUs.
Conclusion: The knowledge and implementation of the ABCDEF bundle in Belgium is incomplete. More than half of the respondents never heard of the bundle. More attention is needed for the combination of SAT and SBT, delirium monitoring and family empowerment to improve standard of care in Belgian ICUs.
References:
1. Pun BT, Balas MC, Barnes-Daly MA, et al. Caring for critically ill patients with the ABCDEF bundle: results of the ICU Liberation Collaborative in over 15,000 adults. Crit Care Med 2018.

09AP10-3
Post- operative delirium : risk factors

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Background and Goal of Study: Delirium is one of the most comum postoperative complication in old patients. There are a lot of associated risk factors, the aim of this study is to identify these factors.
Materials and Methods: we analyzed the medical records of patients undergoing total hip arthroplasty during the period August 2013 to January 2014 and who were admitted to the intensive unit (ICU) ; 102 subjects . Patients with suspicion of delirium at admission underwent evaluation by means of the CAM -ICU (Confusion Assessment Method in the Intensive Care Unit) , applied by the nurses. Through the analysis of medical records, we identified risk factors for delirium selecting the most incidents for analysis : systemic hypertension (SH), heart failure (CHF), chronic renal failure (CRF), diabetes, dyslipidemia, perioperative bleeding, transfusion and length of stay in the intensive care unit (ICU); in addition to gender , age , surgical time, type of anesthesia and blood transfusion. For statistical evaluation we used descriptive analysis and binary logistic regression using the SPSS software .
Results and Discussion: The sample was 102 subjects, 50 females, aged between 51 and 91 years. Third two had delirium at some time in hospital. Was held initially a descriptive analysis of the results to verify the correlation of risk factors with delirium. We used binary logistic regression in an attempt to replicate a model that had high sensitivity estimate in patients with low likelyhood of developing delirium. Upon repeated analysis, was obtained as a prototype compound of the variables: male; not have: IRC , hypertension ; less than 24 hours of ICU admission , obtaining 92.9 % sensitivity in identifying patients with a low likelihood of developing delirium. We calculated odds ratios still each variable: Female (OR: 4.17/95% CI 1.39 to 12.51) , CRF (OR: 7.55/95% CI:1.63 to 34.89), hypertension (OR: 5.47/95 % CI:1,68 to 18), more than 24 hours in the ICU (OR: 3.07/95% CI : 1.42 to 6.66). The ICC variable was excluded from the analysis because all patients with this comorbidity developed delirium postoperatively; can generate a statistical interference.
Conclusions: Female, kidney disease, hypertension and more than 24 hours in the ICU is the most incident risk factors for delirium. The results of this study are not conclusive, for the definitive diagnosis of exclusion of post- operative delirium, however, proposes a discussion about this complication

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09AP10-4
Characteristics of Postoperative Delirium in Intensive Care Unit using Heart Rate Variability (HRV) in Night Time Recording

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Background and Goal of Study: Delirium is recognized as a significant contributor to postoperative morbidity and mortality in intensive care unit (ICU). The early detection and appropriate intervention are indispensable. We previously showed that high frequency (HF) power which given electrocardiogram (ECG) measurement on the day before surgery was significantly decreased in delirium patients (2). HF power is considered as parasympathetic nerve activity. The significant decrease of HF power in delirium patients indicates that preoperative deficiency of autonomic nerve system may be related to postoperative delirium. There are no data of HRV measurements during night time in ICU in regardless of delirium. The aim of study is to compare HRV analysis between postoperative delirium patients and non-delirium patients during postoperative day (POD) 1 night and POD2 night.
Materials and Methods: This study was approved by the Institutional Review Board. Informed consent was obtained from patients scheduled for esophageal cancer surgery. ECG were recorded on POD1 night and POD2 night. The patients were induced general anesthesia with epidural anesthesia. The patients of trachea were extubated in the morning on POD1 and subsequent management was continued in ICU. Based on medical interview, the psychiatrists diagnosed delirium.
Results and Discussion: Twenty patients completed the study schedule and were analyzed. One person was excluded because of atrial fibrillation. Five of them experienced delirium (delirium group) and 14 of them did not (non-delirium group). Except sex there are no difference between two groups. The preoperative HRV data showed that HF power in the delirium group was low compared to non-delirium group on both POD1 and POD2 (Welch t test, $P < 0.05$). HF power reflects parasympathetic nerve activity. It is considered that disorder of autonomic nervous system causes sleeplessness. Furthermore sleeplessness is a major risk factor of delirium. Three lead ECG is non-invasive and HRV measurement is useful method for autonomic nerve activity. Furthermore HRV measurement might help the diagnosis of postoperative delirium.
Conclusions: In this study, postoperative ECG showed the significant decrease in HF power in the delirium patients on POD1 and POD2.
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09AP10-5
Using of dexmedetomidine in a patient with severe pain syndrome.

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Background: Patients in intensive care unite (ICU) often need sedation. Level of sedation is selected individually for a specific situation[1]. But this shouldn't prevent early rehabilitation. Dexmedetomidine (DEX) was used for the clinical situation described below because of its ability to enhance the effects of opioids[2].
Case Report: A 20-year-old man was admitted to Regional Center of Oncology to the Department of Abdominal Surgery with suspected pancreatic cancer. He complained of severe pain in the left knee, weakness in the left foot, recurrent pain in the right leg, difficulty walking, lumbar pain, left ptosis, diplopia, headache, general weakness. Because of the severe pain he was transferred to the ICU. In CT scans neoplastic process of the pancreas, focal lesions of the kidneys, adrenal glands, omentum, retroperitoneal mesenteric lymphadenopathy, hepatosplenomegaly, ascites was found. Lumbar spine MRI showed signs of multiple lesions of the cauda equina, spinal nerves at the lumbar level andlymphadenopathy, manifestations of lymphoproliferative disease. Microscopic examination result - non-Hodgkin's lymphoma. Laboratory tests were conducted. Special treatment cannot be started without the results of immunohistochemistry. Symptomatic therapy in the ICU was initiated. The first 4 days patient received combined analgesic therapy: morphine (40 mg/day) IM, parecoxib (80 mg/day) IV, nalbuphine (10mg/day) IM. We decided to add to therapy DEX for sedation and potentiation of the action of opioids. In the next 4 days the patient received DEX (0.5 μg/kg/h) as an IV infusion, morphine (20 mg/day) IM, parecoxib (80 mg/day) IV. After the correction of pain syndrome the patient was transferred to oncohematology unit for special therapy.
Discussion: As a result of the addition of DEX to therapy we were able to reduce the number of opioids, as well as to eliminate the patient's agitation. In addition the level of sedation allowed maintaining full contact of medical staff with a patient[2]. We believe that using of DEX will ensure patient comfort and help with pain syndrome treatment.
References:
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Learning points: DEX allows reducing the number of opioids and achieving a sufficient level of sedation.

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09AP10-6
Evaluation of a visual noise warning system on noise levels and patients' sleep quality in a surgical intensive care unit.

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Background and Goal of Study: The effects of noise are harmful to patients in the ICU environment, which are particularly noisy places (1). High noise levels seem to be a factor in sleep disturbance, which can in turn result in increased morbidity (2, 3). We aimed to determine whether the implementation of a visual noise warning system had an effect in reducing noise levels in a surgical ICU and if this showed an improvement in patients' quality of sleep.
Materials and Methods: An analytical, observational and interventional study was conducted in a 12 bed surgical ICU. Noise levels were continuously recorded using a Type II sound level meter for 6 weeks. On the third week of study, a visual noise warning system (SoundEar II ®) which changed colour depending upon noise levels inside ICU, was put in place and switched off in the beginning of the fifth week. Sleep quality was evaluated using the Richards-Campbell Sleep Questionnaire (RCSQ).
Results and Discussion: Mean noise night time levels in the pre-intervention period were of 55.98 dBA, during the intervention they were reduced to 54.14 dB and the post-intervention period showed mean levels of 54.98 dBA. Mean noise levels were significantly reduced by 1.35 dBA (CI 95% 0.63 to 2.08, $p < 0.001$) with a sustained reduction of 0.86 dBA from baseline noise levels two weeks after the SoundEar II ® was switched off. Mean RCSQ scores during the three study periods were similar (period 1: 56.53mm, period 2: 54.75mm, period 3: 50.84mm). A correlation was found when analysing individual nights, with higher noise levels at night showing lower RCSQ scores (r= -3.92, CI95%; -7.57 to -0.27, p=0.04).
Conclusions: Visual noise warning systems can be an effective tool in providing a reduction in noise levels in critical care units and in turn aiding in quality of sleep in critically ill patients.
References:
1. Xie H, Kang J, Mills GH. Crit Care. 2009;13:209
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3. Grandner MA, Hale L, Moore M, Patel NP. Sleep Med Rev. 2010;14(3):191–203

09AP10-7
A measure of noise levels in a surgical ICU and the effects of a visual noise-warning system on noise levels.

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Background and Goal of Study: The WHO guidelines state that noise levels on hospital wards should not exceed 30 dB noise equivalent levels (LAFeq) and that peak noise levels at night should not exceed 40 dB (1). ICUs are noisy environments and mean sound levels are often reported in the range of 45-65dB with peaks above 85dB (2). Much of the noise is due to human activities and speech (3). The aim of our study was to evaluate the impact of a visual noise-warning system on noise levels in a surgical ICU.
Materials and Methods: The LAFeq, as well as maximum (LAFmax), minimum (LAFmin), peak and percentile 90 sound levels were recorded as A-weighted curves using a Type II sound level meter. All sound levels were measured each second for a 6 week period in a 12-bed surgical ICU. Readings were divided in morning (between 8.00-15.00), afternoon (15.01-22.00) and night (22.01-7.59). The third week, two noise measuring visual alarm systems (SoundEar II®) were implemented across the unit. After analysing baseline noise levels, the alarm system was set to light up green when noise levels were below 55 A-weighted decibels (dBA), orange when noise levels were between 55 dBA and 60 dBA and turn red when noise levels rose above 60 dBA.
Results and Discussion: Noise levels were reduced by 1.35 dBA (CI 95% 0.63 to 2.08, p < 0.001) when the SoundEar II® was in place. Comparing the pre intervention period and the post intervention period noise levels were reduced by 0.86 dBA (CI 95% 0.16 to 1.56, p = 0.02). No statistically significant differences were found between period 2 and 3 (when the SoundEar II® was in place and when it was switched off), although sound levels tended to increase 0.5 dBA (CI 95% -0.13 to 1.13, p =0.12).
Conclusions: In our ICU, noise levels were high far above the WHO's recommendations. The implementation of a visual noise- warning significantly reduced noise levels and this reduction was maintained after the system was turned off.
References:

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09AP10-8
Controlling pain and opening visiting hours decrease anxiety among patients in intensive care units

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Background and Goal of study: An intensive care unit (ICU) admission is a stressful event. A previous study conducted in our unit, showed that "missing your family" and "feeling pain", were the top 2 stress factors in the ICU. The purpose of this study was to implement changes concerning these 2 factors, and determine the effects on anxiety scores.
Materials & Methods: Patients admitted to the ICU in February 2017 were included. The modifications implemented before conducting the study were: applying a standardized pain management algorithm and extending visiting hours from 1.5 hours to 4 hours daily. The Intensive Care Unit Environmental Stressor Scale (ICUESS) was used to collect data from the patients who were interviewed within 48 hours of discharge from ICU.
Results and Discussion: 38 patients were included. There were no significant differences in patients' characteristics between 2016 and 2017. Both samples reported a mild level of stress with a significant decrease in 2017 compared to 2016 (M = 69.97 in 2016 v/s M = 22.87 in 2017; p-value <0.01). After implementing the changes, we noticed a significant decrease for the medians of the top 5 most stressful stressors between 2016 and 2017, except for the stressor "being thirsty".
Conclusion: The importance of adopting practical and effective pain assessment and relieve measures should be emphasized in ICUs to provide patients with the best possible analgesia. Moreover, opening visiting hours has an important role in decreasing anxiety scores for ill patients with potential beneficial effects on patients' health.

09AP10-9
ICU-acquired weakness, assessed by the MRC-SUM score, and its association with length of stay: a single centre retrospective analysis

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Background and Goal of Study: Intensive care unit-acquired weakness (ICUAW) has been recognized as an important and persistent complication in survivors of critical illness. ICUAW can be assessed using the sum of manual muscle strength test scores in 12 muscle groups (Medical Research Council sum score, MRC-SUM, range 0-60). The MRC-SUM was included in our early mobilisation programme to provide quantifiable data on muscle weakness in prolonged critically ill patients and to evaluate the efficacy of their rehabilitation. This study analyses the implementation rate of the MRC-SUM and the impact of ICUAW on mortality and length of stay in our patient population.
Materials and Methods: The setting is a 36-bed mixed ICU of a large non-academic teaching hospital. The first MRC-SUM was taken on 27-09-2016 and patients admitted until 03-12-2018 were included. Two trained physiotherapists took the MRC-SUM scores. The new protocol advised to have at least 1 MRC-SUM in the prolonged critically ill patients (ICU-stay >7 days). ICUAW is defined as an MRC-SUM score of less than 48. Data are presented as proportions or medians (IQR) and compared by Fisher's exact and Wilcoxon tests, respectively.
Results and Discussion: In the studied period 6543 patients were admitted to the ICU, of which 682 (10.4%) had a prolonged ICU-stay. 306/6543 (4.7%) underwent a MRC-SUM score assessment on median day 10 (IQR 4-21) in their hospital stay. MRC-SUM was median 46 (IQR 41-48). ICUAW was present in 182/306 patients (59%). 157/306 (51%) patients had a prolonged ICU-stay. Patients with ICUAW had an ICU-LOS of 10d (IQR 4-21) versus 7d (IQR 4-13) in patients without ICUAW (p=0.009). Hospital LOS was longer in patients with ICUAW (32d (IQR 20-56)) than in those without ICUAW (20d (IQR 13-43))(p=0.0002). 50/182 (27%) of patients with ICUAW died, compared with 20/124 (16%) of those without ICUAW (p=0.02).
Conclusions: MRC-SUM measurements to quantify ICUAW were done in about half of the target population of prolonged critically ill patients. The timing of the MRC-SUM was also too variable for structured detection of ICUAW, which may be related to the required cooperation of the patient during the MRC-SUM assessment. Nevertheless, we could confirm the poor outcome of patients with ICUAW.

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09AP10-10
Ultrasonographic evaluation of ICU-acquired weakness (ICU-AW) by measurement of femoral muscle cross sectional area in infants – a potential novel method

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Background: ICU-AW has been recognized as a complicated problem. In infants, however, the diagnosis of ICU-AW largely depends on physicians' subjective decision, as quantitative muscle strength tests are difficult. We hypothesized ultrasonographic assessment of muscle volume could evaluate ICU-AW in infants.
Case Report: We measured cross sectional area (CSA) of rectus femoris muscle (RFM) on right foot using linear array ultrasound probe. According to a previous report [1], the probe was put on the middle of the thigh. We also evaluated circumference of the mid-thigh using a tape measure.
Case 1: A 2-months-old female was planned Norwood surgery for interruption of aortic arch. After the surgery, she was deeply sedated including continuous infusion of muscle relaxant until delayed sternal closure on the postoperative day (POD) 7. During this period, the CSA rapidly reduced to about 70% of preoperative level (0.873cm2 on POD -1 to 0.640cm2 on POD 7). On POD 9, tracheal extubation was planned, but was aborted because of tachypnea and weak cough. Attending physicians considered ICU-AW. She received respiratory rehabilitation until successful extubation on POD 14. Non-invasive respiratory support was continued due to persistent ICU-AW until POD 24. During this period, the CSA of RFM was gradually increased (0.72cm2 on POD 25). Circumference of the thigh showed elevation in a few days after the surgery. This seemed peripheral edema due to positive water balance.
Case 2: A 4-months-old female with truncus arteriosus was planned truncal valve plasty and Rastelli surgery. She received the planned operation and re-operation for the valve on POD 10. After both operations, her trachea was successfully extubated on 4 days after each operation. During the perioperative period around both operations, her CSA of RFM showed no apparent change. Circumference of thigh showed elevation early after the operations, both paralleled water in-out balance.
Discussion: These cases suggested our novel method could assess ICU-AW in infants. Direct observation of muscle would not be affected by peripheral edema. Further investigation is necessary to reveal its reliability and association with clinical outcomes.
References: Thomaes T, et al. Reliability and validity of the ultrasound technique to measure the rectus femoris muscle diameter in older CAD-patients. BMC Med Imaging. 2012 Apr 2;12:7
Learning points: Ultrasonographic assessment of muscle volume could evaluate ICU-AW in infants.

Critical Emergency Medicine - Trauma and Resuscitation

10AP01-1
A Case report: Managing priorities and logistics of 'non-hospital teams' in theatres

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Background: Managing isolated limb traumas is not something that is novel for most hospital theatre teams. However since the introduction of Major Trauma Centres (MTC) in the UK in 2012 (1), even some large teaching hospitals find they are less familiar with these types of injuries due to their increasingly rare presentation. This lack of familiarity is exagerated when there is a requirement for external emergency services in operating theatres. Their presence can bring different challenges and their priorities need to be carefully considered. In a review of the literature, there is no acknowledgement of the importance of this communication between hospital teams and external emergency services as well as the challenges that it may present.
Case Report: A 21 year old male was brought via air ambulance to St Thomas' Hospital (STH) with isolated limb trauma overnight. He presented with a penetrating right forearm injury from a spiked metal fence, from which he had been impaled after falling. STH is a trauma unit which rarely manages impaling injuries. The patient was haemodynamically stable but heavily intoxicated after the use of recreational ketamine, with a further dose given by HEMS. A large portion of the fence was in situ when the patient was assessed in A&E, with his arm immobilised. The patient required removal of the foreign body followed by an urgent washout and exploration of the wound by the plastic surgery team.
Discussion: Although not clinically complex, the case presented logistical challenges rarely encountered for the theatre team. The large metal gate presented difficulties for induction due to its position lying across the patient. Further challenges included coordinating a 'non-hospital' team (fire service) in a theatre environment and considering their plan and priorities. Theatre sterility needed to be prioritised with use of 'dirty' power tools and uniforms required for removal of the foreign body. Removal created heat and sparks increasing risk of fire or explosion. Further endangering the patient, staff and anaesthetic equipment.
References:
1. https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(18)30007-5/fulltext
Learning points: This case highlights the importance of communication between theatre teams and non-hospital teams. A thorough team briefing should be performed highlighting each team's priorities and concerns. Only then can a plan be formulated to proceed safely in the best interests of the patient.

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10AP01-2
Fatal pulmonary haemorrhage following multiple time intercostal drain insertions.

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Background: Intercostal drain (ICD) insertion is a common procedure in any critical care unit. Multiple ICD insertions may be lead to injury to vessels or pulmonary parenchyma.
Case Report: A 70-year-old man underwent coronary artery bypass grafting (CABG). The patient had a total three ICD insertion during the hospital course, first ICD was inserted on the right side of chest, post-CABG. This first ICD was removed after 3 days in the post-operative period following extubation. Patient developed right-sided pneumonia with pleural effusion with respiratory distress and patient was reintubated on postoperative day 5. The second intercostal drain was inserted due to right-sided pleural effusion which was removed. Unable to wean the patient from ventilator due to respiratory distress after 2 weeks of ventilation tracheostomy was done. Following tracheostomy patient had reduced air entry on the right side, increased airway pressure and reduction in oxygen saturation. Chest x-ray revealed right-sided pneumothorax and an intercostal drain insertion was done. Following chest drain, insertion patient had bleeding from the intercostal drain and developed hypotension. Fluid resuscitation was started, with ongoing hypotension ICD was clamped and urgent thoracotomy was planned. With hypotension patient suffered cardiac arrest, cardiopulmonary resuscitation was done but the patient couldn't be revived.
Discussion: Pulmonary haemorrhage is known complication of ICD insertion [1,2]. Following pneumothorax ICD insertion was attempted from same site were second ICD was done. Previous ICD insertion has caused the development of adhesions which was evident on chest x-ray. Reattempting ICD insertion from the same site has caused haemorrhage. Multiple ICD insertions should be done under real-time imaging in the form of either ultrasound guidance or Fluoroscopy [3].
References:
1.Takanami I. Pulmonary artery perforation by a tube thoracostomy. Interact Cardiovasc Thorac Surg. 2005;4:473–4.
2.Rombola etal. Parapneumonic pleural effusion. Accidental insertion of a chest tube into the right pulmonary artery. Eur J Cardiothorac Surg. 2008;34:903.
3.Harnsberger etal. Rapid, inexpensive real-time directed thoracocentesis. Radiology 1983;146:545–6.
Learning Points: When multiple insertions of ICD are warranted due to multiple indications, careful examination of chest x-ray for correct intercostal space selection for ICD insertion along with use of real-time imaging is imperative.

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10AP01-3
An unusual case of colon perforation presenting with life-threatening pneumomediastinum and pneumothorax after sedation colonoscopy

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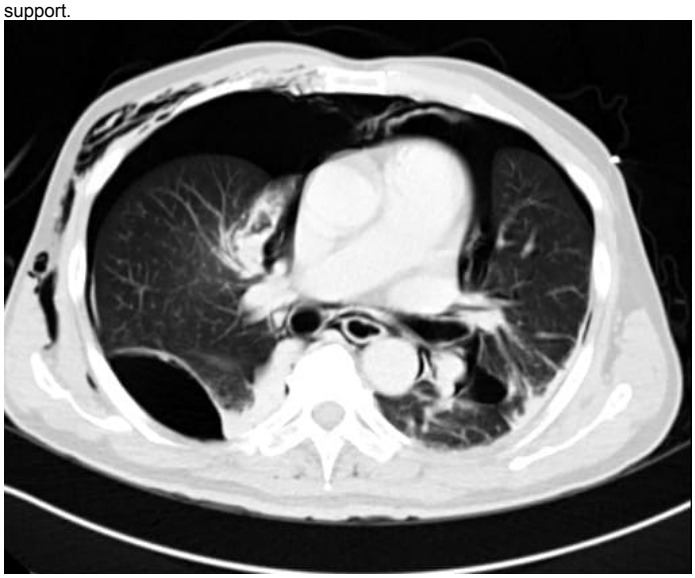
Background: We report a patient who undertook a routine colonoscopic examination with occult colon cancer. Perforation with resulting pneumoperitoneum, pneumomediastinum, pneumopericardium and pneumothorax were found, which required emergent surgical intervention. The pathophysiology and anesthetic plan are discussed.
Case Report: A 63-year-old male undertook screening gastroscopy and colonoscopy for abdominal cramps. After the examination, he reported severe abdominal pain and hypoxia. An abdominal computer tomography confirmed massive pneumoperitoneum, pneumomediastinum, pneumopericardium and pneumothorax. It was found that air was insufflated into the colon instead of CO2 during the examination, making tissue absorption of the gas more difficult. Severe pneumopericardium and pneumoperitoneum might have caused instabilities of the cardiopulmonary system. The patient showed signs of tachycardia, tachypnea, desaturation, hypertension. and engorged jugular veins. Emergency operation was indicated. General anesthesia with an artery line monitor was arranged. We carefully titrated induction medication with the goal of maintaining sufficient cardiac output. During laparotomy, the surgeon found colon tumor invasion and metastasis. The lesion was repaired and the patient was transferred to ICU for further ventilatory support.



Discussion: Type of air insufflation (air vs CO2) during colonoscopy is an important determinant for hemodynamic stability after iatrogenic bowel perforation. Air requires more time to be absorbed [1] and may induce rapidly progressive life-threatening events. Severe pneumoperitoneum and pneumopericardium compromise the cardiovascular system. Maintaining sufficient cardiac output is crucial to the anesthetic plan.
References:
[1] Fernández-Calderón M, Muñoz-Navas MÁ, Carrascosa-Gil J, Carbon dioxide vs. air insufflation in ileo-colonoscopy and in gastroscopy plus ileo-colonoscopy: a comparative study. Rev Esp Enferm Dig. 2012;104 :237-241.
Learning points: pneumoperitoneum and pneumopericardium caused by insufflation of air compromise the cardiovascular system. Maintaining sufficient cardiac output is crucial to the anesthetic plan.

10AP01-4
Aortocaval fistula after discectomy surgery: a case report.

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Background: Major vascular injury is a rare but potentially fatal complication during spinal surgical procedures performed in orthopaedic and neurosurgical units, requiring an early diagnostic suspicion and prompt intervention.
Case Report: We report a case of a 67-year-old female patient with a secondary injury of abdominal aorta and inferior vena cava during an elective L4-L5 discectomy procedure under general anesthesia (disk herniation diagnosis, otherwise healthy). Near the end of the surgery she developed acute hypotension combined with low exhaled CO2 levels. During the primary survey she was subjected to clinical examination, a transesophageal echocardiography and abdominal ultrasound in the OR to rule out embolisms, iatrogenic trauma, hypovolemic, cardiogenic or anaphylactic shock. Simultaneously, invasive arterial blood pressure was measured, large venous accesses were added and a state of emergency to the OR and blood bank staff was declared. Hb decreased to 5g/dl, severe hypotension persisted despite fluid overload and massive transfusion with a rapid-infuser device and an important retroperitoneal haematoma was found in the ultrasound so we contacted the vascular surgeons who detected two great lacerations, one in the aorta and the other in the inferior vena cava. Once the vessel injuries were repaired they were unable to close the abdominal wall due to edema so the patient was transferred to the ICU for further treatment. Initial evolution was compromised by ARDS but after 2 months she was discharged from hospital.
Discussion: Immediate recognition is key to the survival of patients in these acute complications, followed by a systematic approach including communicating without delay the situation to the operative team, resuscitation and specific operative strategies to locate and control the hemorrhage. Potential risk for significant blood loss dictates the requirement of continuous improvement in hemodynamic monitoring and the need of safety protocols for bleeding control.
References:
1. Feliciano DV. Management of traumatic retroperitoneal hematoma. Ann Surg 1990; 211:109.
2. The European guideline on management of major bleeding and coagulopathy following trauma. Rossaint et al. Critical Care 2016 20:100
Learning points: For the hemodynamically unestable patient, a focused assessment with ultrasonography should be obtained. Negative chest findings should increase suspicion for retroperitoneal bleeding during spinal procedures.

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10AP01-5
Successful multidisciplinary treatment of secondary aorto-esophageal fistula

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Background: Aorto-esophageal fistula is a rare but catastrophic condition causing massive and life-threatening gastrointestinal hemorrhage. [1] Management of aorto-esophageal fistula remains controversial. [2] Mortality is reported to be 100% without treatment, but even with intervention is only 77%. [3]
Case Report: A 65 year old man presented to the emergency department with massive active hematemesis after minimally invasive esophagectomy. The patient was operated 46 days prior for a distal esophageal adenocarcinoma and managed postoperatively according to an enhanced recovery protocol. Computed tomography angiography (CTA) was performed showing an aorto-esophageal fistula. The patient received a massive blood transfusion and hemorrhage control was achieved via thoracic aortic graft insertion. The patient was successfully discharged from the intensive care unit 5 days postoperatively. He survived this fatal condition with minor neurological deficit.
Discussion: Multidisciplinary teamwork and prompt decision making resulted in patient survival despite resuscitated hemorrhagic shock secondary to an aorto-esophageal fistula.
References:
[1] Fuyuhiko Y et al, Ann Thorac Surg (2002) 73: 673-639
[2] Xu R et al, Journal of Cardiothoracic Surgery (2013) 8: 206
[3] Yang Y et al, Am J of Emerg Med (2018) 36: 343.e1-343.e3
Learning points: Survival of an aorto-esophageal fistula is possible with fast identification of the entity and hemorrhage control with immediate endovascular intervention and multidisciplinary teamwork.

10AP01-7
Epidural morphine in patients with multiple rib fractures: case report

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Background: Rib fractures occur in 10% of cases in patients with severe trauma and in 40% of patients with blunt chest trauma. Multiple rib fractures are accompanied by severe pain that makes breathing difficult, which underlies the development of secondary complications. Systematic use of opioids can lead to respiratory depression, especially if they are used in high doses. Epiural administration of local anesthetics may increase the risk of developing atelectasis due to the segmental block of intercostal muscles.An alternative and promising method is the epidural morphine in these patients.
Case Report: Male 19 years old, was admitted to the emergency department. Diagnosis: Fractures of 4-11 ribs on the left without displacement of fragments. Bruise of the left lung. Left hemopneumothorax. Right-sided pneumothorax, comminuted fracture of the left ilium with displaced fragments. Hematoma of the soft tissues of the left iliac region. Small pelvic hydroperitonium. The severity of injure on the ISS scale is 38 points.Epidural administration of morphine 2 mg was prescribed as a bolus, then a constant infusion at the rate of 0.4-0.6 mg / h. Additionally, as components of multimodal analgesia. The results of hemodynamics and the level of pain are presented in the figure 1 and 2.The patient is transferred from ICU in satisfactory condition in 4 days after the operation.
Discussion: Opioids, administered epidurally, cause analgesia even at low concentrations in the cerebrospinal fluid, which is sufficient for highly effective pain relief for several hours. Morphine has advantages over meperedin and fentanyl, as it creates a wide antinociceptive zone, blocking almost all segments of the spinal cord. Thus, morphine creates a depot in the fatty tissue of the epidural space and slowly diffuses through the dura mater, reducing the risk of adverse effects.In epidural analgesia with morphine, the indicators of MAP and heart rate vary slightly only in patients who have suffered massive blood loss and hemorrhagic shock. The development of arterial hypotension after administration of morphine epidurally occurs very rarely.
References:
Epidural administration of morphine is the optimal method of pain relief for patients with traumatic rib fractures. Low doses of morphine do not cause undesirable effects, such as effects on hemodynamics. Therefore, it is safe to use it in patients undergoing massive blood loss and hemorrhagic shock.

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10AP01-8
Sedation for resuscitation

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Background: Cerebral perfusion pressure generated by the cardio-pulmonar resuscitation (CPR) correlates closely with brain oxygenation during resuscitation[1]. Therefore, CPR-induced consciousness is a potential effect of good quality resuscitation[1]. The authors describe a case of cardiac arrest during coronary angiography. The immediate CPR manoeuvres led to maintenance of consciousness, and a decision was made to sedate the patient.
Case Report: A 72-year-old woman, ASA 2 classification – type 2 diabetes, admitted in the emergency room due to myocardial infarction with ST elevation, was proposed for coronary angiography. During the procedure cardiac arrest in asystole occurs and CPR is initiated. During this time, the patient remains awake, alert, producing incomprehensible sounds, and engaged in purposeful movements during manual chest compressions, without occurring return of spontaneous circulation (ROSC). She was sedated with 2 mg of midazolam IV, 100 mcg of fentanyl IV and 30 mg of propofol IV. ROSC occurred after 4 minutes, without the need for tracheal intubation. After two-vessel angioplasty, the patient was transferred to the coronary intensive care unit, in spontaneous ventilation, under ionotropic support.
Discussion: In literature reviews, the level of consciousness reported during CPR varies widely[1].In the case presented the maintenance of consciousness was noticeable. The patient was sedated in order to improve her comfort and to reduce the risk of post-traumatic stress. Although there are no guidelines available, some regional consensus suggest sedation to control agitation and/or pain during mechanical chest compressions[1]. The cause for CPR-induced consciousness is unclear, but is likely the result of a combination of factors[1]. In this case, the patient monitored, the in-hospital witness cardiac arrest and the early and skilled CPR were key factors leading to CPR-induced consciousness.
References:
1. Resuscitation 2015; 86: 44-48. 2. Resuscitation 2016; 103: e15-e16.
Learning points: CPR-induced consciousness may become an emerging phenomenon, with increasing high-quality CPR practices[2]. This requires further research, education and training of health care providers in the management of patients experiencing CPR-induced consciousness.

10AP01-9
Auto Pulse in prolonged resuscitation: clinical report

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Background: Cardiac Arrest (CA) by Pulmonary Embolism (PE) has a high mortality rate and poor neurological outcomes after long Advanced Life Support (ALS). When PE is clinically suspected, ALS for a long period of time with high quality chest compressions is mandatory. In these situations, External Cardiac Compressor (ECC) is a useful device.
Case Report: 65year-old male, proposed for retropubic prostatectomy due benign prostatic hyperplasia. History of hypertension, diabetes, dyslipidemia and ex-smoker. The procedure was performed without complications and the patient was clinical stable after 48h. After the first stand up he had a syncope with recovery after 1 minute. It was objectified dyspnea, SpO2 88% with High Concentration Mask, hypotension and metabolic acidosis. Once in the Emergency Room (ER) he had CA in AEsP with return of spontaneous circulation (ROSC) after 1 ALS cycle. EKG and transthoracic echocardiography (TE) were performed. New CA happened, and ALS was started with Auto Pulse. Due to clinical probability of PE, hemodynamic instability and signs of acute right heart failure in TE, we decided to proceed with fibrinolysis without Pulmonary CT angiography (PCTA), after discussion with Urology and Cardiology. Intravenous perfusion of Alteplase 100mg was started. After 40 minutes from the first CA and with ECC, patient had ROSC with recovery of consciousness. PCTA confirmed the diagnosis and the patient was admitted in intensive care unit. At hospital discharge (55d) he had no neurological sequel.
Discussion: Massive PE survival is dependent on early diagnosis and treatment, highly refractory to conventional resuscitation with mortality rates 65-95%. The most value test with very typical findings is TE, easy to perform in experienced hands and without interrupting chest compressions. EKG findings are also suggestive of PE but less specific. The final diagnosis is given by PCTA. European Society of Cardiology recognizes different treatments, but catheter-directed thrombolysis is preferred. Overall evidence is insufficient to recommend the routine use of ECC and few studies comparing ECC with manual compressions have heterogenous data. However, in some scenarios of CA, with properly trained personnel, its use is encouraged.
Learning points: Multidisciplinary discussion is crucial to decide the best treatment for our patient. ECC can be useful in ER with institutional protocols to act quickly with better outcomes in lifesaving situations.

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10AP02-2
Prediction of long-term quality of life after severe traumatic brain injury based on variables at hospital admission

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Background and Goal of Study: Early variables after severe traumatic brain injury (sTBI) could predict health-related quality of life (HRQoL). The aim was to investigate the rate of patients with a low or impaired HRQoL 4 years after sTBI and to develop of a prediction model with early variables.
Materials and Methods: Adult patients with sTBI [abbreviated injury score of the head region (HAIS) >3] and an assessment with the disease-specific HRQoL instrument "Quality of Life after Brain Injury" (QOLIBRI) were included. The outcome was the total score (TS) of QOLIBRI; cut-off for low or impaired HRQoL: <60 points. A multivariate logistic regression model and a prediction model were performed.
Results and Discussion: 116 patients [median age 50.8 years (IQR 25.9-62.8; 21.6% >65 years)] were included; 68 had a HAIS 4 (58.6%), 48 (41.4%) a HAIS 5. Median GCS was 13 (IQR 3-15). Median TS was 77 (IQR 60 – 88); low or impaired HRQoL was observed in 28 patients (24.1%). Two variables were associated with low or impaired HRQoL: GCS <13, working situation others than employees or retired. The prediction model had an AUROC of 0.765; calibration was moderate (Hosmer Lemeshow Chi2 6.82, p=0.556).
Conclusions: A quarter of patients with sTBI had a low or impaired HRQoL after 4 years; lower GCS and working situations were associated with low or impaired HRQOL.

Figure 1. Assessment of disease-specific HRQoL 4 years after severe TBI. Distribution of total score of QOLIBRI.

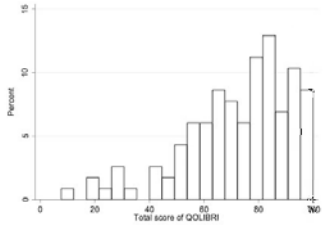
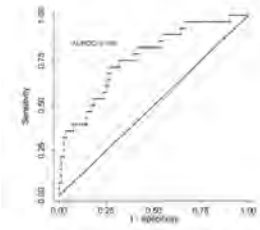


Figure 2. Accuracy of discrimination (AUROC) of the model to predict long-term, low or impaired HRQoL (QOLIBRI TS <60) based on the early clinical variables age, gender, Glasgow Coma Scale, Injury Severity Score, working situation before TBI, suspicion of alcohol and/or psychiatric disorder.



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10AP02-3
The association of perioperative serum lactate levels with postoperative delirium in elderly trauma patients

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Background and Goal of Study: Several studies have shown the utility of lactate level as a predictor of early outcomes in trauma patients. We conducted this study to evaluate the association of perioperative serum lactate levels with postoperative delirium (POD) in elderly trauma patients.
Materials and Methods: This study included 466 elderly trauma patients with serum lactate levels recorded on admission and 1 hour after surgery. The association of POD with the lactate levels both on admission and 1 hour after surgery and lactate clearance were analyzed using Kendall's correlation. The perioperative serum lactate levels and lactate clearance as risk factors for POD were evaluated using univariate or multivariate analysis.
Results and Discussion: The incidence of POD was 38.1% and showed a significant correlation with the serum lactate levels both on admission ($r = 0.31$, $P < 0.01$) and 1 hour after surgery ($r = 0.36$, $P < 0.01$). However, the serum lactate clearance had no correlation with POD ($r = -0.09$). The patients with delirium had significantly higher serum lactate levels both on admission ($P < 0.01$) and 1 hour after surgery ($P < 0.01$) than the patients without delirium. In the univariate analysis of the perioperative serum lactate levels and lactate clearance for POD, the odds ratios (ORs) of the serum lactate levels on admission and 1 hour after surgery were 4.19 ($P < 0.01$) and 3.83 ($P < 0.01$), respectively. However, the OR of the serum lactate clearance was 0.99 ($P = 0.09$). In the multivariate analysis, the ORs of the serum lactate levels on admission and 1 hour after surgery were 2.40 ($P = 0.09$) and 2.80 ($P = 0.01$), respectively. In the present study, elevated serum lactate levels on admission and 1 h after surgery, ICU admission, and ISS were independent risk factors for the development of POD in multivariate analysis, in contrast with the results Norkienė et al. Taking together the results of univariate and multivariate analyses to identify predictors of POD in the present study, elevated serum lactate level 1 h after surgery had a moderate positive correlation with POD and may be suggested as a predictor of POD.
Conclusions: The serum lactate level 1 hour after surgery might be a predictive factor of POD in elderly patients with trauma.
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10AP02-4
Serum Nitric oxide and Peroxynitrite in acute period of multiple trauma.

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Background and Goal of Study: Polytrauma or multiple organ damage is connected with shock and organ failure and is often a cause of death. Nitric oxide and Peroxynitrite play an important role in pathophisiology of polytrauma and their serum levels can indicate the severity of multiple organ damage. To investigate levels of Nitric oxide and Peroxynitrite in patients with acute trauma period as indicators of severity and prognosis of polytrauma.
Materials and Methods: The study included 25 adult patients with multiple trauma treated in Lviv Emergency Hospital. The patients arrived at the hospital within 30 min after the incident. Etiology of trauma was the following: traffic accident –78%, catatrauma –5%, everyday trauma –17%. Blood tests were performed during patient admission and 24 hours after admission. All patients underwent standard physical, laboratory and instrumental examination according to Advanced trauma life support. Exept standard examination additional blood samples for Nitric oxide were taken and measured measured by Griess method. Peroxynitrite was measured using the spectrophotometric method.
Results and Discussion: The severity of patients` injury was determined according to the ISS (Injury severity score). Based on clinical state and ISS, the patients suffered from mild (60%) and severe (40%) polytrauma. Intensive care and surgical treatment of patients during the first 24 hours leads to improvement of hemodynamic parameters and normalization of hourly diuresis. Mean levels of nitric oxide in patients with polytrauma increased from 0,34±0,02 mcmol/l to 0,43±0,03 mcmol/l during 24 hours of intensive therapy (p<0,01). Levels of peroxynitrite decreased during intensive care from 21,16±0,32 to 17,86±0,31 mcmol/l (p<0,05). It is known that peroxynitrite generation leads to development of circulatory shock. Intensive therapy resulted in improvement of patients' clinical state evidenced by perfusion reversibility due to normalization of hemodynamic parameters and diuresis.
Conclusions: In comparation to general clinical parameters, Nitric oxide and Peroxynitrite react on changes in homeostasis faster and more sensitive what allows to use them more widely as biomarkers of organ disfunction development in acute period of polytrauma.
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10AP02-5
Jugular vein and vena cava diameters collapsibility in elderly patients

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Background and Goal of Study: Hip and femur surgeries are procedures with a high risk of complications, such as hypovolemia, hemodynamic instability, thromboembolic events and cardiopulmonary complications. The predominance of elderly patients in such procedures ends up making large orthopedic surgeries increasingly complex. Since these patients depend heavily on the preload to maintain a satisfactory cardiac output, volume monitoring is required. The purpose of this study was to evaluate the non-invasive blood volume monitoring by ultrasonography, based on the inferior vena cava and internal jugular vein diameter as predictors of fluid responsiveness in elderly patients submitted to hip and femur surgeries on spontaneous ventilation.
Materials and Methods: This is a prospective clinical trial of 30 elderly patients (> 65 years) scheduled for elective hip and femoral surgery classified as ASA II to III. Patients with a significant abnormalities in echocardiogram, cardiac or renal failure were excluded. Diameters and collapsibility index of the vena cava and of the internal jugular vein were performed, always by the same operator, before and after volume test with 500 mL of lactated Ringer. The patients were divided into two groups: fluid responsiveness (Group A) or non-fluid responsiveness (group B). Patients who had a 15% elevation in VTI (integral velocity-time) of the aortic outlet flow calculated in the 5-chamber apical echocardiographic window were considered as having fluid responsiveness.
Results and Discussion: From a total of 30 patients, 19 were classified as group A and 11 were in the group B. Patients in group A had smaller cava diameters (0.44 ± 0.19) when compared to group B (1.12 ± 0.31) with p <0.001. Group A showed higher rates of cava collapsibility (63.84 ± 9.52) than group B (31.81 ± 9.46) with p <0.001. The values found for the diameter and collapsibility of the internal jugular vein did not show a statistically significant difference between the groups.
Conclusion: Low vena cava diameters and high rates of collapsibility are reliable parameters of fluid responsiveness in elderly patients in spontaneous ventilation. The jugular vein did not prove to be a predictor of responsiveness in this study.

10AP02-6
Performance analysis of the management of stroke patients: a prospective single centre cohort study

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Background and Goal of Study: Stroke is a leading cause of death and disability worldwide in which Time is Brain. The TARGET Stroke campaign of the American Heart Association strives to improve the operational flow in stroke care. We aimed to determine whether time to CT-scan and time to initiation of treatment would differ between different treatment modalities: classic treatment (CL), thrombolysis (LYS), thrombectomy (ECT).
Materials and Methods: It is a first analysis of a cohort study on Stroke Care in the ZOL-Genk, a large non-academic referral centre in Belgium (NCT03355690). From 01-11-2017 to 01-10-2018, 583 patients were admitted to the Emergency Department (ED) with a tentative stroke diagnosis. 79 patients had a TIA and 257 a proven stroke. CL was given in 161 patients (63%), while 44 (17%) had LYS, 28 (11%) ECT and 24 (9%) a combination (COM) of LYS and ECT. Time between stroke onset and arrival in ED (SOED), door to CT-scan time (D2CT) and time between stroke onset and treatment were registered. Data are presented as median (IQR) and compared by the Kruskal-Wallis Rank Sum Test.
Results and Discussion: SOED time was 3.7 h (1.6-10.2) for CL, 1.3 h (0.8-2.7) for LYS, 1.1 h (0.7-1.9) for ECT and 1.4 h (0.8-2.9) for COM (P<0.001). D2CT was 0.8 h (0.5-1.9) for CL, 0.4 h (0.2-0.6) for LYS, 0.3 h (0.2-0.6) for ECT and 0.3 h (0.1-0.3) for COM (P<0.001). Door-to-needle time was 0.6 (0.5-0.8) h in COM and 0.8 h (0.6-1.2) in LYS (P=0.03). Door-to-puncture time was 1.3 h (0.9-2.1) in ECT and 1.1 h (0.7-1.3) in COM (P=0.04). Time between stroke onset and treatment was 1.9 h (1.4-2.7) for LYS and 2.4 h (1.9-3.8) for ECT (P=0.002).
Conclusions: Initiation of CT-scan was within the TARGET 25 min interval in 50% of the non-CL treated patients. The TARGET goal for door-to-needle time (60 min) and the door-to-puncture time (2h) was reached for at least 75% of the patients. Stroke diagnosis took longer in patients to be treated classically later on. Performance appears to be better in patients receiving thrombectomy. Since stroke is a time critical condition, we should prioritize all presenting stroke patients in an identical manner.

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10AP02-7
Critical emergency medicine trauma team simulation training programmes as a pathway towards secure access to early vital function expertise: A crisis of faith?

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Background and Goal of Study: Trauma represents one of the top causes of death and disability Worldwide. Critical Emergency Medicine (CREM), embodying four main pillars of anaesthesiology specialty: (1) anaesthesia, (2) intensive care, (3) emergency, and (4) pain medicine, is on the verge of the dawn of a new golden era, possessing all the tools available that markedly improve outcomes after traumatic injury. CREM based trauma resuscitation emerged as a pivotal cornerstone of the specialty concerned, by promoting concept of multidisciplinary trauma team simulation training and non – technical skills (NTS) teaching. Correspondingly, European Trauma Course (ETC) Programme demonstrated state of the art trauma team simulation training, principally focusing on multidisciplinary team approach and NTS, spotlighting each step of the series of actions put into motion during the course of trauma resuscitation. The integration of standardized ETC multidisciplinary team approach into United Arab Emirates (UAE) Ministry of Health and Prevention (MOHAP) trauma centers training syllabus started in 2015. The aim of our study was to identify the ETC programme growth in UAE since inaugural course held at the MOHAP Training and Development Center - Sharjah, in October 2015.
Materials and Methods: On the 14th of December 2018 ETC database search was performed. **Results:** Up to date, 22 ETCs were successfully completed in UAE. A total of 261 (82%) male health care professionals, aged from 30 to 67 years (median 40), underwent multidisciplinary trauma team simulation training. The majority were surgeons (41%), followed by emergency physicians (37%), anaesthetists (18%), and general medical practitioners (4%).
Conclusion: Our results exhibit positive growth of the CREM based ETC programme in UAE, spotlighting CREM as a natural extension of the usual anaesthesiologist's role. We strongly encourage anaesthesiologists to embed CREM based trauma training programmes more visibly into their curriculum to secure early vital function expertise access.

10AP02-8
Rapid response team activation after major hip surgery: patient characteristics and outcomes

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Background and Goal of Study: Little is known about the detailed perioperative course and characteristics of patients who require Rapid Response Teams (RRT) activation after major hip surgery. We aimed to describe demographic, preoperative, surgical, anaesthetic and postoperative characteristics of patients who required RRT activation after major hip surgery. We also sought to assess if these characteristics affected mortality during the index hospital admission.
Materials and Methods: We reviewed a RRT database of adult patients undergoing orthopaedic surgery at a university teaching hospital. We then retrospectively reviewed the medical records to extract a priori defined patient, preoperative, surgical, anaesthetic and postoperative data of major hip surgery admissions between September 2014 and December 2017. Patients who survived the index hospital stay were compared to those who died.
Results and Discussion: Overall, 187 patients had a postoperative RRT activations. Mean (SD) age was 82.1 (11.6) years; 125 (67%) were female and most patients had at least one significant comorbidity: mean (SD) Charlson Comorbidity Index (CCI) of 5.6 (2.1). The majority of patients (68%) were frail, ASA class 3 or greater (91%) and underwent non-elective surgery (88%). Median (IQR) time from surgery to RRT activation was 29.4 hours (11.3:75.0), and 25 (13%) patients had unplanned admissions to ICU/HDU. Compared to patients who survived RRT activation, those who died displayed higher CCI [6.5 (1.8) vs. 5.5 (2.1); p=0.02], were more frail (80.1% vs. 56.5%; odds ratio 3.2; 95%CI: 1.2 to 8.1; p=0.03) and received less intraoperative opioids [median (IQR) intravenous morphine equi-analgesia 5.8 (0.1:8.2) mg vs. 11.7 (3.7:19.0) mg; p=0.03]. They were also more likely to receive an urgent medical review prior to RRT activation (62% vs 40%; odds ratio 2.4; 95%CI: 1.1 to 5.6; p=0.05).
Conclusions: Death after RRT activation occurred in 1 out of 7 patients undergoing major hip surgery. Common patient characteristics included advanced age (>82 years), frailty, high CCI and emergency surgery. Further studies investigating perioperative surveillance teams in the identification of the high-risk patients before surgery, and deteriorating patients after major hip surgery, are warranted.

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10AP02-9
Hemodynamic effects of target temperature management in cardiogenic shock after successful cardiopulmonary resuscitation: a retrospective analysis

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Background and Goal of Study: Target temperature management (TTM) should be applied carefully in shock due to its negative influence on hemodynamics. The aim of our study was to investigate the hemodynamic effects of TTM in cardiogenic shock and the adequacy of temperature therapy in this patient group.
Materials and Methods: In this retrospective analysis data were collected from medical records and charts. 39 comatose patients after cardiopulmonary resuscitation (CPR) were divided into two groups on the basis of their cardiac index (CI) at admission and the presence of shock signs: Cardiogenic Shock (CS: CI≤2.2 l/min/m2; N=23) and Control (C: CI>2.2 l/min/m2; N=16). They were cooled to 32-34 for 24 hours. PiCCO™ (Pulse index Contour Cardiac Output) monitor was used to specify hemodynamic parameters. Demographic data, circumstances of CPR and hemodynamic parameters (heart rate (HR), mean arterial pressure (MAP), CI, systemic vascular reistance index (SVRI), global ejection fraction (GEF)) were compared between the groups. Hemodynamic parameters were also specified and matched during the different phases of cooling (initiation: 0h, hipothermia: 12 and 24 hours after initiation, rewarmed phase: 48 hours after initiation) in each group. Mann-Whitney`s U, Fisher`s exact and Friedman tests were performed. The significance level was set at p<0.05.
Results and Discussion: No difference was found in demographics and circumstances of CPR, except time to return of spontaneous circulation (CS:31.4±14.6 min vs C:18.2±12.1 min, p=0.01). We found statistically significant difference in CI (CS:1.59±0.44 vs C:2.67±0.46, p<0.0001), GEF (CS:11.2±4.2 vs C:15.3±6.6, p=0.019) and SVRI (CS:3980±1615 vs C:2323±744, p<0.0001) measured with PiCCO™ at 0h between the two groups. However the hemodynamic parameters equalized during TTM and similar values were measured in both groups. HR, GEF as MAP, CI and SVRI showed significant changes during TTM in control group with worse parameters at lower temperature. On the other hand the initially poorer GEF, CI and SVRI did not show further deterioration during TTM and their improvement was observed after rewarming in CS. MAP did not change in the time of TTM in CS patients that highlights the need of advanced hemodynamic monitoring in this patient group.
Conclusions: TTM may be applied safely in cardiogenic shock after successful resuscitation if advanced hemodynamic monitoring is used.

10AP03-1
Anesthesia on board? Spanish Navy medical experience in Indian Ocean (2010-2018)

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Background and Goal of Study: To describe anesthesia carried out in Spanish Navy ships during Operation European Union “Atalanta” developed at Indian Ocean from 2010-2018.
Materials and Methods: Observational, descriptive, retrospective study carried out in the different hospitals on board (Spanish Navy) deployed to Indian Ocean from 2010 to 2018. Inclusion criteria: patients admitted to the resuscitation unit. Exclusion criteria: none. There are three types of variables: independent (disease, accident, attack), dependents (mortality -yes/no-, need for surgical intervention -yes/no-, need for anesthesia -yes/no-, need for blood components -yes/no-, need for telemedicine -yes/no-) and sociodemographic and control (sex, age, civil / military). The material used to measure these variables was a data collection sheet. Variables were evaluated by reviewing medical records. Finally health care is described based on the capabilities of the vessel. The corresponding military authorization has been obtained.
Results and Discussion: During the study period 9 major surgical procedures were performed. Three of them by gunshot and the rest trauma injuries. Anesthetic technique was: 4 general anesthesias, 5 regional anesthesias (1 epidural, 2 spinal and 2 interscalenic blocks). None of the patients died on board during the study period.
Conclusions: Anesthesia and critical care at sea is a challenge due to the peculiarities of the environment, isolation and the scarcity of resources. In this area of operations, anesthesiological and resuscitation standards were similar to those provided in Europe.
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Acknowledgements: Spanish Navy.

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10AP03-2
Medical care at a mass-gathering music festival: A retrospective study over seven years (2011 - 2017)

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Goal of the Study: Published data of medical care at music festivals is sparse, especially for the comparison of epidemiological data of the same event over the course of several years. The goal of this study was to determine and compare type, severity and frequency of illnesses as well as the logistics of medical care at the FM4 Frequency Festival – a large Austrian music festival with approximately 115,000 to 200,000 visitors - over the years 2011 to 2017.
Methods: Prospectively collected data from the rescue operation protocols of the Notruf Niederoesterreich were retrieved, adjudicated and analyzed. The patient presentation rate (PPR) and transport to hospital rate (TTHR) were calculated and compared among years using Chi Square test. Influence of number of visitors on total number of patient presentations and influence of environmental factors on temperature related medical emergencies was investigated using linear regression. A description of the medical management and logistics was performed. In an exploratory analysis number of medical emergencies were correlated with environmental factors.
Results: PPR ranged (min to max) from 9.32/1000 in 2016 to 20.86/1000 visitors in 2011 (chi², p<0.001), TTHR from 0.40/1000 in 2017 to 1.07/1000 visitors in 2013 (chi², p<0.001). Overall PPR was 13.71/1000 and TTHR was 0.61/1000. In the linear regression models the number of visitors did not predict the total number of patient presentations (p=0.53), NACA 1-2 (p=0.6), or NACA 3-5 classified emergencies (p=0.31). There was a strong correlation between local temperature and heat related patient presentations (linear regression, R^2=0.883, p<0.001). 64.8% of presentations were due to pain. The main cause of pain were injuries (70.0%). Intoxication was the reason of 5.4% of patient presentations. Most of them where due to alcohol but a wide variety of recreational drugs was found in the records. Removing insect nests at the site lead to a significant reduction in insect bites (chi², p<0.001).
Conclusions: There were significant differences in PPR as well as TTHR over the years. The number of visitors did not predict the number of patient presentations. Temperature was associated with the number of heat related emergencies.

10AP03-3
Soluble P-selectin rescues mice from a "2-hit" model of hemorrhagic shock and ischemia-reperfusion injury by enhancing the endogenous anti-oxidative reaction

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Background and Goal of Study: Nonocclusive mesenteric ischemia may be associated with hemorrhagic shock during major trauma and reperfusion after resuscitation inevitably leads to severe metabolic acidosis, hemodynamic derangement and reperfusion injuries, resulting in multiple organ failure and worse survival outcomes. P-selectin is an important molecule responsible for leukocyte-endothelial adhesion and disruption of capillary barriers during major trauma. However, the soluble form of P-selectin (sP-sel) has been recently characterized to mediate potent anti-inflammatory property in cell survival. This study aimed to determine the rescue potentials of sP-sel in a "2-hit" model of hemorrhagic shock and reperfusion injury.
Materials and Methods: Hemorrhagic shock resuscitation (HSR) was induced by direct withdrawing blood (0.3mL) from the femoral artery of anesthetized mice and resuscitated with the same volume of crystalloid 30min later. Ischemia to the mid-jejunum was resulted by cross-clamping of the superior mesenteric artery (SMA) for 10 min. Time of survival after release of SMA occluder was recorded. In other quantitative studies, ischemic jejunal tissues were obtained at 6 h after reperfusion for analysis.
Results and Discussion: A high mortality of up to 60% was observed at 15 h after reperfusion injury. Intraperitoneal injection of recombinant P-sel IgG-Fc fusion protein (rP-sel-Fc) significantly improved the overall survival rate of the mice (80% vs 40%, P=0.047). rP-sel-Fc did not affect the infiltration of inflammatory cells or the activity of myeloperoxidase in the ischemic intestine. However, supplement of the soluble form of P-sel (rP-sel-Fc) restored the Bcl-2/BAX ratio (indicator of anti-apoptosis), and the expression of superoxide dismutases (CuZnSOD and MnSOD) in the injured jejunal tissue. Treatment with rP-sel-Fc also suppressed the formation of malondialdehyde (MDA, the end-product of lipid peroxidation) and attenuated the intestine injury score.
Conclusions: Our results demonstrated that sP-sel attenuates tissue injury during ischemia-reperfusion insult and improves the survival outcome of mice with HSR. The protective effect of sP-sel is apparently independent from the anti-inflammatory property, but is mediated by the potent antioxidative reaction through restoring of the endogenous activities of superoxide dismutases and attenuating mitochondrial apoptosis.

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10AP03-4
The comparative effectiveness of chest compressions with hand and heel

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Background and Goal of Study: The effectiveness of chest compressions plays a central role in cardio-pulmonary resuscitation. The alternative technique with a leg can be useful in some cases: low body mass, wrist arthritis, and when hands are needed to phone for calling emergency team. The aim of the study was to compare the effectiveness of chest compressions with hand and with a heel.
Materials and Methods: We recorded characteristics of chest compressions (rate, depth, and effectiveness as a percentage of 5-6 cm deep compressions) using a monitor connected to the mannequin. Five specialists in emergency medicine were included in the study. All rescuers were blinded from monitoring data during compressions and were asked to provide compressions with a rate of 100-120 per minute and depth 5-6 cm for two minutes. With resting intervals, the rescuers did compressions with hand, with heel and passive foot on the floor, and then placing it at the mannequin's sternum level. Data are given as M±SE. Pearson's coefficient was used for studying the correlation of data. P<0.05 was considered for significance level.
Results and Discussion: The average frequency of compressions per minute was 119±9 with hand, 115±9 with heel and passive foot placed on the floor, and 118±6 with heel and passive foot placed at the mannequin's sternum level. The average depth of compressions was 4.3±0.2 cm with hand, 4.4±0.3 cm with heel and passive foot placed on the floor, and 4.8±0.2 cm with heel and passive foot placed at the mannequin's sternum level. The average effectiveness of compressions was 32±13% with hand, 28±19% with heel and passive foot placed on the floor, and 38±17% with heel and passive foot placed at the mannequin's sternum level. The rescuers' body mass had negative correlation with frequency of compressions (r=-0.54; p=0.04) and positive correlation with the depth of compressions (r=-0.71; p=0.003) as well as with effectiveness (r=0.66; p=0.007). The rescuers' height significantly positively correlated with the effectiveness of compressions only (r=0.54; p=0.03). The rescuers' age had no significant influence on studied characteristics. All rescuers noticed that heel-compressions were easier to perform than hand-compressions, especially when placing the passive foot at the mannequin's sternum level.
Conclusions: The chest compressions with a heel can be a quite effective alternative technique for CPR.

10AP03-5
Cost-effectiveness of Extracorporeal Membrane Oxygenation for in-hospital cardiac arrest: a Markov decision model

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Background and Goal of Study: Extracorporeal membrane oxygenation (ECMO) has seen an increase use over the last decades. Because the therapy is costly and labor-intensive, this study aims to estimate the cost-effectiveness of ECMO for in-hospital cardiac arrest treatment.
Materials and Methods: A decision tree and Markov model were constructed based on literature. The model was conditional on age, Charlson Comorbidity Index (CCI) and sex. Three treatment strategies were considered: ECMO for no one (NE), ECMO for patients with an Age-Combined Charlson Comorbidity Index (ACCI) below different thresholds (2 - 4), and ECMO for everyone (EALL). Cost-effectiveness was assessed with costs per quality-of-life adjusted life years (QALY).
Results: Treating patients with an ACCI below 2 points costs 7,954 (95% CI: 2,212 – 15,096) euro per QALY; treating patients with an ACCI below 3 costs 13,074 (95% CI: 3,590 – 24,758) euro per QALY; treating patients with an ACCI below 4 costs 17,426 (95% CI: 4,812 – 33,581) euro per QALY; treating everybody with ECMO costs 24,457 (95% CI: 6,493 – 48,012) euro per QALY. For Willingness-To-Pay (WTP) thresholds of up to 43,000 euros, treating nobody with ECMO was the most cost-effective strategy. For WTP thresholds over 43,000 euros, treating all with ECMO was the most cost-effective strategy.
Conclusion: This cost-effectiveness analysis for ECMO demonstrated that treating all in-hospital cardiac arrest patients with ECMO was cost-effective considering a WTP threshold of 43,000. Given that conventional WTP thresholds in Europe and North-America lie between 50,000 - 100,000 euros or dollars, ECMO is a cost-effective treatment after in-hospital cardiac arrest.

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10AP03-6
This study investigates the effect of fluid resuscitation on cerebral perfusion in a porcine hemorrhagic shock model.

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Background and Goal of Study: Therapy of hemorrhagic shock is one challenging tasks in emergency medicine. For many years, colloids are regarded as standard treatment in shock conditions. Recently several studies questioned the benefit of colloids. Negative side effects were noted. This study investigates the impact of Gelatin-polysuccinate (GP), Hydroxyethyl starch (HES) versus balanced electrolyte solution (BEL) on cerebral perfusion in a porcine model of hemorrhagic shock.
Materials and Methods: After approval by the State and Institutional Animal Care Committee 24 anaesthetized were included in a prospective study: three sets of nine animals received fluid resuscitation. Shock was induced by means of arterial blood withdrawal over 15 minutes (35-40 ml kg-1) until mean arterial pressure (< 45 mmHg) and cardiac index (< 40% of the baseline value) decreased. After 30 minutes of shock, fluid resuscitation was started with rapid infusion of the removed amount of blood by either GP, HES or BEL. The cerebral perfusion was measured by arterial spin labelling via MRI-scan. Additionally, post mortem the numbers of living cells were count into the hippocampus and cerebral biomarkers for ischemia like lipocalin2 (LCN-2) were measured. All parameter included hemodynamics were recorded (4h). To analyze the effects a two-way analysis of variance (ANOVA) with pairwise multiple comparison correction were performed using the Student-Newman-Keuls method.
Results and Discussion: Fluid resuscitation stabilizes the macrocirculation during hemorrhagic shock but colloids lead to a significantly higher cardiac index (GP, HES vs. BEL; 169±56%, 174±45% vs. 136±24%; p<0,05). On the other side the hemoglobin dropped lower after infusion of GP and HES (4.5±0.8 vs. 4.5±0.7 &. 5.7±0.6 g/dl; p<0,05). This caused significant increased cerebral perfusion after GP (202±120 vs. 300±150 vs. 132±34 ml/100g min-1; p<0,05) and increased number of cells into the hippocampus after BEL (0.9±0.2 vs. 0.8±0.2 &. 1.1±0.2 cells/µm2; p<0,05) and increase of LCN2 into the cortex (0,005±0,005 vs. 0,008±0,004 & 0,002±0,001 (relative mRNA amount); p<0,05).
Conclusion: Equal amounts of GP, HES and BEL sufficiently stabilize systemic circulation. Fluid resuscitation by colloids should be applied with caution to prevent hemodilution-induced cerebral cell damage by increased brain perfusion.

10AP03-7
Providing anesthesia in a war-torn context: experience from Bosnian war.

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Background and Goal of Study: Provision of healthcare to patients under war conditions is challenging due to high numbers of trauma cases, as well as limited resources and infrastructure. [1] The goal of this study is to present single-anesthesiologists experience in providing anesthesia for surgical procedures performed in improvised war hospital “Rama” during the Bosnian War.
Materials and Methods: Patients’ data were collected retrospectively from March 1992 and February 1994. Analysis was based on routinely collected data from anesthesia charts, so informed consent was not sought from participants. Improvised hospital was organized in an abandoned floppy disk factory. Anesthesia was provided via Dräger Tiberius anesthetic machine without ventilator or oxygen failure protection device. There was oxygen and nitrous oxide cylinder supply, as well as electricity fuel supply. Vital signs monitoring included manual non-invasive blood pressure and oscilloscopic ECG. General anesthesia with or without endotracheal intubation and single–shot spinal anesthesia were provided by the lead author.
Results and Discussion: There were 51 patients (41 males, 10 females), aged median 28 years (IQR 20-51.5), ASA physical status 1-3, of which 41 presented for emergency and 10 for elective surgery. General endotracheal anesthesia was the most common type of anesthesia (49 % of all anesthetics). General anesthesia without intubation was also frequently administered (n=21, 41%). The most common indication for surgery was non traumatic (n=25, 49%), followed by war-related trauma (n=20, 40%). Abdominal procedures were performed in the majority of patients (n=20, 40%), followed by minor procedures (n=12, 24%), and orthopedic/vascular surgery (n=11, 22%). The most common diagnoses at presentation were explosive/gunshot wounds (n=17, 33%) and inguinal hernia (n=8, 16%). Five patients (9.8 %) presented with hemorrhagic shock. There was no intraoperative mortality.
Conclusion: In a war setting with minimal anesthesia equipment, below standard monitoring, and limited human resources, and despite increased need for both emergent and elective anesthetics, good outcomes could be achieved without intraoperative mortality.
References:
1. Trelles M, Dominguez L, Tayler-Smith K et al. Providing surgery in a war-torn context: the Médecins Sans Frontières experience in Syria. Conflict and health 9 36-36 (2015).

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10AP03-8
Effects of different adrenaline (epinephrine) doses on cerebral cortical perfusion, cerebral oxygenation and cerebral metabolism during cardiopulmonary resuscitation in pigs – preliminary data

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Background and Goal of Study: Adrenaline is routinely used in the treatment of cardiac arrest (CA). It is associated with higher rates of return of spontaneous circulation, but may have detrimental effects on neurologically intact survival. Impairment of cerebral microcirculatory blood flow might be a possible explanation. It could be speculated that lower adrenaline doses, while still promoting vasoconstriction in central vessels, are less interfering with cerebral microvascular perfusion and oxygen delivery. We therefore investigated the effects of two different adrenaline doses (15 vs. 30µg/kg) during advanced life support on cerebral perfusion, oxygenation and metabolism in a porcine CPR model.
Materials and Methods: 14 pigs were anesthetized, intubated and instrumented. After 5min of CA, pigs were randomized to either 15 or 30µg/kg adrenaline and mechanically resuscitated. Adrenaline was administered every 5min. Mean arterial pressure (MAP), intracranial pressure (ICP), cerebral perfusion pressure (CPP) and cerebral regional oxygen saturation (rSO2) were recorded at 10sec-intervals. Laser-doppler flow perfusion units (PU), brain tissue oxygen tension (PbtO2), arterial and cerebral venous oxygen saturation (ScvO2) as well as cerebral microdialysis parameters, e.g lactate/pyruvate ratio (LPR) were measured at baseline, after CA, every 5min during CPR and at the end of the experiment.
Results and Discussion: Each 30 compared to 15µg/kg adrenalin bolus resulted in higher MAP and CPP peaks (Fig.1). Average MAP was higher only after the first bolus whereas average CPP was higher in the 30µg/kg adrenaline group throughout the experiment (Fig.1). However, after 18min of CPR there was no difference in PU(25.1±4.5 vs. 47.1±13.1;p=1), rSO2 (26±2 vs. 27±1;p=0.898), PbtO2 (2.6±1.8 vs. 4.6±3.0;p=0.79), ScvO2 (26.2±5 vs. 25±4.5;p=0.662) and LPR(419±180 vs. 260±114; p=1) between study groups.
Conclusions: Despite higher MAP and CPP after repeated boluses of 30 compared to 15µg/kg adrenaline during advanced life support, cerebral perfusion, cerebral oxygenation and cerebral metabolism were comparable in this porcine CPR model. This indicates that higher blood pressures do not translate into better brain perfusion and oxygen delivery and raises the question whether adrenaline with its pronounced vasoconstrictive effects on cerebral microvessels is the most suitable drug for the treatment of CA.

Respiration and Airway Management

11AP01-1
Use of High Flow Nasal Cannula (HFNC) for Laryngeal Surgery: A Case Report

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Background: High Flow Nasal Cannula (HFNC) is a novel airway technique that uses high-flow humidified nasal oxygen to maintain apneic oxygenation. It has been used in laryngeal surgery to prolong apnea time and facilitate surgery1. We report the use of HFNC in a patient who underwent panendoscopy and biopsy of an epiglottic tumour. HFNC was able to maintain oxygenation during rigid esophagoscopy but not during direct laryngoscopy.
Case Report: A 58-year-old man presented with a 2-month history of throat pain. Nasoendoscopy showed a tumour involving the laryngeal and lingual surfaces of the right epiglottis. Prior to the elective procedure, preoxygenation was performed and facemask ventilation started after induction of general anaesthesia with muscle paralysis. HFNC was then started using the OptiFlow nasal cannula and AirVo 2 system at a rate of 60L/min and FiO2 of 100%. Jaw thrust was maintained throughout with no desaturation noted during rigid esophagoscopy. During direct laryngoscopy, there was difficulty placing the Dedo laryngoscope into the anterior commisssure to visualize the larynx due to the epiglottis prolapsing posteriorly from the tumour bulk. Contact bleeding from the tumour was also noted. The patient desaturated to 60% but oxygen saturation recovered after bag-mask ventilation. Intubation was performed using the Bonfils optical stylet. HFNC had maintained the oxygen saturations > 98% during a total apneic time of 8 minutes.
Discussion: We report this case to show that HFNC may not be the best option for patients with epiglottic pathology. The success of HFNC is dependent on the presence of a patent upper airway to facilitate gas exchange. Surgical exposure of the epiglottic tumour using rigid laryngoscopy is difficult due to the fixed epiglottis and tumour bulk. Repeated laryngoscope manipulation and contact bleeding of the tumour may result in glottic obstruction, which impairs oxygen delivery via HFNC and reduces the effectiveness of apneic oxygenation.
References:
1. Patel A et al. Transnasal humidified rapid-insufflation ventilatory exchange (THRIVE). Anaes 2015;70:323-9
Learning points: The success of HFNC in maintaining apneic oxygenation for laryngeal surgery is dependent on the nature of laryngeal pathology, type of surgery and type of direct laryngoscope used. Hence careful patient selection and inter-disciplinary communication should be done before considering the use of HFNC in such surgeries.

11AP01-2
Do Nasal High-Flow Systems maintain oxygenation levels in obese patients with intellectual disabilities during deep sedation for dental treatment?

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Background and Goal of Study: During deep sedation, airway management aimed at maintaining the patient's oxygen level is important for patient safety. In anesthetic management, it is widely accepted that obese patients are more likely to suffer airway blockages and reductions in arterial oxygen saturation (SpO_2) than non-obese patients. Therefore, airway obstruction and hypoxia are major incidents that anesthetists often encounter and have to resolve during the deep sedation of obese patients. Nasal High-Flow Systems (NHFS) are a new type of device, which supply warmed and humidified oxygen at a high flow rate, and they are receiving growing attention as an alternative form of respiratory support. We hypothesized that the use of NHFS might prevent desaturation and contribute to patient safety during deep sedation in obese patients. This was a clinical study, which examined whether the use of NHFS reduced the incidence of hypoxemia during the deep sedation of obese patients with intellectual disabilities for dental treatment.
Materials and Methods: The present study was approved by the ethics committee of Okayama University, Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences. We enrolled 18 obese patients (body mass index:>25) with intellectual disabilities who underwent dental sedation. In each case, sedation was induced using propofol and was maintained at a bispectral index of 50-70. The subjects were randomly assigned to the control oxygen administration (control arm; 5 L/min via a nasal cannula) or NHFS arm (NHFS arm; 40% O_2, 40 L/min, 37) in alternate shifts as a crossover trial. The primary end-points were the minimum SpO_2 value and the incidence of hypoxemia (oxygen saturation: ≤94%) during dental treatment.
Results: The mean minimum SpO_2 values were 93.6±4.1 in the control arm and 95.8±2.1 in the NHFS arm (p=0.0052, paired t test). Hypoxemic episodes occurred in 11 cases (61.1%) in the control arm and 3 cases (16.7%) in the NHFS arm (p=0.0076, Fisher's exact test).
Conclusion: Our results suggest that NHFS keep obese patients oxygenated and prevent hypoxemic episodes during deep sedation for dental treatment.

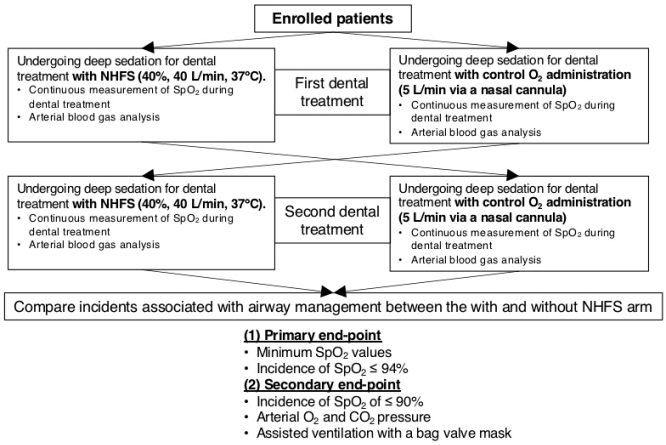

Fig. Study design

11AP01-3
The effect of using high-flow nasal oxygen-delivery system in patients under intravenous general anesthesia, preliminary results

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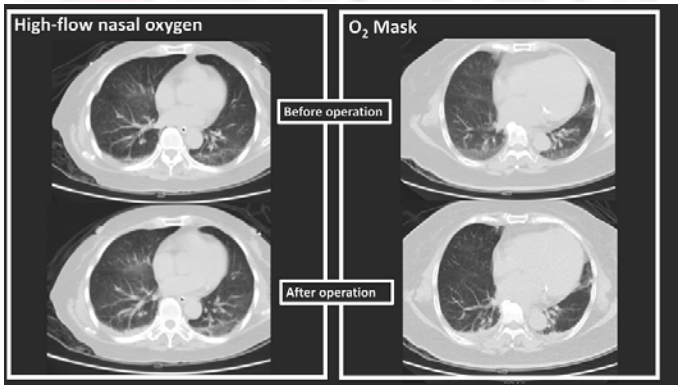
Background and Goal of Study: Lung atelectasis is common in patients under general anesthesia. The goal of this study is to evaluate high-flow nasal oxygen's impact on lung atelectasis during intravenous general anesthesia.
Materials and Methods: This study is a randomized controlled trial. It was approved by our research ethics board (ClinicalTrials.gov Identifier: NCT03019354). Patients receiving CT-guided liver tumor radiofrequency ablation were recruited. Forty patients were randomized to receive either high-flow nasal oxygen (H group, oxygen flow 50L) or oxygen mask (M group, oxygen flow 10L) during intravenous general anesthesia. Both group received propofol target-controlled infusion (Schneider model, Ce: 2.5-3.5 ug/ml), and fentanyl 0.5-1 ug/kg intermittent bolus. After induction, CT images were obtained before and after the operation. Transversal CT cuts above the right diaphragm were used to calculate the atelectasis area. Atelectasis was defined as areas which densities between -100~+100 Hounsfield units and was expressed in percentages of the total lung area.
Results and Discussion: From 2017/2~2018/8, 40 patients were included in this study. There was no difference in pre-operative atelectasis between 2 groups (H group:2.8% , O group: 4.2%, p=0.54). However, there was a trend that H group had less post-operative atelectasis (H group:7.41% , O group: 10.49% , p=0.08). The initial saturation at post-anesthesia care unit was higher in H group (H group: 100% , O group: 98% , p=0.02). The complication incidence and hospital stay were comparable between 2 groups.

	Optiflow (N=19)	O_2Mask (N=21)	p value
Characristic			
Age	70.6 ± 7.9	67.2 ± 7.9	p = 0.19
Height (cm)	156.2 ± 8.5	161.3 ± 9.5	p = 0.08
Weight (kg)	59.9 ± 11.7	64.3 ± 10.2	p = 0.21
Sex (M/F)	8/11	13/8	p = 0.20
Smoking (%)	26.3	28.6	p = 0.87
Pre-operation			
Heart rate	77.4 ± 18.2	77.1 ± 15.4	p = 0.95
Systolic BP (mmHg)	134.2 ± 21.9	138.1 ± 18.6	p = 0.55
Diastolic BP (mmHg)	73.5 ± 14.9	79.2 ± 14	p = 0.23
SpO2 (%)	99 (98-100)	99 (97-100)	p = 0.64
Post-operation			
Heart rate	77.5 ± 16.8	78.4 ± 13.9	p = 0.86
Systolic BP (mmHg)	136.8 ± 27.3	137.4 ± 19.7	p = 0.95
Diastolic BP (mmHg)	81 ± 16.5	83.6 ± 16.2	p = 0.63
SpO2 (%)	100 (98-100)	98 (97-98)	**p = 0.02**
Duration (min)	80 (56-99)	100 (90-121)	p = 0.05
Outcome			
O2 cannula to ward (%)	27.8	57.1	p = 0.11
Fever (%)	31.5	23.8	p = 0.73
Total complication (%)	52.6	47.6	p = 1.00
Hospital stay (day)	2 (1-3)	2 (1-3)	p = 0.97
Pre-operation			
Atelectasis %	2.8 (1.67-5.83)	4.19 (1.79-6.9)	p = 0.54
Post-operation			
Atelectasis %	7.4 (4.08-11.6)	10.49 (8.05-14.1)	p = 0.08



Conclusions: Our results suggest high-flow nasal oxygen has a trend of less lung atelectasis during intravenous general anesthesia and improvement of post-operative saturation. Larger number of patients are needed to confirm these results.

11AP01-4
Can the effects of High Flow Nasal Cannula Oxygenation on postoperative atelectasis be evaluated with lung ultrasound?

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Background and Goal of Study: In obese patients, lung compliance decreases by 25% and Functional Residual Capacity decreases by about one-third. As they consume about 25% more oxygen than non-obese individuals, postoperative pulmonary complications occur more commonly. POINT (Peri-Operative Insufflatory Nasal Therapy) provides humidified and heated high flow oxygen therapy in perioperative period. Lung ultrasonography (LUS) has been used more frequently in the diagnosis of pulmonary pathologies than chest radiography. The aim of this prospective observational study is to evaluate the effects of high-flow nasal oxygen therapy on atelectasis in the perioperative period by lung ultrasound (LUS) in bariatric surgery patients.
Materials and Methods: Following the Ethics Committee approval and written informed consents, 24 adult bariatric surgery patients were included in this observational study. HFNCO was started at a flow rate of 20 L/min with 100% oxygen in the preoperative period. It was titrated up to 50 L/min and increased to 80 L/min under general anesthesia until tracheal intubation. Atelectasis evaluation with lung ultrasound was performed and scored in 6 different areas before and after HFNCO. Pulmonary function tests and blood gas parameters were compared.
Results and Discussion: Postoperative LUS scores decreased significantly in the right and left anterior, anterolateral and posterolateral areas compared to preoperative period ($p < 0.05$, Figure 1). Postoperative PaO2and PaCO2values of blood gas analysis showed a significant increase compared to preoperative period, whereas HCO3and BE values decreased significantly ($p<0.05$). Postoperative pulmonary function test parameters FEV1, FEVC, FEV1/FEVC and PEFR values did not show a significant change, while postoperative FEF 25-75% showed a significant increase ($p<0.05$, Figure 2). Postoperative PaO2/FiO2value increased significantly compared to preoperative period ($p<0.05$).
Conclusion: In conclusion, it has been shown that HFNCO may decrease the incidence of postoperative atelectasis, and have a healing effect on both pulmonary function tests and blood gas parameters in patients undergoing bariatric surgery.

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11AP01-6
Comparison of Wei Nasal Jet Tube and NasalProngs for Supplement Oxygen During Gastroscopy with Intravenous Anesthesia in Obese Patients: A Prospective Controlled Randomized Trial

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Background and Goal of Study: Hypoxemia is one of severe complications during gastroscopy with intravenous anesthesia in obese patients. It remains unclear whether the WNJT, a new kind of nasopharyngeal airway, has a better risk-benefit ratio than the convenient nasal prongs for supplement oxygen during gastroscopy with intravenous anesthesia in obese patients. Thus, this prospective randomized controlled trial was designed to compare efficacy and safety of WNJT and nasal prongs for supplement oxygen in this condition.
Materials and Methods: 103 obese patients with a body mass index >30 kg/m^2 who underwent elective gastroscopy were randomized to receive the WNJT and nasal prongs. After adequate anesthesia with propofol, gastroscopy was begun. During gastroscopy, pure oxygen (5L/min) was delivered through the jet port of WNJT and a nasal cannula in the groups A and B, respectively. The lowest SpO_2, and incidence of hypoxemia and severe hypoxemia during gastroscopy were recorded.
Results and Discussion: The median lowest SpO_2 during gastroscopy was 97% (IQ, 94.5-98) and 92% (IQ, 87.25-94.75) in the groups A and B, respectively. During gastroscopy, hypoxemia occurred in 3 and 16 patients in groups A and B, respectively; severe hypoxemia occurred in 1 and 4 patients in the groups A and B. The use of jaw-lift maneuver ($P<0.0001$), and incidence hypoxemia and severe hypoxemia were significantly reduced in the group A compared with group B ($P<0.0001$). Slight nasal bleeding occurred in 3 patients after insertion of WNJT in the group A, but it stopped naturally without the need for medical or surgical treatment. There was no statistically significant difference in the satisfaction of patients between two devices. However, the WNJT provided improved satisfactions of anesthetists ($P=0.005$) and gastroscopists($P=0.038$).
Conclusions: During gastroscopy with intravenous anesthesia in obese patients, the WNJT compared with the nasal prongs for supplement oxygen can significantly reduce the incidence of hypoxemia and severe hypoxemia and provide better satisfactions of anesthetists and gastroscopists, despite it may result in a potential risk of slight epistaxis. In view of a better risk-benefit ratio, the WNJT should be recommended for supplement oxygen during gastroscopy with intravenous anesthesia in obese patients.

11AP01-7
Comparison of Wei Nasal Jet Tube and Nasal Prongs for Supplement Oxygen During Gastroscopy With Intravenous Anesthesia in Normal BMI Patients: A Prospective Randomized Controlled Trial

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Background and Goal of Study: Hypoxemia is a major concern during gastroscopy under intravenous anesthesia. The use of convenient nasopharyngeal airway for supplement oxygen is a common method to address this issue, but it may cause adverse outcomes including upper airway stimuli and nasal damage. However, there has been no study assessing whether the WNJT, a new special nasopharyngeal airway, performs better than the convenient nasal prongs for supplement oxygen during gastroscopy with intravenous anesthesia. Thus, this prospective randomized controlled study was designed to compare efficacy and safety of WNJT and nasal prongs for supplement oxygen during gastroscopy with intravenous anesthesia in patients with a normal body mass index (BMI).
Materials and Methods: After the study protocol was approved by hospital ethics committee, 291 patients with a normal BMI who underwent elective gastroscopy were randomized to receive the WNJT (group A, n=147) and nasal prongs (group B, n=144) for supplement oxygen. Before anesthesia, preoxygenation aimed to obtain an expiratory oxygen concentration of 88% to 90% was performed. After adequate anesthesia with propofol, gastroscopy was begun. During gastroscopy, pure oxygen (5L/min) was delivered through the jet port of WNJT and a nasal cannula in the groups A and B, respectively. The lowest SpO_2 during gastroscopy was recorded. The primary endpoint was the incidence of hypoxemia and severe hypoxemia.
Results and Discussion: The median lowest SpO_2 during gastroscopy was 98% (IQ, 97-99) and 96% (IQ, 93-98) in the groups A and B, respectively. Hypoxemia occurred in 2 patients and 19 cases in the groups A and B, respectively; severe hypoxemia occurred in 1 patient and 2 cases in the groups A and B. The incidence of hypoxemia and severe hypoxemia during gastroscopy was significantly decreased in the group A compared with group B ($P<0.0001$). Nasal bleeding occurred in seven patients after insertion of WNJT in the group A, but nasal bleeding stopped naturally without any treatment.
Conclusions: During gastroscopy with intravenous anesthesia in patients with a normal BMI, the WNJT compared with the nasal prongs for supplement oxygen is a more effective tool for prevention of hypoxemia. However, this benefit of the WNJT is at the expense of slight epistaxis. In making a decision about the choice of supplementary oxygen methods in normal BMI patients, thus, the risk-benefit ratio of the WNJT must be carefully considered.

11AP01-8
Use of a novel modified paediatric face mask to provide nasal CPAP pre-oxygenation and pressure-controlled nasal ventilation/oxygenation while teaching medical student to perform endotracheal intubation in a high-risk patient with cystic fibrosis undergoing endoscopic sinus surgery

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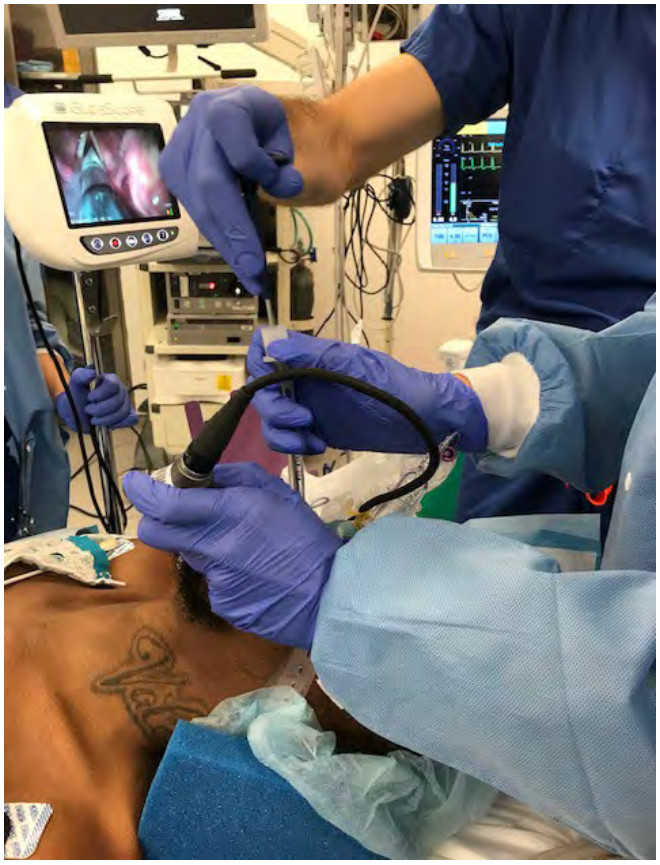
Background: Patients with cystic fibrosis (CF) are prone to severe desaturation during GA induction. We used a modified paediatric face mask to provide nasal CPAP pre-oxygenation and pressure-controlled (PC) nasal ventilation in a CF patient as described.[1-3]
Case Report: A 24 y/o CF male with recent exacerbation of Pseudomonas and MRSA in sputum presented for endoscopic sinus surgery for chronic sinusitis. He was sitting up and had an active cough with yellow sputum production. His SpO_2 improved from 90% to 94% with 4L O_2/min via nasal cannula. He had mild expiratory wheezes which improved slightly with nebulized albuterol. A modified infant face mask (#2) was secured over his nose with head straps and connected to anaesthesia breathing circuit/machine. APL valve was adjusted to deliver 6 cm H_2O CPAP with 4 L O_2/min. His SpO_2 improved to 98%. After GA induction with lidocaine and propofol, nasal ventilation was easily accomplished . Following rocuronium administration, he was supported with PC nasal ventilation (PIP 13 cm H_2O, PEEP 5, RR 20/min).

With PC nasal ventilation/oxygenation, video-laryngoscopy (VL) ETI was successful by a medical student with some assistance.



He remained at 96-98% SpO_2 throughout. He tolerated the procedure well and was extubated without complication.
Discussion: This modified pediatric face mask provided nasal CPAP pre-oxygenation and PC nasal ventilation/oxygenation in a CF patient during VL ETI by a medical student. It avoided severe desaturation. It may reduce stresses and improve patient safety at low cost.
References:
1. www.TSEMask.com; 2. SAMBA 28th AM, 2013; 3. SASM 3rd AM, 2013
Learning points:
1. How to modify a paediatric mask to fit most adult noses in < 2 mins.
2. How to adjust the mask seal, the APL valve and O2 flow to provide optimal CPAP.
3. How to provide PC nasal ventilation/oxygenation after GA induction & during ETI.

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11AP02-1
Association of mechanical power of ventilation and ventilator induced lung injury in experimental acute respiratory distress syndrome in pigs

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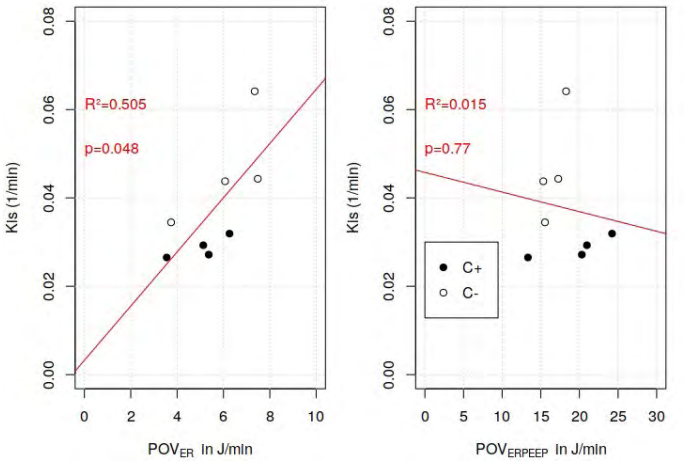
Background and Goal of Study: Mechanical power of ventilation (POV) was proposed as a unifying mechanism of ventilator induced lung injury (VILI) during controlled mechanical ventilation. However, the derivation of POV contains important methodological flaws in modelling the role of positive end-expiratory pressure (PEEP). Also, one single feature of VILI has been considered so far. We hypothesized that VILI, as measured by neutrophilic inflammation, is associated with POV only upon appropriate computation of PEEP during storage of mechanical energy in lungs.
Materials and Methods: Data from previous experiments were used for this investigation. Acute respiratory distress syndrome was induced in pigs by repeated saline lung lavage followed by injurious ventilation. PEEP was titrated to transpulmonary pressure of zero cmH_2O (closing pressure). Animals were randomly assigned to PEEP four cmH_2O above (C+) or below (C-) closing pressure. V_T was 6mL/kg. Neutrophilic inflammation was assessed after 12 hours of therapy as uptake rate of [^{18}F]FDG normalized to tissue density (Kis). POV was calculated based on the mean values during therapy of respiratory system elastance (E), resistance (R), tidal volume (VT), PEEP and respiratory rate (RR) each experiment according to five different models: $POV_E = 1/2 \cdot V_T^2 \cdot E$, $POV_R = 1/2 \cdot V_T^2 \cdot R/T_{insp}$, $POV_{ER} = 1/2 \cdot V_T^2 \cdot (E+R/T_{insp})$ and $POV_{ERPEEP} = 1/2 \cdot (V_T^2 \cdot E+V_T^2 \cdot R/T_{insp}) + PEEP \cdot V_T$. Association between POV and Kis was assessed by linear modelling and compared using the coefficient of determination R^2.
Results and Discussion: Association between POV and Kis was highest for model POV_{ER} comprised of both resistive and elastic POV (POV_{ER}: R^2=0.51,

P=0.048, Figure 1). Elastic POV_E but not resistive POV_R was weakly associated with Kis (POV_R: R^2=0.33, P=0.049 and POV_E: R^2=0.50, P=0.049). The widely used POV_{ERPEEP} was not associated with Kis (R^2=0.02, P=0.77).
Conclusions: Our results suggest that the widely used model to derive POV, which includes a dependence on PEEP, does not predict VILI and is out-performed by more accurate POV models that consider elastic and resistive components only.



11AP02-2
Effect of PEEP on position and function of the human diaphragm

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Background and Goal of Study: Mechanical ventilation with positive end-expiratory pressure (PEEP) helps to prevent airway collapse and thereby improves oxygenation in patients with acute respiratory failure. However, the effects of PEEP on diaphragm function are largely unknown. We have previously demonstrated that PEEP shortens diaphragm muscle fibers[1]. In the current study, we hypothesize that this shortening leads to decreased contractility of the diaphragm, since it no longer operates on its optimum length of the force-length relation. Our aim is to investigate the acute effects of PEEP on the position and function of the diaphragm.
Materials and Methods: Fifteen healthy subjects were instrumented with esophageal catheters to measure the electrical activity of the diaphragm and transdiaphragmatic pressures while under non-invasive ventilation with PEEP. During the protocol each subject was exposed to four PEEP levels: 2 – 5 – 10 – 15cmH_2O. At each level, magnetic stimulation of the phrenic nerve was performed to measure the transdiaphragmatic pressure (Pdi twitch). Afterwards, a MRI was performed to determine changes in position, shape and length of the diaphragm at the different PEEP levels.
Results and Discussion: All subjects completed the protocol. A gradual caudal displacement of the diaphragm was found at increasing the PEEP level (figure 1), which was only significant for PEEP of 15cmH_2O (p = 0.03). There was no correlation between the degree of caudal displacement and Pdi twitch (R = 0.269). Whether this is also the case for critically ill patients has to be investigated, since they might be more vulnerable to the effects of PEEP.
Conclusions: Increasing PEEP levels result in a gradual caudal displacement of the diaphragm. This displacement does not lead to a decreased contractibility of the diaphragm, at least not in our non-invasively ventilated healthy subjects.
References:
1. van den Berg M., Hooijman P.E., Beishuizen A., et al. Diaphragm Atrophy and Weakness in the Absence of Mitochondrial Dysfunction in the Critically Ill. AJRCCM 2017 Dec 15;196(12):1544-1558.

11AP02-3
The respiratory and haemodynamic effects of alveolar recruitment maneuver during and after Living Donor Liver Transplantation, randomized controlled trial.

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Background: GA and abdominal retraction reduce lung volumes.
Aim: Alveolar recruitment maneuver ARM effects on dynamic compliance (Cdyn), arterial oxygenation ($PaO_{2)}$, hepatic haemodynamic (hepatic and portal vain blood flow(HVF, PVF), postoperative pulmonary complications PPC and ICU stay.
Materials and Methods: Local Ethics Committee approval and PACTR201811462663708, 57 recipients (2017-2018) one excluded severe bleeding. Aneathesia depth monitored, FiO2 0.4.Two groups, C_{gp} *n*=29.Volume control ventilation VCV(PEEP 5 cmH_2O, TV 6-8 ml/kg). ARM_{gp} *n*=27. Individualized ARM, Pressure CV (Driving pressure 15 cm H_2O, Step up 5 in PEEP guided by Cdyn ml/cmH_2O) repeated until optimal PEEP reached, then switched to VCV. ARM timing: post intubation, post-surgical retraction applied and at ICU. ARM was aborted when hemodynamic instability prevails. Fluids guided by Trans-esophageal Doppler, corrected flow time FTc ml/Sec. Cardiac output CO l/min. Invasive arterial IBP and CVP were monitored during dissection phase (T1), post reperfusion (T2) and at ICU(T3).
Results and Discussion: Median [IQ] Comparable ARM, vs C_{gp} Age p=0.66, MELD (13.5[11.5-17] vs 15 (12-18], p=0.16). Anaesthesia time p=0.826, norepinephrine support p=0.154, and blood products p=0.144. ARM increased PEEP, Cdyn and PaO_2 at (T1) (9[9-10] vs. 5 $_{cmH2O}$, p<0.001), (54[48-63] vs. 39[39-40] ml/cmH_2O, p<0.001), and (202 [181-237] vs. 170 [153-186] mmHg, p<0.01), respectively. In ICU ARM improved PaO_2 at (T3) (210 [172-226] vs. (168 [133-189], mmHg, p<0.0.1),ARM reduced PPC (0/28 vs 8/29 (27.59%), p= 0.003),but no significant effect on ICU ventilation time (p=0.085) and ICU stay (p=0.898). ARM increased CVP cmHo_2 at (T1)(11[9-13] vs. 9 [8-10] p=0.001) and continue at (T2)(11[9-13] vs 9[9-10], p=0.004), but FTc were not affected, p= 0.7. Negligible CVP and FTc correlation (394 readings), t= 0.106, p=0.036). Comparable CO(p=0.2) and IBP (p=0.1) . ARM did not affects hepatic haemodynamics. PVF (30 [19-46] vs 38[26-45] cm/sec, p=0.831) and HVF (25[20-34] vs 25[20-30], cm/sec, p=0.39).
Conclusions: ARM improved lung Cdyn, PaO_2 and reduced PPC but not the ICU stay. The systemic and hepatic haemodynamics were not affected by ARM optimal PEEP. FTc is superior to CVP in assessing intrathoracic fluids.

11AP02-4
Gait speed on entering the operating room is related to hypoxemia during one lung ventilation in younger patients undergoing noncardiac thoracic surgery.

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Background and Goal of Study: Slow gait speed is a predictor of poor outcomes in patients undergoing surgery. The 6-meter gait speed test is often used for the diagnosis of frailty and assessment of postoperative morbidity risk. However, not all centers are able to test gait speed and physical status may change prior to surgery. Measuring gait speed when patients are entering the operation room (OR) is a noninvasive easy method. The gait speed on entering the OR provides information of the current physical status of patients and may reflect the capacity of the patient to tolerate changes in the ventilation-perfusion ratio during one lung ventilation (OLV). In this study we explored the association of gait speed on entering the OR with the frequency of intraoperative hypoxemia during OLV in non-cardiac thoracic surgery.
Methods: After review board approval, we performed a retrospective review of hospital records of all patients undergoing non-cardiac thoracic surgery with OLV at our center from September to December 2018. Gait speed was measured postoperatively by reviewing video recordings from monitoring cameras in our surgical department. The time required for the patient to walk a flat 25.4-meter corridor at a self-regulated pace was used to calculate gait speed. Patients unable to walk freely were excluded. Hypoxemia was defined as percutaneous oxygen saturation less than 93% which was unrelated to the surgical procedure during OLV. Patients were grouped to according to ages over or under 70. Statistical analysis of the data included student's t-test and univariate logistic regression.
Results: The final cohort consisted of 93 patients with the average age of 65.4 ± 14.3 years. Overall mean gait speed was 0.91±0.13 m/s and hypoxemia during OLV occurred in 28.0% (n=26). Patients experiencing hypoxemia during OLV in the younger age (<70) group had significantly slower gait speeds (0.82 ± 0.19 vs 0.94 ± 0.12, p=0.015). Gait speeds did not significantly differ between normal and patients with hypoxic events in the older age (70) group (0.91± 0.15 vs 0.91± 0.08 m/s, p=0.96). In our univariate regression model, the odds ratio for hypoxemia increased by 1.84 for every 0.1m/s decrease in gait speed in younger patients (Odds ratio per 0.1m/s 1.84, 95% confidence interval 1.08-3.14, p=0.016).
Conclusion: Our study suggests the gait speed on entering the OR is a predictor of hypoxemia during OLV in patients under 70 but not in older patients.

11AP02-5
Cutting-edge ventilation method in laryngeal microsurgery.

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Background and Goal of Study: The Ventrain system provides a manually controlled ventilation through an ultra-thin endotracheal tube called Tritube. It is a tube with 2.5 mm inner diameter and an outer diameter of only 4 mm, which has a cuff lumen (to inflate and deflate the high volume, low pressure cuff) and an intratracheal pressure measurement lumen (for continuous intratracheal pressure measurement.). It uses the EVA technology that allows active inspiration and expiration, and supplies adequate gas exchange, reducing the risk of air trapping and increasing the visibility of the surgical field in upper airway surgery.
Materials and Methods: We present a 9 cases series of laryngeal microsurgery to treat benign polyps. All of them were intubated with Tritube and underwent general anesthesia, which allowed the use of Ventrain as a ventilation mechanism. 30 minutes after surgery, arterial gasometry was collected, to assess PaO2 and PaCO2, as well as the correct relationship between PaCO2 and End-tidal CO2 capnometry. In addition, we asked the surgeon about his satisfaction during surgery.
Results and Discussion: All patients were ventilated satisfactorily using Ventrain dispositive. PaO2 and PaCO2 measurements obtained were in normal ranges for all cases except for the first one, in which our lack of experience caused the patient an hyperventilation (PaO2 510 mmhg and PaCO2 24 mmHg). Surgical satisfaction was excellent, mainly due to the greater exposure and better maneuverability provided by Tritube.
Conclusions: Ventrain is a cutting-edge ventilation method, which provides active inspiration and expiration using an ultrathin endotracheal tube. Although more studies are needed to confirm results, Ventrain could be considered as an alternative in those laryngeal microsurgeries. If the surgeon knows in advance that there will be complications due to the characteristics of the lesion, this system will provide greater access and visibility.
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Transtracheal ventilation with a novel ejector-based device (Ventrain) in open, partly obstructed, or totally closed upper airways in pigs. Paxian M1, Preussler NP2, Reinz T2, Schlueter A2, Gottschall R2. BJA, 2015 Aug;115(2):308-16.

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11AP02-6
Flow-controlled ventilation improves oxygenation in mechanically ventilated lung-healthy patients - a crossover controlled interventional trial

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Background and Goal of Study: During conventional mechanical ventilation, expiration occurs passively - driven by the passive recoil forces of the respiratory system. The rapid expiratory decrease in airway pressure during conventional ventilation may facilitate early airway closure and consecutive formation of atelectasis. Flow-controlled ventilation (FCV), provided by a new mechanical ventilator (Evone, Ventinova Medical B.V., Eindhoven, The Netherlands), is characterised by a linear increase and decrease of airway pressure and constant flow during inspiration and expiration. FCV improved oxygenation, CO2 elimination and lung aeration in lung-healthy and lung injured pigs. The primary aim of this study was to examine the influence of FCV on arterial blood gases and respiratory system mechanics in lung-healthy patients.
Materials and Methods: After ethical approval, 20 patients scheduled for elective abdominal surgery were randomly allocated into one of two cross-over groups. After 7 minutes of volume-controlled baseline ventilation (BL), one group received a sequence of volume-controlled ventilation (VCV) followed by FCV, whereas the other group received a sequence of FCV followed by VCV. Each ventilation phase was applied for 7 minutes. Ventilation parameters were set identical for each ventilation sequence. After each ventilation phase, arterial blood gases were determined. Primary endpoint was the arterial partial pressure of oxygen (PaO2). Secondary endpoints were respiratory system variables.
Results and Discussion: PaO2 and CO2 elimination were improved under FCV (PaO2: BL: 262.5 ±43.8 mmHg, VCV: 264.0 ±52.3 mmHg, FCV: 286.5 ±52.9 mmHg; PaCO2: BL: 38.3 ±3.7 mmHg, VCV: 38.0 ±3.5 mmHg, FCV: 36.3 ±3.3 mmHg; $p < 0.001$). No differences in respiratory system compliance and inspiratory plateau pressure between BL, VCV and FCV were found. Mean tracheal pressure was higher under FCV compared to BL and VCV (BL: 10.2 ±1.1 cmH_2O, VCV: 10.4 ±0.7 cmH_2O, FCV: 11.5 ±1.0 cmH_2O; $p < 0.001$).
Conclusion: Compared to VCV, FCV improves oxygenation and CO2 elimination with identical ventilation settings, even after a short-term application, in lung healthy mechanically ventilated patients.
Acknowledgements: This work received funding from the European Union's Horizon 2020 research and innovation programme, grant no. 691519. We thank Prof. Dietmar Enk (inventor of FCV) for sharing his thoughts on small lumen ventilation with us.

11AP02-7
Flow-controlled ventilation improves end-expiratory lung volume in obese patients - a crossover controlled interventional trial

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Background and Goal of Study: Due to increased chest wall resistance, reduced respiratory system compliance and thus impaired functional residual capacity (FRC) and expiratory reserve volume (ERV), mechanically ventilated obese patients are at increased risk for early airway closure and consecutive formation of atelectasis. A constant expiratory flow, provided by flow-controlled ventilation (FCV, Evone ventilator, Ventinova Medical B.V., Eindhoven, The Netherlands), was shown to improve aeration of lung tissue and oxygenation in lung-healthy pigs and in an experimental porcine lung injury model. Primary aim of this study was to examine the influence of FCV on regional ventilation (measured with electrical impedance tomography, EIT) and respiratory system mechanics in mechanically ventilated obese patients.
Materials and Methods: After ethical approval, 23 obese patients scheduled for elective bariatric surgery were randomly allocated to receive one of two different ventilation sequences. Baseline samples were taken after 7 minutes of volume-controlled ventilation (BL). Then, one group received volume-controlled ventilation (VCV) followed by FCV, the other group received FCV followed by VCV. FCV and VCV were applied for 7 minutes. The ventilation parameters were set identical in both groups. Primary endpoint was the end-expiratory lung volume (derived from EIT data), secondary endpoints were respiratory system variables.
Results and Discussion: Two patients were excluded due to limited size of the EIT belt, 2 patients were excluded due to incomplete data set. Dynamic decrease in EELV was less pronounced under FCV (FCV: -181 ± 251 ml, VCV: -314 ± 251 ml, $p < 0.001$). With identical tidal volumes per predicted body weight, peak inspiratory pressure under FCV was lower than under VCV (20.9 ± 4.0 cmH2O vs. 22.1 ± 3.7 cmH2O, $P = 0.03$). Under FCV, mean tracheal pressure was significantly higher (FCV: 14.8 ± 2.2 cmH2O, VCV: 12.9 ± 1.2 cmH2O, BL: 13.1 ± 1.1 cmH2O, $P < 0.01$).
Conclusion: Compared to VCV, FCV diminished the anaesthesia induced decrease in EELV in obese patients at comparable PEEP, tidal volume, and inspiratory plateau pressure.
Acknowledgements: This work received funding from the European Union's Horizon 2020 research and innovation programme, grant no. 691519. We thank Prof. Dietmar Enk (inventor of FCV) for sharing his thoughts on small lumen ventilation with us.

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11AP02-9
Ventilatory effect of Midazolam in Deep Sedation Patients Undergoing Radiofrequency Ablation Procedure: An Interim Analysis

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Background and Goal of Study: Radiofrequency ablation (RFA) is an alternative therapy for hepatocellular carcinoma (HCC) and liver metastases when resection cannot be performed. Practically, an intravenous sedation is a technique of choice for the operation. The mainly used anaesthetics are propofol, fentanyl, and midazolam. Though midazolam has respiratory depression, A very few complicated cases has been reported. As a result, the investigators would like to study the ventilatory effect of midazolam in patients after RFA by using capnography monitoring.
Materials and Methods: This prospective study, scheduled from June 2018 to June 2019, has been approved by Siriraj Institutional Review Board (COA: Si 086/2018) and registered via Thai Clinical Trial Registry (TCTR20180909002). Inclusion criteria were volunteered patients, ASA I-III, BMI < 35 kg/m2, aged < 80 years. The exclusion criteria were patients with severe medical diseases. The 174 out of 374 participants were randomized into 2 groups: A-patients receiving propofol and fentanyl (control group), B-patients receiving propofol, fentanyl and midazolam (study group). All patients were administered with oxygen nasal cannula 3 LPM with standard monitoring and end-tidal CO2 via nasal prong. At the end of the procedure, patients were also monitored with sedation score until discharge.
Results and Discussion: There were no significant differences in the patients' characteristics, duration of the procedure, ventilatory parameters and the duration of sleep in the recovery room between the two groups. However, in group B, the mean oxygen saturation at 30 minutes and the mean respiratory rate at 60 minutes after the procedure in the recovery room were significantly lower than those in group A. This might due to midazolam had direct effect on ventilator function prior to discharge. Nevertheless, serious adverse events in both groups were not notified.
Conclusions: Propofol deep sedation with and without midazolam for patients underwent radiofrequency ablation procedure was safe and effective. A minimal dose of midazolam did not yield serious ventilatory effects.

11AP02-10
Negative thoracic-abdominal pressure improves lung mechanics during positive pressure ventilation in pigs

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Background and Goal of Study: Mechanical ventilation with positive pressure may lead to volutrauma and atelectrauma, causing ventilator-induced lung injury (VILI). Recent experimental data suggest that full body continuous external negative pressure (CENP) may recruit and stabilize alveoli in dependent lung zones and reduce VILI. However, the use full body CENP is cumbersome in clinical practice. We hypothesized, that thoracic-abdominal CENP improves lung mechanics and increases transpulmonary pressure.
Materials and Methods: Following approval of the study protocol by the local animal welfare committee, five pigs without lung injury were anesthetized and ventilated with airway pressure release ventilation (driving pressure 15 cmH_2O, inspiratory oxygen fraction 1.0, respiratory rate 20/min, inspiratory to expiratory ratio 1:1). A thoracic-abdominal shell designed for pigs was placed on animals and connected to a negative pressure mechanical ventilator (Pegaso Vent, Dima Italia, Bologna, Italy) to obtain CENP as low as -60 cmH_2O at 0, 7 and 15 cmH_2O of positive end-expiratory pressure (PEEP). We assessed the distribution of ventilation with electrical impedance tomography (EIT), recorded airway pressure, esophageal pressure and flow, and assessed hemodynamics and arterial blood gases. Measurements were obtained with the shell in predominantly cranial and predominantly caudal positions.
Results and Discussion: Independent of PEEP, thoracic-abdominal CENP shifted ventilation towards dorsal lung zones as measured by EIT (*Fig. 1*). Furthermore, it increased transpulmonary pressures, resulting in improved lung compliance. These effects were more pronounced with the shell in predominantly cranial than caudal position. Hemodynamics and gas exchange did not show major differences between CENP/PEEP combinations.

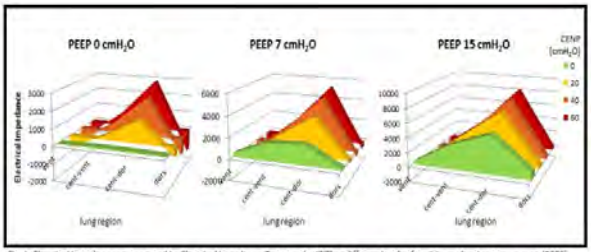

Fig. 1: Electrical impedance as measured by Electrical Impedance Tomography (EIT) at different levels of positive endexpiratory pressure (PEEP) and continuous external negative pressure (CENP), respectively. An increase of impedance represents an increase of local lung aeration. Vent: Ventral; Cent-vent: Centro-ventral; Cent-dor: Centro-dorsal; Dors: Dorsal.

Conclusions: In anesthetized pigs under positive pressure ventilation, thoracic-abdominal CENP improved lung mechanics and increased transpulmonary pressures. Further studies are needed to determine whether thoracic-abdominal CENP may reduce VILI during positive pressure ventilation.

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11AP03-1
Successful anesthetic management during dual stenting of the esophagus and trachea for a tracheo-esophageal fistula: a case report

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Background: A tracheo-esophageal fistula (TEF) is often accompanied by aspiration pneumonia and airway obstruction, which worsen the quality of life. Tracheal and esophageal stenting is a therapeutic option for a TEF. However, anesthetic management of patients with a TEF is challenging since a TEF complicates airway management. Here, we report a case of tracheal and esophageal stenting that was performed under monitored anesthesia care.
Case Report: A 77-year-old man (height, 162 cm; weight, 43 kg) was diagnosed with TEF caused by esophageal carcinoma. Bronchoscopy showed an intractable fistula between the esophagus and the left side of the carina, and the tumor mass close to the left main bronchus. Tracheal and esophageal stenting was scheduled to protect against aspiration pneumonia. Throughout the stenting procedures, the patient was sedated with an intravenous bolus of midazolam (0.7 mg/kg)and titrated propofol (1.2 mg/kg/h) and fentanyl (1.6 μg/kg/h). Spontaneous respiration was maintained with high-flow nasal cannula therapy during esophageal stenting. First, a guide-wire catheter was placed in the left main bronchus and then an esophageal stent was placed. After the esophageal stenting, a chest exam revealed normal breath sounds bilaterally. Then the trachea was intubated, and the guide-wire catheter was removed. An airway exchange catheter (AEC) was inserted into the right main bronchus and manual jet ventilation was performed via the AEC during tracheal stenting. After removal of the endotracheal tube, a rigid bronchoscope was inserted. Subsequently, a tracheal stent was placed for stenosis of the trachea. The scope and the AEC were removed and a laryngeal mask airway (LMA) was inserted. Arterial oxygen saturation was maintained above 93% throughout the stenting procedures. He was discharged one week after the stenting without developing any complications.
Discussion: In the present case, we used a guide-wire catheter in the left main bronchus to prevent possible airway occlusion and high-flow nasal cannula therapy for preventing hypoxemia during esophageal stenting. During tracheal stenting, we used manual jet ventilation via the AEC to maintain arterial oxygen saturation without interfering with the stenting procedures. These approaches could be used under monitored anesthesia care without the development of complications.
Learning points: We successfully managed a case of tracheal and esophageal stenting for a TEF under monitored anesthesia care.

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11AP03-2
Ruptured Thoracic Aortic Ulcer with Intra-operative Tracheal Compression : A case report

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Background: A 75-yr-old female underwent emergency thoracic endovascular aortic repair (TEVAR) for ruptured Thoracic Aortic Ulcer, but developed high airway pressures and difficult ventilation. We believe this occurred due to a large mediastinal hematoma causing posterior tracheal wall compression. PubMed seach revealed no previous similar case report.
Case Report: This patient presented with acute onset central chest pain and CT chest/aortogram findings were suggestive of a ruptured penetrating atherosclerotic ulcer with active haemorrhage. In theatre, a rapid sequence induction was performed with IV Midazolam 5mg and IV Ketamine 20 mg. However, we had difficulty inserting a 35Fr Mallinkcrodt left double lumen tube (DLT) and a size-7 Parker tip endotracheal tube (ETT) was inserted on 2nd attempt. During surgery, airway pressures rose to 32 cmH20. Air-entry was poor bilaterally with coarse crepitations. Intraoperative bronchoscopy performed showed a significant extrinsic compression of the posterior tracheal wall, 1cm above and at the level of the carina [Figure 1]. Ventilation was adjusted and patient was kept intubated post-operatively.
Discussion: Risk factors of PAU include age, hypertension and atherosclerosis, and usually involves the descending thoracic aorta [1]. Complications of PAU include localised intramural hematoma due to erosion, pseudoaneurysm, progression to overt aortic dissection, or rupture. For TEVAR, DLT improves surgical exposure and provides increased margin of safety. Potential trauma is minimised since one lung is collapsed. Contralateral lung is protected from blood spillage during surgical manipulation. Our failed DLT attempt was likely due to partial obstruction of the left main bronchus by the expanding mediastinal hematoma. Endobronchial blocker tubes should be considered, yet in this patient, we rationalised it reasonable to proceed with a single lumen ETT in view of emergency airway and planned minimally invasive technique.
References:
1. Cook JP, Kazmier FJ, Arzulak TA, et al. Penetrating aortic ulcer: pathologic manifestations, diagnosis, and management. Mayo Clin Proc 1988; 63:718-725
Learning points: We concluded that an expanding mediastinal hematoma caused by a penetrating aortic ulcer (PAU) resulted in external tracheal compression, contributing to difficult intubation and ventilation. Raised airway pressures secondary to such a complication is rarely encountered and diagnosis has to be confirmed by bronchoscopy.

11AP03-3
A case report of a huge tongue mucocele in a child in a resource limited setting.

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Background: A huge tongue mucocele in a one year old child that presented to the emergency room at a *Medicins Sans Frontieres* secondary health care facility in South Sudan that increased in size gradually until full cessation of feeding and pending respiratory compromise were the main concerns managed in a resource limited setting under general anesthesia and endotracheal intubation.
Case Report :A case of a huge mucocele affecting the anterior aspect of the togue extending through the ventral to the dorsal surfaces that increased in size gradually and resulted in a complete cessation of feeding and pending respiratory difficulty in a male patient of one year of age that presented to a *Medicins Sans Froentieres* operated health structure in Agok,South Sudan. Airway management was the main concern as fiberoptic bronchoscpy and video assisted laryngoscopy were unavailable, elective tracheostomy was not an option due to the inexperience of the staff in managing it and the high risk of infection ,post-operative mechanical ventilation isn't available and very hard to establish . The patient had drooling through the nose, inability to feed, difficulty swallowing and distress. General Anesthesia induced through a T-Piece breathing circuit using halothane with nasotracheal tube placed and the level of anesthesia deepened with fentanyl while maintaining sponatneous breathing during induction and throughout the procedure.
Discussion: Mucoceles are one of the most common lesions affecting the oral cavity that usually result from trauma and most commonly affect the lower lip, floor of the mouth and ventral surface of the tongue[1] with a peak incidence age between 10-20 years [2], the treatment involves surgical excision and marcipulization of the cyst wall to prevent recurrence. Anesthesiolgists are not usually concerned with such lesions as in the developed world they present early and usually are small and not involving the airway.
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Learning points:
1.Anesthesiolgists play a critical role in resource limited settings.
2.Inhalational induction is safe in difficult airway scenarios.

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11AP03-4
Difficult airway secondary to complication of oropharyngeal stenosis post robotic lingual and palatine tonsillectomy

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Background: We present a case of difficult airway due to oropharyngeal stenosis.
Case Report: A 41 year old male underwent excision of back lump. He had medical history of severe obstructive sleep apnea and underwent robotic lingual and palatine tonsillectomy. Postoperatively, there was complication of oropharyngeal stenosis with revision pharyngoplasty performed. In light of his narrowed oropharyngeal inlet, decision was made to induce patient under GA with maintenance of spontaneous ventilation with no instrumentation of the airway. Patient was co-induced with 100% oxygen, 8% sevoflurane and intermittent boluses of IV propofol with maintenance of spontaneous respiration. A nasopharyngeal airway was inserted to maintain airway patency and operation commenced once an adequate depth of anaesthesia was achieved. Subsequent evaluation of the airway via fibreoptic bronchoscope (FOB) showed a fibrous cicatrix causing severe narrowing of the oropharynx. We were able to pass the FOB orally through the 15mm opening of the cicatrix and found the larynx to be normal. Nasal fibreoptic bronchoscopy also showed that airway was patent from nasopharynx all the way to the larynx.
Discussion: Cohen reported the prevalence of postoperative oropharyngeal stenosis to be 7.8% in patients who underwent uvulopalatopharyngoplasty or trans-oral robotic surgery.[1] Adhesion of the tonsillar pillars to the tongue base and scar tissue formation narrows the oropharyngeal inlet. This presents a challenging scenario to anaesthetists as the cicatrix causing narrowing of the oropharynx makes passage of an endotracheal tube or LMA difficult, if not impossible. Pre-operative laryngofiberscopy will allow assessment of the site and severity of obstruction and also rule out concomitant nasopharyngeal stenosis. In event the airway must be secured in a patient with oropharyngeal stenosis, nasal fibreoptic intubation represents a viable option.[2]
References:
1. Nishimori M et al. Unanticipated difficult airway due to undiagnosed oropharyngeal stenosis: a case report. JA Clin Rep 2016;2:10
2. Boles KS et al. Oropharyngeal stenosis leading to an unanticipated difficult airway in a patient after uvulopalatopharyngoplasty: a case report and review of the literature. A A Pract 2018;11:124-127
Learning points: Our case highlights the importance of early recognition of oropharyngeal stenosis a rare complication of upper airway surgery in order to plan airway management appropriately.

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11AP03-5
Airway management with video laryngoscope in a pediatric patient with severe cleft lip and palate: case report

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Background: Securing the pediatric airway is a critical skill for the anesthetists. The cleft lip and palate are the most common craniofacial anomalies in children with difficult airway management, with an incidence of 1/800 live births (1). In this case report, we aim to emphasize successful airway management with Glidescope video laryngoscope in pediatric patient with anatomic defect such as cleft lip and palate, considering the risk of difficult laryngoscopy and intubation.
Case Report: 18-month-old female patient with a weight of 9 kg and height of 75 cm was brought to our operating room for hydrocephalus shunting operation. In physical examination, it was observed that the patient had severe cleft lip and palate. With the help of Glidescope titanium lopro T3 blade video laryngoscope, tracheal intubation was performed in the first attempt and without desaturation in the patient by 3.5 numbered spiral tube inserted into flexible thin probe. The patient was extubated at the end of the operation (Figure 1).

Figure 1 The view of cleft lip and palate and nasal anatomic defect after extubation

Discussion: Glidescope is a video laryngoscope system which is designated for difficult airways, and has camera and 60 degree curve, and is made of hard plastic, and is composed of blade, light source and monitor that the image is transferred. In the study of pediatric difficult airways made by Karslı et al., as compared with direct laryngoscopy, they stated that the video laryngoscopy provided a better view of glottis (2).
References:
1. Kulkarni R., et al. Perioperative respiratory complications in cleft lip and palate repairs: An audit of 1000 cases under 'Smile Train Project'. Indian Journal of Anaesthesia, Vol. 57, Issue 6,Nov- Dec 2013/562.
2. Karslı C., et al. A comparison between the Glidescope video laryngoscope and direct laryngoscope in paediatric patients with difficult airways- a pilot study. Anaesthesia, 2010, 65, pages 353- 357.
Learning points: In conclusion, Glidescope video laryngoscope which is used airway management of patients with cleft lip and palate anomaly characterized part in literature as a difficult airway, has successfully provided airway management in our case.

11AP03-6
Incidental laryngeal web encountered during videolaryngoscopy

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Background: Laryngeal web is a membrane like structure in the larynx which could be either congenital or acquired.[1] They are usually symptomatic in childhood but they could also be asymptomatic.[2]
Case Report: A 8-year-old boy with cerebral palsy was accepted to the operating room for a femoral derotational osteotomy. Airway assessment was normal other than a mild hoarseness. Induction was done with 2,5mg/kg propofol, 1mcg/kg fentanyl and 0.6mg/kg rocuronium after preoxygenation. We decided to do videolaryngoscopy because of the hoarseness and realized a laryngeal web which was narrowing the lumen. Endotracheal intubation with an uncuffed 4.5mm tube was done. 2% sevoflurane and 0.05mcg/kg/min remifentanil were used for maintenance. An otolaryngologist was consulted and she removed the web after taking consent from the family. The endotracheal tube was changed with a 5mm cuffed tube. To prevent edema, 2mg/kg methylprednisolone and 1mg/kg ranitidine were given intravenously. At the end of the orthopedic procedure rocuronium was reversed with 2mg/kg sugammadex and patient was extubated successfully. There were no respiratory complications.
Discussion: Undiagnosed laryngeal webs may cause unanticipated difficult intubation. Patients may be misdiagnosed as asthma because of similar symptoms like dyspnea.[2] During laryngeal mask airway ventilation, laryngeal web may cause an increase in the airway pressures that could mimic bronchospasm.[3]
In our case videolaryngoscopy helped us diagnose the web and to choose the proper sized endotracheal tube. As Gupta et al. mentioned, early use of videolaryngoscopy in the patients with suspicious airway abnormality can minimize airway morbidity.[2]
References:
1. Siggers B, Ross O et al. A rare cause of upper airway obstruction in a 5-year-old girl: a laryngeal web. Pediatric Anesthesia, 2003. 13(8): p.722-724.
2. Gupta A, Gupta N. Anterior Laryngeal Web Leading to Unanticipated Difficult Tracheal Intubation in a Neonate Diagnosed and Managed Successfully With CMAC Video Laryngoscope: A Case Report. A&A Practice, 2018. 10(1): p.28-30.
3. Singh P, Khanna P. Incidental laryngeal web simulating intra-operative refractory bronchospasm. Indian Journal of Anesthesia, 2013. 57(1): p.82.
Learning points: Laryngeal webs may cause difficult intubation and if they do, use of videolaryngoscopy and small sized endotracheal tubes can make intubation easier. An ENT consultation should be done in case of a suspicious airway abnormality.

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11AP03-7
When inbubation by fibroscopy fails: a case report

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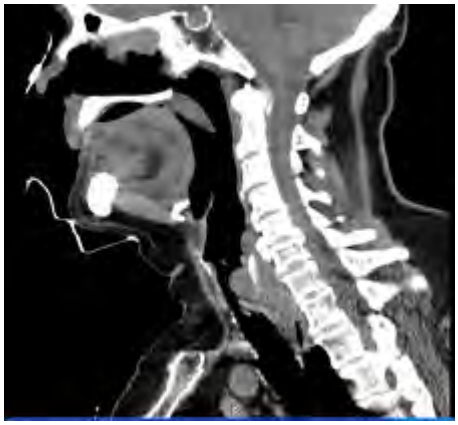
Background: The efficacy of videolaryngoscopy for the management of predictable difficult airways (DA) in awaken patients has been demonstrated. The aim of this present case is to discuss the advantages/disadvantages associated with the use of videolaryngoscopes in management of awake patient in comparison with fibroscopy.
Case Report: A 75-year-old female, ASA 3. She wnt to emergency department due to aggravation of dysphonia and dyspnea. A cervical CT revealed “Subglottic expansive lesion, occupying the posterior laryngeal lumen (only 5 mm of free lumen), with 3 cm of extension” (figure 1). Steroid therapy was started, the antiaggregation was suspended and she was admitted for elective biopsy. Because of respiratory distress, she was transferred to the intensive care unit where noninvasive ventilation was started. It was decided to perform an urgent tracheostomy. The initial strategy to approach the airway was orotracheal intubation with the awaken patient by fibroscopy, without sedation, only local anesthesia with 2% lidocaine. A pediatric fibroscope (3.4mm diameter) was used (the available adult fibroscope did not allow the progression of a 5.5mm tube). Fibroscopy intubation was not achieved by the difficulty in orienting the fibroscope through the lesion. The C-MAC D-Blade videolaryngoscope was then treated with the awaked patient, successfully achieved at the 1st attempt. The tracheostomy was uneventful.
Discussion: Videolaryngoscopy is an effective alternative to fibroscopy in awaken patients, since it allows a global view of the entire glottic structure. Correct use is associated with less difficulty and a faster learning curve. The choice of the fibroscopic pediatric, due to its diameter and greater flexibility, made it impossible to overcome the lesion with the available space. The use of fibroscopy in the context of tumor lesions may also be hampered by the possibility of hemorrhage associated with tissue friability.
Learning points: It is essential requesting for help and the prior definition of the strategy to adopt and knowledge of available material. In the initial approach of an agreed upon DA, the videolaryngoscopy should be considered.



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11AP03-8
Safe intubation with videolaryngoscope in a patient with multiple episodes of regurgitation and aspiration of gastric contents after several intubation attempts using a rapid sequence induction (RSI) with Macintosh and Sellick

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Background: recognition and management of the difficult airway remain a core skill in the practice of Anesthesiology. Endotracheal intubation awakens is basic in decision-making trees of difficult airway algorithms based on a patient’s history.
Case Report: we present an 80-year-old male, ASA 4, BMI 24, Cognitive impairment suggestive of dementia, non-smoker, casual drinker, not known allergies, scheduled for distal gastric adenocarcinoma, with relative duodenal pyloric stenosis. Mallampati 4, cervical mobility 90-100º, mouth opening >3 cm., thyromental distance of 6 cm. approx., and upper lip bite test 0. Patient had presented 4 episodes of gastric regurgitation after the induction despite using a rapid sequence induction (RSI) with Macintosh and Sellick in 4 previous attemps, with pulmonary aspiration and 2 episodes of pneumonia, the last treaty with vancomycin e imipenem, ended 3 days before. Patient was taken to the operating room and standard ASA monitors were applied. He was seated to reduce the pressure on the upper esophageal sphincter. After recording of baseline vital signs, patient received oxygen (O2) at 3 liters per minute via a nasal cannula. To maximize the chance of success when performing the intubation, the upper airway was sufficiently anesthetized with airway topical anesthesia for the comfort of the patient and subsequent successful instrumentation. Airway topicalization constituted spraying lidocaine 10% in the posterior oropharynx using a mucosal atomizing device to avoid glossopharynx reflex. We used sevoflurane to perform a General Anesthesia maintaining spontaneous ventilation and pharyngeal muscle tone of the patient. We deemed an acceptable anesthesia when patient appeared comfortable, and was breathing 10-15 breaths per minute. The patient was lack of reaction to insertion of the Airtraq blade, and intubation was performed successfully, safety and effectively.
Discussion: Awake intubation is regarded as a cornerstone of safe anesthetic practice. But, in some patients we can perform a General Anesthesia wit spontaneous ventilation maintaining muscle tone. In this patient, we did not suspect a difficult intubation, and our only concern was to maintain the muscular tone of the upper oesophageal sphincter to avoid a new aspiration of gastric contents. Topicalization of the oropharynx, spontaneous breathing and seated position prevents the disastrous consequences of gastric aspiration.

11AP03-9
One lung ventilation via double lumen tube in patient with tracheostomy: Case report

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Background: One lung ventilation in tracheostomized patient is quite a challenging situation because of the distorted anatomy by previous surgery. Anesthesiologists should always anticipate difficulties in airway management and every patient should be individually evaluated and prepared[1]. Clear preoperative scenario must be discussed and planed by the team.
Case Report: A 62 years old male patient was admitted for lung cancer surgery. He was diagnosed with adenocarcinoma in right superior lobe and planed for lobectomy by video-assisted thoracoscopic surgery. Two years ago he had total laryngectomy and had permanent tracheostomy. After all preoperative examinations, he was prepared for surgery. He was preoxigenated through the tracheostomy and then was anesthetized with Midazolam 2mg, Fentanyl 0.15mg, Rocuronium 50mg and Propofol 150mg. A left-sided 35Fr double lumen tube was placed through the stoma under bronchoscopic guide. After the patient was positioned in his definite lateral position, the tube position was once again evaluated by fiberoptic bronchoscopy and then it was fixed with sutures to the skin. During the surgery, no complications were noted and the emergence was without any difficulties.
Discussion: Few options for airway management in patients after total laryngectomy are considered. Placing a double lumen tracheostomy tube is certainly the safest but not always readily available option. Bronchial blocker through tracheostomy cannula is a possibility but brings difficulties in suctioning maneuvers, longer time needed for collapse and higher possibility for displacement. A standard double lumen tube has few advantages, facilitates the suctioning, provides rapid collapse and anesthesiologists are more experienced in positioning[2]. Attention should be paid on early recognition of malposition, because conventional double lumen tubes are too long for the shortened airway.
References:
1. Yaney LL: Double-lumen endobroncheal tube for one-lung ventilation through a fresh tracheostomy stoma: a case report; AANA J. 2007 Dec; 75(6):411-5
2. Renton M.C., Conacher I.D.: Single-lung ventilation via a double lumen tube in patient with a tracheostomy; Anesthesia, 2002, 57, pages 183-208
Learning points: In situation where specialized double lumen tracheostomy tube and bronchial blockers are not available, this technique is a feasible option for lung isolation surgery. But bronchoscopic control for confirmation of accurate position is mandatory.

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11AP03-10
Nasal obstruction with mass abutting middle turbinate after nasotracheal intubation for transoral hemithyroidectomy : A case report

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Background: Nasotracheal intubation is valuable during intra-oral surgery. Common complication of this technique is epistaxis. Rarely, traumatic avulsion of structures within nasal fossa and nasopharynx were reported [1]. We experienced a case of middle turbinate fracture which showed no immediate signs of fracture such as bleeding or avulsed particles. Two months later, it discovered in the form of nasal obstruction with mass like lesion.
Case Report: A 37 year old, 165 cm, and 66.8kg female underwent transoral approach hemithyroidectomy. She had no remarkable medical history. A lubricated size 6.0 mm nasal tube (Nasal RAE tracheal tube cuffed, Covidien, Ireland) was gently inserted via left nostril during anesthesia. Some resistance was felt, and several redirections of tube were done. After entering into oropharynx, guided the tube into the trachea with Margill forcep under direct vision of curved laryngoscope. There was no remarkable findings. The patient discharged from hospital four days after operation uneventfully. Two months later, the patient complained of nasal obstruction sensation. Endoscopy and nasal CT revealed a mass abutting left middle turbinate (Figure 1, 2). Middle turbinate fracture associated with nasotracheal intubation was diagnosed.
Discussion: There are two main anatomical pathways in nasal cavity for nasotracheal intubation. The lower pathway which lies under inferior turbinate, and the upper pathway between the inferior turbinate and middle turbinate (figure 1). The lower pathway is considered to be more safe passage with less vascularity [2]. It seems that multiple redirection might cause the fracture.
References:
1. Hall CE, Shutt LE. Nasotracheal intubation for head and neck surgery. Anaesthesia 2003; 58: 249-56.
2. Ahmed-Nusrath A, Tong JL, Smith JE. Pathways through the nose for nasal intubation: a comparison of three endotracheal tubes. Br J Anaesth 2008; 100: 269-74.
Learning points: It seems that several redirection of nasal tube may cause significant trauma of structures in nasal cavity, and it could be asymptomatic during immediate period. Checking the soundness of nasal structures is recommended, when multiple attempts were made even if there is no signs of trauma.
Figure legends
Figure 1. Coronal CT view. (A) lower pathway, and (B) upper pathway.
Figure 2. Endoscopic image. (A) nasal septum, (B) injured middle turbinate, and (C) inferior turbinate.

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11AP04-1
Anesthesia for Flexible Bronchoscopy; Intravenous Sedation or Airway Block?

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Background and Goal of Study: Nowadays, flexible bronchoscopy (FB) plays an important role in diagnosis and treatment of respiratory problems. It always makes a challenging situation for anesthesiologist as the pulmonologist working on airway, sometimes mandates patients cooperation or sedation without intubation during the procedure. Unfortunately intravenous sedation can cause serious cardiopulmonary complication. In this study we compared two methods of intravenous sedation and airway block as the anesthetic technique for patients undergoing FB.
Materials and Methods: 39 patients scheduled for FB were enrolled in this clinical trial pilot study. After obtaining informed consent, patients were randomly allocated into two study groups;Group1,received IV sedation with Fentanyl 2μg⁄kg,Lidocaine1mg⁄kg and Propofol1mg⁄kg followed by 0.5mg⁄kg incrementally, While Group 2 received Airway Block(Superior laryngeal nerve and Transtracheal injection with Lidocaine1%).In both Groups pulmonologist applied topical anesthesia. In group 2,propofol(0.5mg⁄kg)was used in case of patient's discomfort during the procedure. In both groups, demographic parameters, incidence of coughing and hypoxia(Spo2≤80%),Ramsay sedation score, total dose of propofol, and patient's and pulmonologist's satisfaction were recorded and compared.
Results and Discussion: There was no significant difference between groups with respect to age, gender, education, Body Mass Index, type of procedure and ASA class of patients. Hypoxia was occurred in ninety percent of patients in Group 1,but no one in Group2;(p=0.008). Propofol requirement in Group 1 was 151±68.8 mg(±SD) while in Group2 was 90.5±55.1 mg(±SD) with (p=0.004).The Mean(±SD) of Ramsay Sedation scores in Group 1and 2 were 5.1±0.8(±SD) and 3.2±0.7 respectively(p<0.001).Coughing mainly occurred in both groups while passing bronchoscope through glottis, however the incidence of coughing was comparable in two groups;(p =0.235).Pulmonologist satisfaction in Group2 was higher than in Group1;(p=0.001).Although there was no significant difference between two groups with respect to patients satisfaction;(p=0.605)
Conclusions: The results of this study showed lower incidence of hypoxia during FB under airway block which can be related to lesser need to sedative agents in patients received airway block for FB. Pulmonologist satisfaction was higher when a suitable and effective regional airway block was applied.

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11AP04-2
How much time do we need to get skills in performing a fiberoptic guided intubation? Learning curves of trainees from FIDIVA training program.

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Background and Goal of Study: Fiberoptic intubation is a core technique in Anesthesia. Learning this isn´t defined in many training programs, even that it is first choice in many cases of a known/suspected difficult airway. Its correct performance leads to a high success rate. Therefore, it is necessary to standardize a procedure for teaching the fiberoptic intubation technique in awake patients with difficult airway.
Materials and Methods: Prospective observational study. Approved by the hospital ethics committee (INCLIVA, 06/19/2015). 51 trainees were evaluated. 1294 consecutive patients were recruited for general non-urgent anesthesia and fiberoptic asleep intubation was performed. Before that, all trainees received a theoretical training program (6 h) and also practical one in a simulator (intubation in less than 30 s). The primary objective was to determine the total intubation time in any performance using the flexible fibroscope. Success was achieved when the resident could perform the intubation in less than 90 s.
Results and Discussion: 95% of trainees performed a fiberoptic intubation in less than 67.5 s, requiring less than 30 intubations. 95% of trainees achieved the visualization of the carina in less than 35 s. More than 85% did an intubation in less than 90, 68 and 60 seconds before cases 23, 25 and 26 respectively. Intubation times (tTotal) gradually decreased until the 10th one, from which they took a more horizontal trajectory; these results are concordant with previously published ones[i],[ii]. A total of 60 patients (4.4 %) presented complications related to the

technique. The figure below shows an analysis of the learning trajectories of each trainee and also the global times grouped by correlative case numbers.
Conclusions: With a structured and feasible training program, learning the technique of fiberoptic intubation is a simple procedure that should be mandatory in the curriculum of all anesthesia trainees.
References:
[1] Schmidt RA. Motor learning and performance: From Principles to practice. Illinois: Human Kinetics publishers; 1991.
[1] Schaefer HG, Marsch SCU, Keller HL, Strebel S, Anselmi L, Drewe J. Teaching fibreoptic intubation in anaesthetised patients. Anaesthesia. 1994;49(4):331-4.

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11AP04-3
Awake intubation with flexible videoendoscopu using dexmedetominide when collaboration from the patient isn't possible in a predicted difficult airway

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Background: Dexmedetomidine is a highly selective α2-receptor agonist with sedative, analgesic and anxiolytic effects, has been shown to be a useful drug in invasive procedures in patients few collaborators. It´s a safe drug for awake intubation because it maintains spontaneous breathing
Case Report: Male, 19 years old, with a polimalphormative syndrome and moderate cognitive impairment, proposed for septoplasty. Airway examination revealed retrognathism, mouth opening limitation (31 mm), Mallampati IV, upper lip bite test II and thyromentonian distance of 58 mm. In this context, awake orotracheal intubation was decided, with local block techniques and moderate sedation. After adequate monitoring (ASA standard and bispectral index), dexmedetomidine was initiated (1 mcg/kg bolus, during 15 minutes, followed by a perfusion of 0,6-0,9 mck/kg/h until Ramsay 2-3). At this moment, topicalization of the oropharynx with lidocaine gel was performed, allowing the introduction of a VAMA fibroscopic intubation cannula, which was adequately tolerated. With a standard 7,5 mm endotracheal tube threaded in a 5,5 mm flexible videoendoscope, topicalization of the entire intubation channel was performed with 2% lidocaine, using the working channel, after which the tube was advanced without complications. Once correct orotracheal tube position was confirmed, anesthetic induction was carried out. No neuromuscular blocking agent was used. Supplemental oxygen was continuously administered throughout the procedure and peripheral oxygen saturation was always higher than 97.
Discussion: Dexmedetomidine has been shown to be a useful drug for less painful procedures, with short/medium duration, where sedation is necessary but with rapid response from the patient when required. We believe that in a known or highly probable difficult airway and in contexts when collaboration from the patient isn't possible, it can have a preponderant role over other more dangerous or unpredictable sedatives or hypnotics. It is necessary to confirm these suspicions with a clinical trial.
References:
Li, A., Yuen, V. M., Goulay-Dufaÿ, S., Sheng, Y., Standing, J. F., Kwok, P. C. L., ... & Irwin, M. G. (2018). Pharmacokinetic and pharmacodynamic study of intranasal and intravenous dexmedetomidine. British journal of anaesthesia
Learning points: Dexmedetomidine is a safe and effective drug that is useful for sedation in difficult airway context and when rapid response from the patient is needed.

11AP04-4
Indications for use of videolaryngoscopy and flexible fiberoptic bronchoscopy for difficult airway management in a tertiary referral center.

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Background and Goal of Study: Indications for use of videolaryngoscopy and flexible fiberoptic bronchoscopy for difficult airway management in a tertiary referral center.
Materials and Methods: Data collection: 01/01/2018 to 30/06/2018. Anesthesiologists who performed the intubation were interviewed on indications for use of VL or FFB. In patients with suspected difficult intubation (SDI), the grade of suspicion (low/medium/high/impossible) was recorded. Data on all tracheal intubations performed during study period were retrieved from the anesthesia information management system.
Results and Discussion: Included 4289 tracheal intubations: Direct laryngoscopy (DL) 4048 (94.4%), VL 201 (4.7%), FFB 40 (0.9%). Indications: SDI 113 (46.9%): VL 92 (81.4%), FFB 21 (18.6%); Cervical pathology 54 (22.4%): VL 52 (96.3%), FFB 2 (3.7%); Unexpected difficult intubation 21 (8.7%): VL 21 (100%); Known difficult intubation 17 (7.1%): VL 14 (82.4%), FFB 3 (17.6%); Teaching 17 (7.1%): VL 14 (82.4%), FFB 3 (17.6%); Cervical/Oral Tumor/Abscess 6 (2.5%): VL 3 (50%), FFB 3 (50%); Other not related to difficult airway: 13 (5.4%): VL 11 (84.6%), FFB 2 (15.4%). Suspicion: Impossible 2 (1.8%): FFB 2 (100%); High 51 (45.1%): VL 36 (70.6%), FFB 15 (29.4%); Medium 54 (47.8%): VL 50 (92.6%), FFB 4 (7.4%); Low 6 (5.3%): VL 6 (100%). VL is used mostly for suspected, unexpected or expected difficult intubation and patients with cervical pathology. In patients with oral/cervical tumor or abscess, FFB and VL are equally used. FFB is exclusively used in cases where intubation is expected to be impossible.
Conclusions: Videolaryngoscopy has replaced fiberoptic bronchoscopy for the management of difficult airway. In patients with limited moth opening, fiberoptic bronchoscopy is still first choice for intubation.

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11AP04-5
Dexmedetomidine sedation in awake fiberoptic intubation – a rising powerful weapon

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Awake fiberoptic intubation (AFI) is an important tool of the anesthesiologist's armamentarium for difficult airway (DA). Its use, as well as being technically challenging, it is also stressful for all involved. When a patient with DA meets criteria for AFI, his collaboration is a very important factor to achieve success with the technique. To accomplish that, it's necessary to use proper sedation, which we can obtain with a variety of drugs. A new approach, rising in this field, is the sedation with the alpha-2 agonist, dexmedetomidine (DEX). The great advantages of this drug is the anxiolytic, analgesic and sedative effect, combined with a low risk for respiratory depression.
We describe a case of 61 years old female, with past medical history of Obstructive Sleep Apnea (OSA) treated with nocturne Continuous Positive Airway Pressure (CPAP), Depressive Syndrome, Hypothyroidism, marked cervical kyphosis and Gastroesophageal Reflux Disease. The patient was proposed for Laparoscopic Nissen Fundoplication under general anesthesia, and was classified as ASA III. While evaluating the airway we found Mallampati IV score, moderate retrognathia, severe limitation to cervical extension, thyromental distance of 5cm, neck width of 33cm, negative upper bite test. After this evaluation, we decided to perform an orotracheal intubation with AFI under sedation with DEX plus "spray as you go" local anesthetic. The DEX perfusion started 20 minutes before the orotracheal intubation at 0,7ug/Kg/h. After the achievement of a conscious sedation we proceeded to awake orotracheal intubation, and there were no cardiovascular or respiratory intercurrences. While passing the fiberscope through the vocal cords, the patient didn't react against it. After the surgery, the patient went to the Intensive Care Unit. She was extubated 24 hours after the procedure, without any complications. When asked, the patient had no memory to the awake procedure, and had no irritation of oropharynx.
In this work we can draw attention to a patient with a conjugation of DA predictors, which lead to a decision of elective awake intubation with DEX sedation, in order to reduce the respiratory depression possibility. The combination of these unique sedative properties, cooperation, anxiolysis, and beneficial anti-sympathetic effects make dexmedetomidine within a profile of an ideal drug for most awake fiberoptic intubations.

11AP04-6
Awake video laryngoscopy in patients with head and neck pathology: is there any value?

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Background and Goal of Study: Awake firberoptic intubation is considered the gold standard for management of the anticipated difficult airway.[1]More recently awake video laryngoscopic tracheal intubation has been described as an alternative technique.[2,3] However, no study has focused on the use of this technique on patients with head and neck pathology such as airway masses or previous neck radiation. The purpose of this study was to safely assess the feasibility of using a video laryngoscope for tracheal intubation in this population by performing video laryngoscopy after securing the tracheal tube by awake fiberoptic intubation.
Materials and Methods: Thirty patients with a history of head/neck pathology scheduled for elective surgery underwent awake fibeoptic intubation. After securing the tube and inducing general anesthesia, video laryngoscopy was performed with the Airtraq SP and the GlideScope AVL. The Cormack-Lehane laryngeal view and complications from laryngoscopy were recorded.
Results and Discussion: Neck and/or neck pathology included supraglottic masses (n= 3), laryngeal masses (n= 3), neck masses (n= 4), or a history of neck radiation or surgery (n= 20). Cormack-Lehane views with the Airtraq were grade 1 (n= 9) grade 2 (n= 6) grade 3 (n= 4) and grade 4 (n= 9). Cormack-Lehane views with the GlideScope AVL were grade 1 (n= 12), grade 2 (n= 7), grade 3 (n= 3) and grade 4 (n= 6). Two patients had small mouth openings that prevented insertion of either videolaryngoscope. No complications (eg bleeding etc)were recorded.
Conclusions: Difficult laryngoscopic view (≥ grade 3) occurred in 13/28 (46.4%) patients with the Airtraq and 9/28 (32.1%) patients with the Glidescope. Although a randomized prospective comparison of awake bronchoscopic to video laryngoscopic intubation has not been performed, these findings suggest that a video laryngoscope may provide an inadequate view for successful awake intubation in a significant portion of patients. Thus, anesthesiologists should maintain the skills to perform bronchoscopic intubation in order to safely care for patients with head and neck pathology.
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11AP04-7
Awake tracheal intubation guidelines: A survey of 632 anaesthetists in the United Kingdom.

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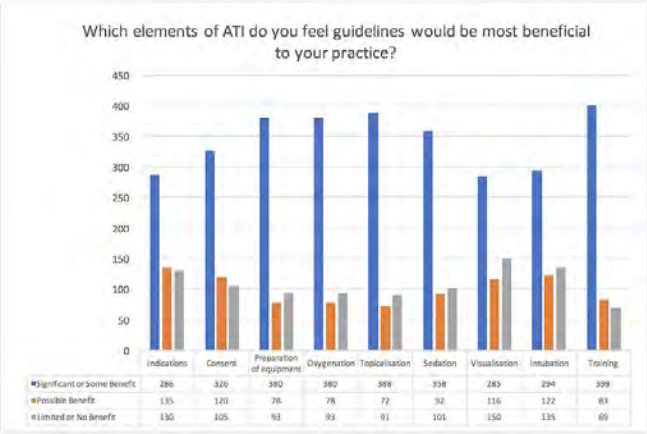
Background: There are currently no guidelines on the performance of awake tracheal intubation (ATI), including awake flexible bronchoscopic and videolaryngoscopic techniques. There are variations in the confidence and experience among both trainee and consultant anaesthetists. The success of ATI can be hampered by patient factors, disparity in training provision and availability of appropriate equipment.[1] The Difficult Airway Society (DAS) are developing guidelines on the performance of ATI and sought insights from DAS members to inform the development of the guidelines.
Methods: The survey was designed by DAS committee members and the questions formatted to gauge confidence, experience and levels of training in ATI techniques. The problems and complications occurring during intubation and whether guidelines would support various aspects of ATI. Responses were scored either on a scale of 1–10 or qualitatively. The electronic survey was sent to all DAS members and the data analysed using SPSS.
Results: A total of 632 anaesthetists completed the survey, 522 (82.6%) of which were consultant anaesthetists. The median (IQR [range]) confidence in performing ATI techniques was 9 (7–10 [1–10]) furthermore there was a significant correlation between confidence in ATI and approximate numbers flexible bronchoscopies performed (r=0.546, p=0.01). Many have experienced complications during ATI with desaturation and oversedation cited most commonly. Time pressure, lack of equipment, training and support were cited as reasons for not performing ATI when felt to be indicated. 62% (n=342) reported that guidelines would be useful for performance and 75.7% (n=417) for training ATI.(Fig. 1)



Conclusion: DAS members supported the production of guidelines that would benefit clinicians and reduce complications from ATI. The guidelines will also help improve equipment, training and support in ATI nationally.

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11AP04-8
Training in maneuvers performed whenever difficulty in tube advance appears during fiberoptic intubation.

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Background and Goal of Study: Fiberoptic intubation is a core technique, first choice in case of a known airway difficulty. The difficulty in advancing the endotracheal tube through the epiglotis and through the arytenoid cartilages is one of the problems in achieving the success during intubation. Our aim was to analyze the frequency of this problem and to find an easy solution to avoid it during the fiberoptic intubation of trainees.
Materials and Methods: A prospective observational study was approved by the hospital ethics committee (INCLIVA, 06/19/2015). 51 trainees were evaluated. A total of 1294 patients were analyzed for non-urgent general anesthesia performed with fiberoptic intubation. We recorded the cases in which there was difficulty in advancing the endotracheal tube as well as the number of maneuvers necessary to achieve it. When help was used, it consisted of slightly withdrawing the endotracheal tube, rotating it 90º counterclockwise and reintroducing it.
Results and Discussion: 76.20 % of the patients didn't have any difficulty in advancing the endotracheal tube; 23.72 % of the remaining patients required help maneuvers up to 8 times (result which is similar than the previous studies published[1], [2], [3], [4]). In one case the intubation was impossible. In 18.02% of the patients, a maximum of 2 help maneuvers were necessary. There was an increase of the intubation times related to the largest number of help maneuvers performed.
Conclusions: A critical moment during the intubation through a fibroscope is the advance of the endotracheal tube. The knowledge on how to act when any problem related to it appears will make professionals solve the airway difficulty easily. Therefore, reducing this means reducing great part of the airway related complications.
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11AP04-9
New predictors of difficult intubation in obstetric patients: a prospective observational study

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Background and Goal of Study: Unpredictable difficult intubation remains so frequent in obstetric anesthesia which means that usual predictors (mallampati, mouth opening and thyromental distance) are insufficient. This study was performed to assess the ability of the weight gain during pregnancy and the ratio of the chest circumference to sternomental distance and the neck circumference to predict difficult intubation in obstetric patients.
Materials and Methods: Chest circumference, sternomental distance, BMI, neck circumference and weight gain were evaluated in 143 pregnant woman undergoing cesarean section delivery under general anesthesia. Patients were divided into 2 groups according to their Cormack laryngoscopic view:
- Group E (easy intubation): for Cormack I or II.
- Group D (difficult intubation): for Cormack III or IV.

Then we looked if these parameters were predictors for difficult intubation in obstetric patients.
Results and Discussion: In this study we noted 31 cases in group D versus 112 in group E. Body mass index was 27.6 in group E versus 33.0 in droup D ($p<0.001$). Weight gain was 9.4 in group E versus 12.4 in group D with $p<0.001$. It was a predictor of difficult intubation when it exceeds to 11.7 with 71% sensitivity and 83 % specificity. Chest circumference to sternomental distance was 6.5 in group E versus 8.3 in group D with $P<0.001$. It was a predictor of difficult intubation when it exceeds to 7.1 with 80% sensitivity and 70 % specificity.
Conclusions: Chest circumference to sternomental distance ratio is a new method for predicting difficult intubation in obstetric patients when it exceeds to 7.1 and weight gain during pregnancy may lead to difficult laryngoscopic view when it exceeds to 11.7 Kg.

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11AP04-10
The comparison of mask ventilation between face masks with and without air cushion.

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Background and the goal of study: Mask ventilation is basic technique for induction of anesthesia. Difficult mask ventilation is not frequent, but it may cause severe hypoxia. In head and neck surgery, we encountered difficulty in ventilation due to deformities of facial and pharyngeal structures. A face mask usually consists of mask body and air cushion, which is useful for tight sealing for ventilation. Recently, however, a different type of face mask without air cushion, QuadraLite face mask [QuadraLite]), was developed. The structure of the mask is simple, compact and causes no air cushion trouble. The aim of this study was to compare the performance of new type face mask and traditional face mask at induction of anesthesia.
Materials and Method: This study is a crossover prospective study. Participants were patients (>18 yrs) underwent oral maxillofacial surgery under general anesthesia. The risk factors were checked; (male gender, age>45 yrs, BMI>30 kg/m2, history of snoring, limitation of neck movement, lack of teeth, Mallampti □ or □, presence of beard, mouth opening<30 mm and facial deformation). Patients were divided into three groups; Low risk: predicted 1 risk factor in predicted difficult mask ventilation, Medium risk: 2 or 3 risk factors and High risk: 4 or more risk factors. After administration of rocuronium, anesthesia was maintained with 1 MAC of inhalational anesthetics. An anesthesiologist hold face mask tightly using jaw thrust maneuver. Air cushion face mask [Cushion] and QuadraLite was used by turns for 3 minutes each under pressure-controlled ventilation at 15 cmH2O with a rate of 15 breaths/min. The expiratory tidal volumes were compared between them.
Results and discussion: A total of 48 patients were included; 16 in Low risk, 16 in Medium risk and 16 in High risk. Higher expiratory tidal volumes were observed in QuadraLite compared to Cushion, although it did not reach to the significant level; 549.0±52.1 mL vs 529.8±58.4 mL in Low risk, 586.0±117.6 mL vs 574.3±116.0 mL in Medium risk, 628.3±85.5 mL vs 588.8 ± 129.0 mL in High risk, respectively. Sufficient tidal volume was maintained by using QuadraLite even in High risk. QuadraLite is compact in size as it has no air cushion, and may achieve better and easier tight air seal with face.
Conclusion: QuadraLite could provide sufficient mask ventilation as well as usual face mask with air cushion. It may achieve better ventilation even with difficult airway.

11AP05-1
Airway management of a patient with systemic scleroderma disease undergoing plastic surgery: a case report

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Background: Systemic Scleroderma (SS) is an autoimmune disease with pathological effects on various organ-systems, that impacts anaesthetic management1. Particularly, most of SS patients are predictable difficult airways (PDA) due to microstomia, diminished neck mobility and prone to nasal and oral bleeding. We highlight the anaesthetic challenges faced by our team in the airway management of a patient with SS.
Case Report: 16-year-old SS female patient, with hypertension and pulmonary artery hypertension was proposed for bilateral comissuroplasty. The patient presented with orofacial dysmorphias: reduced mouth opening, mandibular retrognathia and pinched nose. The plastic surgery team asked for a nasotracheal tube to maximize the operative field. Attending the patient facies, classical nasal intubation was excluded. Instead, and because of fiberscope unavailability, a two steps approach with a C-MAC® video laryngoscope was attempted. At first, an orotracheal 6mm cuffed tube was successfully endeavoured. Then, the nasal approach was accomplished. An orotracheal microsurgery tube ID 5mm was introduced through the right nostril to the oropharynx, and directed to the larynx, under C-MAC® visualization, enhancing tubes switch. Following surgery, anaesthesia emergence and extubation were uneventful, and three hours later the patient leaved the post-anaesthetic unit.
Discussion: Most of the patients with SS present with orofacial dysmorphia, being tagged as PDA. Managing a PDA requires an appropriate characterization of the patient and its airway (clinical history, physical examination, diagnostic exams), and importantly to plan a suitable approach of the airway2. This last involves knowing the PDA guidelines, the apparatus available at the operating room, the skills of the anaesthetic team, and what is the best for the patient.
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Learning points: Patients with SS are challenging to the anaesthetic team. Beside the clinical issues, they present physical dysmorphias becoming PDA. Managing a PDA is always cumbersome, and the anaesthetic team needs to gather all the information needed for a successful approach.

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11AP05-2
Lingual tonsillar hypertrophy (LTH) and difficult airway (DA) : a case report

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Background: LTH can be the cause of an unexpected DA hindering both intubation and patient ventilation. Routine examination of the airway cannot predict this condition. The use of flexible bronchoscope in patients with records of unexpected DA is an excellent diagnostic tool in this situation.
Case Report: 39 year old male diagnosed with morbid obesity BMI 42(weight of 140kg and 1.82m of height)type II diabetes, hypertriglyceridemia and with polysomnographic diagnosis of severe OSAS. Other medical records include smoking habit of a daily pack of cigarettes. Preanestethic assessment includes uncomplicated previous regional anaesthesia, airway exam didn't arise suspicion for a DA (Mallampati grade II, bite test B, DTM 6). Patient is listed for bariatric surgery, after check list the patient is transferred to theatre and monitored. Initial face-mask ventilation proves to be complicated so we used a Glideoscope, discovering lymphoid tissue hypertrophy of the lingual tonsil. Laryngeal vision was a Cormack-Lehabe 2 and the patient was intubated with ETT size 8.5.Surgical procedure was uneventful and the patient was extubated in theatre. ENT consultation discovered a possible papilomatosis affecting lingual tonsil, left pharyingoepiglottic fold with a possible epiglottic extension, the patient has been listed for biopsy.
Discussion: LTH is generally asymptomatic although it should be considered in patients who snore or in those who have been previously diagnosed of OSAS, thus in these patients we must consider the possibility of an unexpected DA Airway exam of patients in the anaesthetic clinic doesn't allow as to confirm this diagnosis as it requires the use of a flexible nasopharyngoscope or a laryngeal mirror, generally available only in ENT clinics. We must always bear in mind the risk of difficult ventilation/difficult ventilation in this patients, furthermore if they also present with comorbidities. The use of videolaryngoscopes will allow for an improved view. Supraglottic devices will help us to ventilate the patient in cases we cannot intubate though the risk of bleeding or glottic obstruction have to be weighed. Lingual tonsillectomy is a surgical technique performed to improve the upper airway during sleep but it has risks like important bleeding compared to others (tonsillectomy, expansion pharyingoplasty).
Conclusion: Lingual tonsil hypertrophy is a treatable cause of OSAS which can unexpectedly confront us with a difficult ventilation/difficult ventilation situation.

11AP05-3
Awake Glidescope® intubation assisted with Ambu® aScope™ in a patient with an obstructive supraglottic mass.

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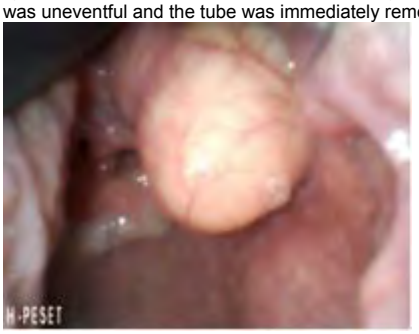
Background: Patients with a supraglottic friable mass always brings a challenging scenery to anesthesiologists. We describe a case of a succesful awake intubation using the video laryngoscope (VL) Glidescope® assisted with fiberoptic bronchoscopy (FB) Ambu® aScope™ in a patient with a vallecular cyst, causing obstruction in the airway.
Case Report: A 55 year old male patient was diagnosed of a right vallecular cyst and schedulled for a laryngeal microsurgery. Concerns in the airway evaluation included the difficult mask ventilation, friability of the cyst which ocluded the glottis and its displacement. It was decided to perform an awake intubation with topical anesthesia, using FB assisted with VL. Topical anesthesia was sprayed. After preoxygenation, at the introduction of the VL blade, the cyst was over the epiglottis, collapsing the glottis and making it hardly visible. With the aid of FB, we obtained a better visualization of the glottis and it was possible to direct it to the trachea and a 6.5 F armored endotracheal tube (ETT) was introduced under VL vision. Excision of cyst and redundant tissue was made without any complication. Intraoperative period was uneventful and the tube was immediately removed after the end of surgery.



Discussion: Experience with the Glidescope® has demonstrated to decrease failed intubations and improve the glottic view(1). Nevertheless, it has several limitations. Despite this device is provided with a rigid stylet, in some cases the device angulation makes difficult to direct the ETT through the glotis. It has been suggested by some authors that a flexible stylet can be an useful strategy to avoid this disadvantage(2). We used the aScope®, taking advantage of the insertion cord's maneuverability, that allowed to direct it to the trachea.
Learning Points: This approach has been described as a valid alternative to overcome the VL limitations and in our experience, this device combination approach in an awake patient has been a useful and safe alternative in cases in which the glottis is displaced and occluded.
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11AP05-4
Dexmedetomidine and midazolam sedation for awake fiberoptic nasotracheal intubation in patient with severe psychomotor retardation and fulminant submandibular abscess: A case report

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Background: Patient with severe psychomotor retardation and fulminant deep neck abscess due to odontogenic infection for surgical drainage.
Case Report: A 40-year old woman with severe psychomotor retardation (perinatal asphyxia) was admitted with deep neck abscess. Medical history included myoclonic spasms on valproic acid and phenobarbital. She was on antibiotics for 3 days after consultation of a private dentist. Physical examination revealed extensive cervicofacial oedema affecting both sides of neck, pus draining from the submandibular space, interincisor gap <1cm and restricted neck extension compromising the airway. CT was not feasible since the patient was uncooperative. Emergency surgical drainage was imperative. Corticosteroids and antibiotics IV were initiated. Nasal flexible endoscopy revealed oedema of the epiglottis and tongue base, resembling Ludwig's angina. Awake fiberoptic nasotracheal intubation (AFOI) was planned with emergency tracheostomy as a backup plan. Airway topical anaesthesia, sedation with dexmedetomidine (bolus 0.5mcg/kg, infusion 0.5mcg/kg/min) and midazolam (0.03mg/kg) was decided. After adequate sedation, intubation was smoothly achieved. No hypoxia or heamodynamic instability was recorded. Anaesthesia was maintained with sevoflurane and fentanyl. Postoperatively, the patient was transferred intubated to the ICU.
Discussion: Securing the airway in patients with deep neck infections is challenging. AFOI remains a safe choice. Although inability of the patient to communicate is considered a relative contraindication, in our case intubation with direct laryngoscopy or video-laryngoscopy seemed impossible. According to ENT surgeons, tracheostomy seemed difficult due to short neck with distorted anatomy and risk of life-threatening mediastinal expansion of the infection. Optimal conditions for AFOI require sedation with minimal respiratory depression, amnesia and anxiolysis, making dexmedetomidine with midazolam effective. In the literature, AFOI has never been described before in a patient with severe psychomotor retardation and compromised airway.
References:
Tapiovaara L et al. Comparison of intubation and tracheotomy in patients with deep neck infection. Eur Arch Otorhinolaryngol. 2017 Oct;274:3767-3772
Learning points: AFOI is a safe option for securing the airway in deep neck infections. It is the first report of AFOI under sedation in patient with psychomotor retardation.

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11AP05-5
Successful airway management in a patient with achalasia for total thiroidectomy

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Background: Achalasia is a disorder characterized by dysphagia and regurgitation of undigested, retained food caused by aperistalsis of the oesophagus. Some complications include acute and chronic aspiration with possible respiratory compromise. Therefore, these patients challenge anaesthesiologists in accomplishing a safe induction, securing the airway, and appropriately timing extubation.
Case Report: 65-year-old female patient was admitted for elective total thyroidectomy due to multinodular goitre. Past history revealed achalasia with difficulty in swallowing solids and liquids and frequent regurgitation. Pre-operative cervical CT reported an enlarged thyroid with tracheal compression, possibly compromising the airway. The high risk of aspiration of accumulated food content along with an anticipated difficult intubation led to the choice of awake fibre-optic intubation. Standard ASA monitoring as well as bispectral index and neuromuscular monitoring were applied. Intubation was performed uneventful. After securing the airway large amounts of food content were aspirated. Intraoperative period occurred without incidents and the patient was extubated successfully in the seating position. Liquid diet was kept throughout the post-operative period and the patient was discharged two days later.
Discussion: In patients with achalasia it is important that the risk of aspiration is diminished and rapid tracheal intubation is a well-known approach. However, when a difficult airway is anticipated other attitudes should be considered. Awake fibreoptic intubation not only has indication for patients with a potential difficult airway but, as the protective airway reflexes are preserved, it might be a solution to minimize the risk of pulmonary aspiration. This case highlights the importance of excellent pre-operative planning. Since this was an elective procedure there was time to design a perioperative plan that would overcome the challenges imposed by the potential difficult airway but also the aspiration risk.
References:
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Learning points: This case illustrates how approaching the airway might be a challenge in patients with achalasia. However, a planned scheme for airway management allows safe and effective anaesthesia care.

11AP05-6
Conscious sedation with dexmedetomidine in an intellectually disabled patient with an anticipated difficult airway: a case report

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Background: Perioperative anesthetic management of intellectually disabled (ID) patients is a challenge due to lack of cognition, communication and cooperation. These patients may restrict the options for difficult airway management, particularly when awake intubation is involved. Dexmedetomidine (DMT) is an alpha-2 adrenoreceptor agonist with sedative, analgesic and anxiolytic properties, but minimal respiratory and cardiovascular depression. We report the case of a conscious sedation of an ID patient with DMT.
Case Report: 53-year-old ID female patient was admitted for biopsy of a large and friable mass, which extended from the oral pavement to the hypopharynx. Past history revealed severe mental retardation, and cervical spine compromise due to rheumatoid arthritis. Therefore, the patient was agitated, uncooperative and presented an anticipated difficult airway. Considering the risky airway management, it would be prudent to preserve spontaneous ventilation. Therefore, the preferred approach for intubation would be an awake fiber-optic intubation. However, as the patient was uncooperative, it would not be possible to perform. No alternative approaches could safely be used and a multidisciplinary team decided to postpone the airway approach. A conscious sedation with a DMT perfusion (20ucg/h) was initiated allowing maintenance of the patient respiratory drive and enough relaxation for inspection of the lesion. During the procedure the patient was always awake, presenting a BIS of 80, but calm. This allowed the patient to be better evaluated by the surgical team who decided to not perform the biopsy.
Discussion: This case highlights the use of DMT intraoperatively to achieve appropriate sedation levels to overcome the need to manage a predictable difficult airway in an uncooperative patient. Primarily, an awake fiberoptic intubation would require some cooperation. Moreover, it would be necessary to overpass the lesion preventing bleeding, bearing in mind that it would be almost impossible to perform a surgical airway assessment due to severe cervical kyphosis.
References:
Chaudhary K et al. Anesthesia for intellectually disabled. J Anaesthesiol Clin Pharmacol. 2017; 33(4):432-440
Learning points: DMT seems to rapidly calm down agitated patient without over-sedation along with hemodynamic and respiratory stability. There might be a role for DMT in intraoperative sedation of psychiatric patients.

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11AP05-7
Negative pressure pulmonary edema (NPPE) in the immediate postoperative period of a pediatric patient: a case report

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Background: NPPE occurs after obstruction of the upper airway by a mechanical factor or secondary to pain. An incidence of 0.05 to 0.1 is estimated and the literature describes laryngospasm as one of its triggers.
Case Report: 12 years, female, ASA II, 44kg, 143 cm admitted for left femoral osteotomy. Subjected to general anesthesia with intravenous induction, atraumatic intubation, and an epidural. At the end of surgery neuromuscular blockade was reversed. After good respiratory pattern she was extubated, but developed respiratory effort, desaturation and cyanosis. Positive pressure ventilation was performed under face mask with 100% oxygen, and IV hydrocortisone, propofol and succinylcholine. Pulmonary auscultation evidenced bilateral rales. Inhalation with saline and adrenaline was performed and, after improvement, transfer to the post-anesthetic care unit (PACU) where she presented new worsening of respiratory pattern, bilateral rales and blood pressure of 150x90mmHg. IV furosemide was given. Chest x-ray had no alterations, and arterial blood gas showed respiratory acidosis. After desaturation to 89% and tachypnea despite supplementary O_2, we opted for reintubation and transfer to the pediatric ICU. The patient was extubated 7 hours later, but remained dependent on supplemental oxygen for two days when she was transferred to the infirmary. Hospital discharge occurred on the third day.
Discussion: NPPE results from an intense inspiratory effort against an obstructed airway, which generates profound intra-thoracic negative pressure, altering the permeability of alveolar capillaries, increased hydrostatic and venous pressures, intra-alveolar extraversion of fluids and pulmonary edema[1]. Symptoms include hypoxemia, pulmonary rash, presence of pink foamy discharge, intense dyspnea, laryngeal stridor, and chest radiography showing bilateral interstitial and alveolar infiltrates[2]. Treatment is based on the maintenance of positive pressure ventilation, ensuring airway control with oxygen supplementation and diuretics when necessary.
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Learning points: NPPE is a rare but potentially serious complication in general anesthesia. Immediate diagnosis and treatment are needed for recovery and to reduce mortality.

11AP05-9
Treacher-Collins syndrome: Different but effective approaches for airway management

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Background: TCS is a condition which affects the development of face tissues in different degrees. It affects about 1/50000 people and is usually due to mutations in TCOF1 gene that participates in the production of rRNA, leading to a higher rate of apoptosis of certain cells and the subsequent abnormal craniofacial development.
Case Report: The authors present 2 patients with TCS in which the airway management was done differently after alternative airway tools were prepared. A 12 yo patient admitted to bilateral cochlear implant surgery due to hypoacusia and choanal atresia. She had no previous surgeries and besides TCS she was healthy. Thyromental distance was 5 cm, mouth opening 4 cm and Mallampati score was 3. Eye and ear deformity and short-depressed jaw were present. After pre-oxygenation with 100% oxygen for 3 min, a smooth inhaled induction was performed with sevoflurane through facial mask, a Guedel tube size 2 was used and she maintained an effective spontaneous ventilation. Videolaryngoscopy was performed and since Cormack-Lehane score was 2,fentanyl and propofol were administered and intubation was uneventful. A 29 yo patient was admitted for a face lipofilling under general anaesthesia. She had less marked face dysmorphic characteristics due to a bimaxillary orthognathic surgery performed 3 years before. Mallampati score was 3 and neck mobility less than 20º. After sedation with midazolam and fentanyl and a transtracheal block with lidocaine 4%, an awake fiberoptic intubation was performed. The maintenance of anaesthesia was ensured using sevoflurane, the patients remained hemodynamically stable and were extubated without any problem.
Discussion: TCS is usually characterized by dysplasia of the maxilla, mandible and zygomatic bone. All these deformities make it of special interest to anesthesiologists because of the increased risk of difficult airway management. In general, this likelihood risk seems to increase with increasing age and there is no consensus about the best approach of the airway in these patients. Regardless of the surgical procedure, the anesthesiologist should anticipate a difficult airway and different strategies must be available to avoid complications.
Learning points: In what concerns the airway management of TCS patients, the current literature available is still scarce. Therefore, airway complication rates can sometimes be underestimated and further research should be done in prospective studies.

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11AP06-1
A randomised comparison of AMBU® AuraGainTM & LMA SupremeTM in patients undergoing laparoscopic surgery under general anaesthesia

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Background and Goal of Study: Second generation supraglottic devices (SGDs) have better seal pressures compared to their first-generation counterparts. As such, the use of these SGDs in laparoscopic surgery is becoming increasingly common. We compared the efficacy of the AMBU AuraGain (AG) with the LMA Supreme (LS) during short laparoscopic surgeries (laparoscopic cholecystectomy, incisional or inguinal herniorrhaphy).
Materials and Methods: Patients of ASA physical status I to III, aged 21 to 80 years old, undergoing general anaesthesia for short laparoscopic surgeries were recruited for this randomised controlled trial. Patients with a history of or predicted difficult airway, contraindications to SGD usage and patients who declined to participate or lacked the mental capacity to give consent were excluded from the study. General anaesthesia with muscle paralysis was performed in a standardised manner. Participants were randomised to AuraGain or LMA Supreme insertion. Primary outcome measured was Oropharyngeal Leak Pressure (OLP). Secondary outcomes included overall successful insertion, ease of insertion, intra-operative ventilatory and device performance parameters, intra-operative and post-operative complications.
Results and Discussion: A total of 119 patients were recruited based on power calculation. Patient demographics were comparable between both AG and LS groups. AG had a higher OLP of 25.8cmH2O, compared to 21.3cmH2O with LS ($p < 0.01$). First attempt success was 95% with AG and 91.5% with LS ($p=0.692$). Overall success at insertion was 98.3% for AG and 94.9% for LS ($p=0.364$). The LS was easier to insert ($p < 0.01$), with a shorter mean time to insertion (28s vs 32.2s for AG, $p < 0.01$). Peak inspiratory pressures rose following CO2 insufflation for laparoscopic surgery, but there was no significant difference in the intra-operative device performance and ventilatory parameters between the two devices. There were no reported cases of regurgitation or aspiration and no significant differences in postoperative complications between the two groups.
Conclusions: Although the LMA Supreme was easier to insert and had a shorter time to insertion, the AuraGain had a higher oropharyngeal leak pressure. The superior seal pressure conferred by the AuraGain may influence the choice of SGD for laparoscopic surgeries.

11AP06-10
Dexmedetomidine reduces sevoflurane EC50 required for BlockbusterTM supraglottic airway device insertion in spontaneously breathing morbidly obese patients

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Background: Safe airway management poses a serious challenge in morbidly obese patients undergoing surgery. For patients with a suspected or proven difficult airway, the airway control under spontaneously breathing is a common choice. Furthermore, sevoflurane is a useful agent for inhalational anesthesia in the management of the difficult pediatric and adult airway, as the patient's airway can be tested by a gradual onset of anesthesia and the spontaneous breathing may be well maintained. This study was designed to assess the effect of intravenous dexmedetomidine (DEX) on the end-tidal concentration of sevoflurane where 50% (EC50) of the attempts for successful insertion of BlockbusterTM supraglottic airway device (SAD) in spontaneously breathing morbidly obese patients.
Methods: After the study protocol was approved by hospital ethics committee, 38 morbidly obese patients with a body mass index 40-57 kg/m2 who were scheduled for bariatric surgery were allocated to the two groups receiving the different treatments: group S, saline was given intravenously, and group D, a bolus dose of 1μg.kg-1 DEX was adminstered intravenously over 10 min, followed by intravenous infusion at a rate of 0.5μg.kg-1.h-1. After the bolus dose of tested drug was given, 5% sevoflurane was immediately administered, and the end-tidal expiratory sevoflurane concentration (ETsev) was adjusted to a target value determined by Dixon's up-and-down method and was maintained for 5 min. Then, the BlockbusterTM SAD was inserted. Patients' response to BlockbusterTM SAD insertion was classified as 'Movement' or 'no movement'. The average of the midpoints of each crossover point was defined as EC50 of sevoflurane. Patient enrollment was stopped when six crossover points were obtained in each group.
Results: The EC50 of sevoflurane for successful insertion of BlockbusterTM SAD was significantly lower in group D than in group S (1.75±0.32% vs. 2.92±0.26%, p□0.001). By the probit regression analysis, EC50 and EC95 of sevoflurane for successful insertion of BlockbustererTM SAD were 1.59% (95% CI, 1.22-1.90%) and 2.15% (95% CI, 1.86-3.84%) in the group D, respectively; and 2.81% (95% CI, 2.35-3.29%) and 3.32% (3.02-6.74%) in the group S (Figure).
Conclusion: DEX can significantly reduce the EC50 of sevoflurane required for successful insertion of BlockbusterTM SAD by about 40%.

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11AP06-2
Evaluate the efficacy and safety of the original modified insertion technique to facilitate blind trachea intubation through the intubating laringeal tube

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Goal of Study: Evaluate the efficacy and safety of the original modified insertion technique to facilitate blind trachea intubation through the iLTS-D®.
Materials and Methods: 100 adults, ASA 1 and 2 patients with normal airway undergoing elective laparoscopic surgery were included. After induction of anesthesia wirh propofol, fenthanyl and rocuronium, the iLTS-D® was placed with using of an original modified procedure. The procedure included: 1) preliminary determination of the depth of insertion of the iLTS-D®; 2) application of bimanual jaw thrust maneuver during the insertion of iLTS-D® to ensure displacement of epiglottis anteriorly and median position of the distal hole opposite of the vocal cords. In case of failed ventilation after two attempts of insertion of iLTS-D® the anesthesiologist performed direct laryngoscopy and intubation of the trachea. After evaluating the ventilation through device, an attempt of blind tracheal intubation with special reinforced ETT through iLTS-D® was made with maintaining ventilation during this process through ETT. In case of failed 1-st attempt of intubation, the following maneuvers were applied successively: 1) lateral displacement of the larynx to match the distal hole and the glottis; 2) iLTS-D® cuff deflation, proximal traction of device in 1 cm increments, cuff inflation, intubation attempt. In case of two failed intubation attempts anesthesia plan was changed to CMV trough iLTS-D®. 'Time to ventilation', 'time to trachea intubation', success rates of first attempt and number of attempts of ventilation and intubation, rate and severity of complications were recorded.
Results and Discussion: Successful insertion of iLTS-D® and ventilation from first attempt was in 92 patients (92%), after two attempts - in 100 patients (100%). The ventilation time was 15 sec (interquartile range 11-31). In 86 patients, the first attempt of blind trachea intubation was successful (86%), the total success rate of trachea intubation through iLTS-D® was 93 cases (93%). The first attempt intubation time was 20 sec (10-52). Traces of blood on the device were found in 3 cases (3%). In 5 (5%) patients slight pain in the throat was noted during the first day, light hoarseness was noted in 2 patients (2%).
Conclusions: The our original modified technique of iLTS-D® insertion and blind trachea intubation provides easy insertion, effective ventilation, high success rate of blind tracheal intubation.

11AP06-3
Airway management with a self-pressurizing laryngeal mask on patients with Mucopolysaccharidosis type III.

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Background and Goal of Study: Mucopolysaccharidosis type III (MPS III) or Sanfilippo syndrome is a lysosomal storage disorder caused by the deficiency of enzymes required for the breakdown of a glycosaminoglycan called heparan sulfate. It is transmitted by autosomal recessive inheritance. Clinical features include progressive decline of the central nervous system, macroglossia and other facial deformities that may collapse the upper airway. Our goal is to study the incidence of complications dealing with airway management when using the Air-Q self-pressurizing laryngeal mask during general anesthesia for cerebral and abdominal MRI and lumbar puncture in patients with MPS III.
Materials and Methods: A retrospective observational study was conducted at the Hospital Clínico Universitario of Santiago de Compostela. Data from nine children aged 2 to 12 years with MPS III (subtype A: 5, subtype B: 4) who repeatedly underwent general anesthesia for cerebral and abdominal MRI and lumbar puncture were collected in the last three years, obtaining a total of 35 anesthetic procedures that lasted an average of 186 minutes (SD 95). Variables collected included: need of oral cannula over induction, MLA placement in the first attempt, need to replace the MLA anytime during the procedure and complications such as hyper/hypocapnia (EtCO2 >40, <35mmHg), laryngospasm, bronchospasm, desaturation (SatO2 <95%) or cough. Air-Q LMA was inserted following induction with sevoflurane and cannulating a venous access. We used end-tidal sevoflurane 2,5-3% to maintain spontaneous breathing. Once ventilatory parameters were ensured, tidal volume 5-6 ml/kg, SatO2 99-100% and EtCO2 35-40 mmHg, MRI started. Afterwards, sevoflurane inspired fraction was increased to reposition patients laterally before lumbar puncture and awakening.
Results and Discussion: Regardless of sex, age or weight, an oral cannula was needed in 2 out of 35 procedures (5,7%). The LMA was placed at first attempt in 97,14% of cases. In no case the replacement of the LMA was necessary, nor when MRI antenna was replaced or the patient repositioned. Ventilatory parameters were adequate in all cases. No bronchospasm, laryngospasm or desaturation episode occurred. The most frequent complication found was cough, probably due to the excessive amount of secretions associated with MPS.
Conclusions: The LMA Air-Q SP was a safe way to secure the airway under general anesthesia for MRI and lumbar punture in patients with MPS III.

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11AP06-4
Relationship between oropharyngeal leak pressure and Laryngeal Mask Airway ProtectorTM size selection, a prospective observational study

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Introduction: The ease of insertion and the oropharyngeal leak pressure (OLP) of supraglottic devices (SAD) depend, among other factors, on the size used. The LMA Protector (LMAP) is the latest marked single-use second-generation SAD. LMAP is more voluminous than its predecessors, so smaller sizes than the traditional weight recommendation are often chosen to facilitate insertion. We do not know the impact of the size of the LMAP on its performance. Our objective was to assess the OLP and its relationship to the LMAP sizes insertion according to weight recommendation and patient's gender.
Materials and Methods: After IRB approval, ASA I-III consecutive patients presenting for elective surgery under general anesthesia were included. Patients with known difficult airway, increased risk of aspiration, morbid obesity or recent upper respiratory tract infection were excluded. Expert researchers in the use of SAD made the insertions of the LMAP. LMAP size was chosen according to the manufactures recommendations (size 3 for patients weighing ≤50kg; size 4, 51-70kg; size 5 >70kg), however a change in the size was permitted according the criteria of the attending anesthesiologist. We evaluated the OLP and their relationships with the size of the LMAP and the patient's gender. Statistics: Anova test; T-Student; Chi-square test.
Results: We included 280 patients (64% females), age-51±14 years and BMI of 26±4.5kg/m2. Insertion was successful in 97.9% (95%CI, 0.95-0.99) of patients (insertion time: 17.7±7 seconds). The LMAP size was inserted weight-adjusted, lower or higher than recommended by weight in 47%, 50% and 3% respectively. The median OLP was 32.5cm H2O (IQR: 27.2-38cm H2O) when LMA size was

weight-selected, 30cm H2O (IQR: 25-36cm H2O) when LMA size was lower than recommended by weight and 22cm H2O (IQR: 20-28cm H2O) when LMA size was higher than recommended by weigh (p=0.003). In 39% of the females the LMAP size was inserted weight-adjusted. This proportion was higher in males: 61% (p=0.001). The most frequent size in females was number 3 and in males number 4 (p=0.0001). We observed no differences in OLP between females and males (31±7 vs. 30±7cm H2O).
Conclusions: Our results show that a high percentage of patients receive lower than recommended LMAP sizes. The OLP were higher when the choice was made according to weight recommendation. Females received lower numbers of LMAPs compared to males, however this did not translate into lower sealing pressures.

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11AP06-5
Ventilation efficacy of i-gel size 3 and size 4 supraglottic airway devices in anesthetized, paralyzed women weighing between 50 and 60 kilograms: a randomized trial

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Background and Goal of Study: Choosing appropriate sizes of supraglottic airway devices (SAD) is important to facilitate adequate positive pressure ventilation and to avoid adverse events from placing. Mostly, SAD is selected according to the manufacturer's body weight-based recommendations. However, an ambiguous overlapping coverage of i-gel® SAD size 3 (30-60 kg) and size 4 (50-70 kg) in patients weighing between 50 and 60 kilograms is confusing. The purpose of this study aims to evaluate the ventilation efficacy of i-gel® size 3 and size 4 in anesthetized, paralyzed women weighing 50 to 60 kg.
Materials and Methods: This study was approved by the Institutional Review Board of National Taiwan University Hospital and registered at ClinicalTrials.gov (NCT03528590). After obtaining written informed consent, 60 adult female patients (ASA 1-2) weighing 50 to 60 kg underwent breast surgery were randomized to i-gel® size 3 and size 4, which were placed by an experienced anesthesiologist after general anesthesia and neuromuscular blockade. The insertion success rate and ventilation efficacy, including ventilation score, oropharyngeal leak pressure, compliance, fiberoptic position score, and postoperative adverse events were evaluated by independent investigators.
Results and Discussion: The insertion success rates of i-gel® size 3 and size 4 were comparable in anesthetized, paralyzed, 50 to 60-kg women. A larger i-gel® was associated with better ventilation efficacy (90% vs 77%, p=0.17) and improved fiberoptic score (87% vs 70%, p=0.12), although they were not statistically significant. Placement of a size 4 i-gel® provided significantly higher sealing pressure (25.9±7.3 vs 21.0±7.4 mmHg, p=0.01) for positive pressure ventilation, but did not cause more adverse effects than size 3. Interestingly, women having size 3 SAD reported hiccup after surgery more often than those having size 4 (25% vs 3%, p=0.02).
Conclusion: In anesthetized, paralyzed women weighing 50 to 60 kilograms, a larger size 4 i-gel® may be preferable to size 3. It provides higher sealing pressure for positive pressure ventilation and reduces postoperative hiccup which may result from unintentional gastric insufflation.

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11AP06-6
Regurgitation and airway management during laparoscopic cholecystectomy: endotracheal tube versus laryngeal mask airway

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Background and Goal of Study: The laryngeal mask airway (LMA) is considered to be the most significant improvement in the last 30 years in the domain of airway management. Its use for laparoscopic cholecystectomy is still a controversial indication with inconsistent results of studies. Goal of this randomized study is to compare Ambu Aura Once LMA and endotracheal tube (ETT) in such an indication, with respect to detected regurgitation into the airway devices using the litmus paper technique.
Materials and Methods: This was a prospective, randomized, single blind study, with patients undergoing elective laparoscopic cholecystectomy, of duration up to 60 min. It included 90 adult patients, respecting contraindications for LMA use, divided into two equal groups, LMA and ETT. Placing ETT/LMA was performed by an experienced anesthesiologist, without bag and mask ventilation before placing. Anaesthesia was induced with propofol and fentanyl, and maintained with sevoflurane in N_2O and oxygen, with intermittent positive pressure ventilation. Standard non-invasive monitoring was applied. Value of oropharyngeal leak pressure was measured in the LMA group. After removal, secretions over both the ventral and dorsal part of the LMA and on distal part of ETT were pH tested with a litmus paper sensitive to changes from pH 2.5 to 8.5. Any complications were recorded.
Results and Discussion: Device placement was successful in all patients and adequate ventilation was achieved in both groups. The average value of oropharyngeal leak pressure in the LMA group was 21.87 ± 2.42 cmH_2O. The airway pressure was maintained constantly lower than 20 cmH_2O, within both groups (p=0.811). There were no statistically significant differences between two groups for SpO_2 and $EtCO_2$. No specific complications were noted. There were no cases of regurgitation of acidic gastric contents into the LMA and ETT after removal in any patient in both groups, detected by the litmus paper technique. Ambu Aura Once LMA with serious selection of patients is an appropriate airway device in such an indication, confirmed in many previous works, even though consensus has not been reached yet.
Conclusions: Ambu Aura Once LMA provides an efficient airway for positive pressure ventilation during laparoscopic cholecystectomy, in the hands of experienced anaesthesiologists with respect to contraindications. Regurgitation was not detected in any patient.

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11AP06-7
Airway control with the LMA® Gastro™ Airway during endoscopic procedures. About one case experience.

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Background: respiratory depression from sedative drugs, airway obstruction and hypoxemia during endoscopic procedures can occur in 11-50% of cases (1). The LMA® Gastro™ Airway is indicated for airway management in adult patients undergoing endoscopic procedures, designed to maintain a patent airway throughout the procedure to support patient safety. It can be used for either spontaneous respiration or positive pressure ventilation.
Case Report: we used LMA® Gastro™ Airway in one patient ASA 3, scheduled for gastroscopy exploration. Patient was 83-year-old male, ASA 3, BMI 28, non-smoker, not known allergies Mallampati 2, edentulous, cervical mobility 90-100º, mouth opening >3 cm., thyromental distance of 6 cm. approx., and upper lip bite test 1.
Discussion: we performed the procedure by deep sedation with propofol. We monitor the patient hemodynamically. Our experience was good, and spontaneous ventilation, monitored by capnography, was maintained throughout the procedure. No higher doses of propofol were needed than would have been used under usual practice. Nevertheless, Teleflex has decided to distribute the device in Spain only for gastroscopy explorations. Due to the usual practice, we believe that it will be most useful in Endoscopic Retrograde Cholangiopancreatography (2). This procedure is performed using either deep sedation (a form of anesthesia in which a patient is allowed to breathe on his or her own) or general anesthesia (with a breathing tube) depending on the patient and the complexity of the procedure required.
References:
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Learning points: Nonoperating room anesthesia (NORA) refers to administration of sedation/anesthesia outside the operating room to patients undergoing painful or uncomfortable procedures, as endoscopic explorations.
The new LMA® Gastro™ Airway with Cuff Pilot™ is the first laryngeal mask specifically designed to facilitate esophageal access and promote airway control during endoscopic procedures.
We believe that studies are needed to demonstrate the indication of LMA® Gastro™ Airway in Endoscopic Retrograde Cholangiopancreatography.

11AP06-8
A new airway maintenance device for improved airway obstruction during endoscopic procedures requiring deep sedation; GELMA(Gastrointestinal endoscopic LMA)

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Background and Goal of Study: Recent advances in endoscopic procedures have led to an increase in the use of endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic submucosal dissection (ESD), which are often cause pain and discomfort to patients. These procedures are associated with discomfort and pain, may take longer than simple endoscopy, and require deep sedation rather than a simple endoscopy, which may lead to respiratory depression. Because of this, an effective airway maintenance device that can be used during endoscopic procedures under sedation is needed.
Materials and Methods: When the supraglottic airway (balloon type or non-baloon type) is widely used, it takes a lot of space in the oral cavity to secure the airway. Therefore, it is difficult for the endoscope probe to pass there through. In this study, the airway maintenance for endoscopic procedures was developed and named as Gastrointestinal endoscopic LMA (GELMA). While the airway secures the airway, a window is made to allow the endoscope probe to pass through the dorsal surface of the airway, and the airway maintenance tube is treated so as not to be disturbed by the endoscopist. In addition, a tool to monitor the spontaneous respiration of patients in the dark endoscope room was also attached.
Results and Discussion: The GELMA secures the airway in the same way as the existing supraglottic airway (laryngeal side) while minimizing the inconvenience of the endoscopist by securing a window for the passage of the endoscope probe along with the support of the mask on the opposite(pharyngeal) side of the supraglottic mask . And because the airway maintenance tube is also positioned beside the opening that leans out of the mouth and protects the endoscope probe, the practitioner can feel the same as the environment without the airway. In addition, there is a window to monitor the spontaneous breathing of the patient even in the dark environment, so that the sedation depth can be controlled.
Conclusions: In this study, GELMA 3D design work and mock-up of the product were made (3D printing) as the stage of development of the airway for gastrointestinal endoscopy under sedation, and domestic patent registration and international patent application were applied to the result.

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11AP06-9
Factors Influencing Choice of Laryngeal Mask Airway Size in Pediatric Population, In Clinical Practice

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Background and Goal of Study: Manufacturers' weight-based recommendations for laryngeal mask airway (LMA) size have no scientific base and have never been clinically validated1. In a previous retrospective study, we showed, that LMA size choice in pediatric population is based weight for children up to 10 years, and also sex for adolescent, with different weight size ranges that those recommended1. The goal of this study was to inquire whether they are other factors 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 immediately collected from the anesthesiologists who inserted the LMA: Age, sex, ASA classification, weight and factors influencing LMA size choice (age, sex, weight, height, body shape, mouth opening or other).
Results and Discussion: Data on 376 patients were recorded for 6 months (05/2017-10/2017) and 63 different anesthesiologists were questioned. Pediatric population was separated in 2 with 299 children (<10yo) and 77 adolescents (>10yo). Demographics Table 1. In 295 (78.2%) patients, weight was at least one of the factors for LMA size choice. He was selected alone in 58.6% of cases, and combined in 41.3%. In children, the most important co-factors associated were the anesthesiologist experience (47,5%) and the age (36%). No difference in factors association were found between children and adolescent. The factors frequency summarized in Table 2.
Conclusion: Although weight is a persistent parameter, clinical observation shows that anesthesiologists commonly use experience and age an to choose the LMA size in pediatric population.
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Multicentre validation of manufacturers' weight-based recommendations for LMA size choice in anaesthetic practice: A retrospective analysis of 20,893 cases. Eur J Anaesthesiol 2015; 32:432-8.

11AP07-1
Sudden respiratory failure after decanulation caused by post-tracheostomy granuloma: case report.

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Background: Mechanical ventilation (MV) allows life support in many patients in intensive care units. Approximately 5-10% (1) of patients require prolonged MV. In these patients weaning can be aided by percutaneous tracheostomy (PT) and thus contributes to reduce morbidity-mortality in intensive care units. Unsuccessful weaning is usually caused by concomitant diseases like heart failure, critic patient polyneuropathy, metabolic disorder, sedatives and anxiety (2), but other risk factor have to be considered such as subglottic or tracheal stenosis.
Case Report: Colon laparoscopic surgery was performed on a 66-years-old male, ASA 3. 5 days later, anastomotic leakage was diagnosed with the help of an abdominal CT scan. After an urgent Hartmann procedure, the patient was admitted to intensive care unit. After 2 unsuccessful extubation attempts, fiberoptic-assited PT was successfully performed. On day 40 since admittance, the patient started recovering and a first unsuccessful decanulation attempt was made on day 48 which failed due to immediate hypoxia. Another attempt was made 7 days later with a similar outcome. A nasal fiberoptic revealed a subglottic granuloma which occluded 2/3 of the airway. This finding explained the sudden hypoxemia after decanulation because the granuloma was thought to fall into subglottic and thereby totally occluding the airway upon inspiration.
Discussion: PT facilitates weaning in intensive care settings, however multiple complications such a tracheal stenosis can occur. This stenosis can arise during the technique, due to aspiration or cuff pressure necrosis. In patients with prolonged PT and unsuccessful decanulation attempts, airway obstruction due to granuloma must be considered in the differential diagnosis of respiratory failure.
References:
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Learning points: Fiberoptic-assisted PT and the use of low pressure cuff have reduced the incidence of adverse outcomes. Decanulation in critical patients has to be performed in optimal hemodynamic, metabolic, neurologic and respiratory conditions. If an unsuccessful attempt occurs, mechanical airway obstruction has to be suspected, of which granuloma may be a cause.

11AP07-2
Airway management in a patient with intestinal obstruction with a modified SALAD technique.

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Background: Bronchoaspiration is a severe yet unusual complication. We describe the use of a modificated SALAD technique (Suction Assisted Laryngoscopy Airway Decontamination)[1] as a result of an unintentional oesophageal intubation.
Case Report: Emergency surgery for bowel obstruction was indicated in a 50 years old female patient. No predictors for difficult airway were identified. A distended stomach was shown in imaging. No content could be aspirated through the nasogastric tube. Sellick's maneuver and a rapid-sequence induction were performed. In the first direct laryngoscopy a Cormack-Lehane class III/IV was identified. An endotracheal tube (ETT) was progressed with the aid of a bougie and its cuff was inflated. Gastric content massively flowed through the ETT. The ETT was left in oesophagus and connected to suction and arranged to the left corner of the mouth. A videolaryngoscopy and endotracheal intubation was conducted by an expert aneshtesiologist (figure 1). No gastric content was later detected in oropharynx nor in the bronchi.

Discussion: The placement of an oesophageal ETT has already been recommended in trauma when fluid in airway overwhelms suction[2]. It has also been reported in cardiopulmonary resuscitation scenarios[3]. This case shows that leaving an ETT unintentionally placed in oesophagus may help in isolating the airway. It also indicates that the SALAD approach may be useful in the clinical setting.
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Learning points: This modificated SALAD approach, which was originally described in simulated scenarios, has proven useful in the prevention of brochoaspiration and the management of a difficult airway in a clinical setting.

11AP07-3
A case of unexpected laryngeal granuloma and planned general anesthesia

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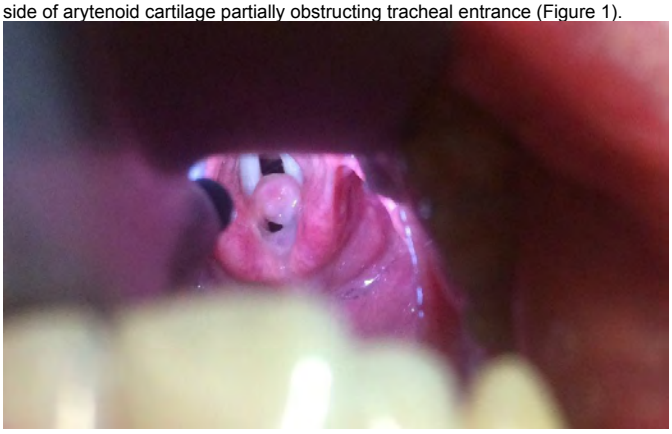
Background: Unexpected discovery of a laryngeal granuloma (LG) during tracheal intubation may challenge anesthesiologist to adapt the initial anesthesia management preventing from eventual granuloma damage. Unintentional LG damage may lead to partial airway obstruction/tracheal hemorrhage.
Case Report: ASA I, BMI25, 24yo man was scheduled for an elective femoral γ-nail exchange with bone grafting. Medical history included smoking and severe trauma with traumatic brain injury, coma, femur/tibia fractures complicated by a compartment syndrome 1 year prior the current surgery. Pre-anesthesia evaluation did not find any airway difficulties, neither dysphonia nor dyspnea. General anesthesia (GA) with endotracheal intubation, combined with peripheral nerve block was consented. The day of surgery the routine GA was started. Manual mask ventilation was uneventful, and a McIntosh 4 laryngoscope was introduced, showing Cormack-Lehane grade I airways with a voluminous granuloma seating on a right posterior side of arytenoid cartilage partially obstructing tracheal entrance (Figure 1).



Discussion: LG is benign and well-known complication of a tracheal intubation. Usually the development of LG is associated with a long lasting hoarseness, dysphonia, feeling of a foreign body in the throat, respiration difficulties. This brings patients to a laryngologist where the diagnosis is quickly established. Multiple cases describe anticipated anesthesia management for known granulomas; however no specific recommendations exist for such unexpected discoveries.
In very limited time we had to decide a strategy to adopt: cancel the surgery and wake the patient up, or proceed to the surgery. Since there were no difficulties for mask ventilation in this non-morbid orthopedic patient, we decided to maintain the surgery. A size 4 classic LMA was used safely and uneventfully for 3-hours surgery. 3 months later a laser excision of this persisting LG was done in laryngology clinic.
Learning points: LG may be asymptomatic and found during laryngoscopy. The following strategy is individual considering the risk/benefit balance. LMA may be a safe option to avoid LG damage.

11AP07-4
Case report: submental intubation

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Background: Patients with complex maxillofacial fractures represent a challenge to the anaesthesiologist because they often present a difficult airway and, additionaly, orotracheal and nasotracheal intubation are usually contraindicated being the tracheostomy the only option. In this regard, submental intubation has proven to be an excellent alternative for airway management, being a comparatively simpler, safer and faster technique.[1,2,3]
Case Report: A 28-year-old male, ASA I, undergoing elective surgery for reduction and internal fixation of a Le Fort II maxillofacial fracture. The anaesthetic induction and orotracheal intubation, with a previously prepared endotracheal tube (ETT), was performed without intercurrences. An incision was made in the submental region, the ETT was disconnected from the ventilator, the universal connector was removed, the tube was passed through the surgical access and finally, the ETT was reconnected to the ventilator and sutured to the skin. At the end of the surgery the ETT was brought back to the orotracheal location and the submental incision was closed, without incidents during extubation and postoperative period.
Discussion: Submental intubation plays a remarkable role when orotracheal and nasotracheal intubation are contraindicated, allowing faster recovery and avoiding possible complications associated with a tracheostomy. Intraoperatively, this technique provides surgeons with optimal conditions to treat fractures without tube interference and avoids changing the intubation method during the surgical procedure.
References:
1. Kishoria N, Upadhyaya RM, Shah DM, Mahajan A. Submental intubation an alternative to tracheostomy in patients with panfacial fractures. OA Case Reports, 2014 Jan; 18; 3(1):8
2. Bradley J. Phillips, Lauren M. Turco. Le Fort Fractures: A Collective Review. Bull Emerg Trauma, 2017; 5(4):221-230
3. Uday Jain, M.D., Ph.D., Maureen McCunn, M.D., M.I.P.P., Charles E. Smith, M.D., Jean-Francois Pittet, M.D. Management of the Traumatized Airway. Anesthesiology, 2016; 124:199–206
Learning points: This clinical case highlights the importance of the airway approach as a central concern in the treatment of complex maxillofacial fractures. Under these circumstances, submental intubation has proven to be an excellent choice, providing optimal surgical and anaesthetic conditions.

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11AP07-5
Case report: Combined inhalational induction with fiberoscopic intubation in patient suffering from Klippel-Feil syndrome, undergoing cholecystectomy.

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Background: Klippel-Feil syndrome has been described first time in 1912 r. Typically consits of hereditary fusion of cervical vertebrae and triad: short neck, restriction of neck mobility, lowering of posterior hair line on the head. The syndrome frequency is described as 1:40000 to 1:42000 newborns. Usually it is skeletal anomaly but cases with heart anomalies and others were described. Metabolic changes leading to abnormal reaction to anaesthetics were not seen. High difficulty in airway access is usually reported.
Case Report: Female patient suffering from inherited Klippel-Feil syndrome, undergoing cholecystectomy, didn't tolerate awake fiberoptic intubation. Apart from cervical stiffenss resulting from fusion of C2-C3 vertebral bodies and C3-C4-C5 spinous processes, other anatomical details, responsible for difficulties, were visualized during fiberoscopy: narrow, flattened lumen of the lower pharynx; long and wide leaf-shaped, floppy epiglottis covering laryngeal entrance, lifted only on inspiration, with expiration via fissurae under lateral edges of epiglottis. Patient has been successfully anaesthetised via inhalational induction and intubated fiberoscopically.
Discussion: All publications for anaesthetising this orphan disease recommend awake fiberoptic intubation. Unfortunately patient didn't tolerate this approach despite careful topicalisation of mucosa with 10% lidocaine. Intubation required waiting with fiberoscope just over larynx for inspiration and lifting of epiglottis. Any lack of cooperation made this impossible. Use of musculorelaxant or induction agent causing apnea would most probably lead to CICO scenario and could be lethal. Using Inhalational induction - known method of anaesthetising patient with difficult airways, allowed for calm fiberoptic intubation without any possible airway injury. This patient was not intubatable without fiberoscope.
References:
1. Klippel-Feil anaesthesia guideline; Jameel Ahmed Khan, Orphan Anesthesia, Jan 2015, www.orphananesthesia.eu
2. Anaesthetic challenges in a patient with Klippel Feil syndrome undergoing surgery; Madhurita Singh, Rupam Prasad, Rebecca Jacob; Indian J. Anaesth. 2005; 49(6):511-514
Learning points: Combining inhalational induction with fiberoscopy appeared to be safe and effective approach in Klippel-Feil patient not tolerating awake fiberoptic intubation.

11AP07-6
"Videolaringoscopy assisted urgent difficult airway management in a patient with a massive thyroid goiter: a case report"

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Background: Difficult airway should be anticipated in a patients with presence of a thyroid goiter or any other pathologic findings in the neck region. It is well known that goiter patients have an increased risk of difficult endotracheal intubation compared to the population with no evidence of goiter or any other risk factor (1).
Case Report: We present a 57 years old female with history of goiter for 12 years which has been brought to our intensive care unit because of hypoxia and breathing difficulties. She was somnolent, cyanotic, with SpO2 62% and massive goiter which extended in the region of the whole neck from the mentum to the sternum. Chest radiography has shown a mass in the neck region with tracheal displacement to the left. We proceeded to urgent awake intubation where direct laringoscopy (DL) was made first, where only epiglottis was visualized. After unsuccessful glottis visualization with DL we've made an urgent video laringoscopy where glottis with Cormack Lehane grade II was visualized after what the patient was intubated with endotracheal tube no.7.0. CT of the neck was made after intubation where cystic formation with dimensions of 12cm x 18cm was seen with compression of the larynx, hyoid bone and trachea to the left.
Discussion: Goiter could be an aggravating factor for difficult intubation especially if is accompanied with an airway deformity Video laryngoscopy is more suitable technique over DL in airway management in a goiter patients in terms of ease of use, time to intubate, first attempt success, lower Cormack-Lehane scores, and lower Intubation Difficulty Scale scores (2). It has been found that videolaringoscopy is more useful than DL in patients with risk factors for difficult intubation providing better visualization of the glottis, decreased time of intubation attempts and fewer repositioning maneuvers.
References:
1. Voyagis GS1, Kyriakos KP. The effect of goiter on endotracheal intubation. Anesth Analg. 1997 Mar;84(3):611-2.
2. Stacey Watt, Jonathan Kalpan, Venkatesware Kolli, Case report of the use of videolaryngoscopy in thyroid goiter masses: An airway challenge Int J Surg Case Rep. 2016; 27: 119–121.
Learning points: Goiter may be cause of anatomical changes of the airway leading to risk for difficult intubation. Video laringoscopy could be first choice of technique in managing anticipated difficult airway in goiter patients.

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11AP07-7
Severe massive hemoptysis after orotracheal extubation– An etiology enigma

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General anesthesia with orotracheal intubation (OTI) is considered a very safe procedure. The handling of the airway during OTI or during extubation, is object of the majority of complications.
We report a case of a 38 years old male, without known diseases, smoker (ASA II), with a past history of two general anesthesias (GA) without intercurrences. He was proposed to supraspinatus raffia through shoulder arthroscopy, under Balanced GA with Sevoflorane. OTI was smooth and easy with a reinforced nº7 tube, without registration of trauma or other complications. After two hours of surgery, during the emergence of GA we gave Sugamadex 2 mg/kg, with adequate reversion of the neuromuscular block and extubation. Two minutes after, the patient presented with laryngospasm with a peripheral oxygen saturation (SpO2) of 88%, which was solved with positive pressure. After this, there was massive hemoptysis, bronchospasm and considerable desaturation (SpO2 76%). The patient was immediately reintubated and the orotracheal tube aspiration revealed a substantial amount of blood. The patient remained hemodynamically stable and SpO2 improved. Besides that, he was admitted in Intensive Care Unit (ICU) with a severe acute respiratory distress syndrome (ARDS). Otorhinolaryngology excluded upper airway hemorrhage, and a diagnostic bronchofibroscopy reported distal massive hemorrhage, without a visible focus. Thorax Computerized Tomography showed diffuse alveolar hemorrhage. In ICU, the orotracheal tube cuff needed high pressure in order to reduce leaks. After 5 days there was great improvement of ARDS and a revision bronchofibroscopy showed a small necrotic lesion (1cm) compatible with trauma, in the posterior wall of trachea. In that day the patient was extubated and transferred to Pulmonology service for etiology investigation. Autoimmune disease was ruled out and the patient had a full recovery to his prior state. There are, in literature, case reports of hemoptysis after Sevoflorane use, and this might be another one. The lesion found in the second bronchofibroscopy can't be attributed to initial airway management as the patient had a second orotracheal tube with a high pressure cuff. Besides, it's unlikely that such a small lesion could give a massive hemoptysis. This clinical report highlights the relevance of immediate airway management. This rare complication can be related with airway trauma, with autoimmune diseases or with a drug secondary effect.

11AP07-8

Use of a paediatric face mask to maintain spontaneous ventilation and provide CPAP oxygenation in a deeply-sedated patient with supraglottic cancer, tracheal stenosis and a tracheostomy during emergency bronchoscopic retrieval of a foreign body in the right mainstem bronchus

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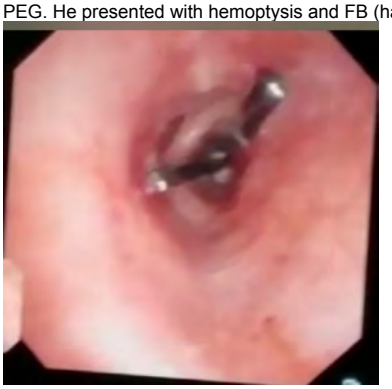
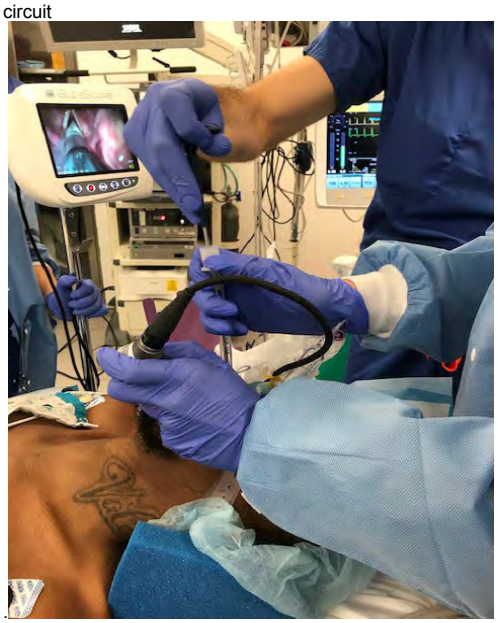
Background: A paediatric mask was shown to maintain spontaneous nasal ventilation/oxygenation in sedated obese OSA patients.[1-3] We used it in a cancer patient with tracheostoma during fiberoptic bronchoscopic (FOB) retrieval of a foreign body (FB).
Case Report: A 66 y/o male, former smoker, with COPD, HTN, CKD, supraglottic cancer s/p chemo and radiation therapy, tracheal stenosis s/p tracheostomy and PEG. He presented with hemoptysis and FB (hair pin) in right mainstem bronchus.



The tracheostomy tube was removed. The plan was to retrieve the V-shaped hair pin through the traheostoma. Instead of using nasal cannula or a tracheostomy collar to provide O_2, a toddler face mask (#3) with fully-inflated air cushion was secured over the stoma with elastic head-straps. It was connected to the anaesthesia machine via a connecter from a flexible connecter, a FOB swivel adapter and a breathing circuit



The APL valve was adjusted to deliver 2-3 cm H_2O CPAP with O_2 flow of 4Lmin. Deep sedation was titrated with 50 mg lidocaine and propofol small boluses (total 200 mg) and infusion (75 mcg/kg/min). During difficult retrieval of the hair pin, the mask was held down to obtain a tight seal. Once FB was retrieved into the mask and quickly removed, the paediatric mask was immediately secured over the stoma to maintain CPAP oxygenation. He tolerated the procedure well and maintained spontaneous ventilation and 99-100% SpO_2 throughout. He recovered quickly.
Discussion: A paediatric mask secured over tracheostoma maintained spontaneous ventilation/oxygenation in a patient during difficult FOB retrieval of bronchial FB. It can be used to deliver immediate assisted ventilation without removing FOB.
References:
1. www.TSEMask.com; 2. SAMBA 28th AM, 2013; 3. IARS AM: MCC1080, 2015
Learning Points: How to assemble a paediatric mask/tracheostoma circuit for FOB and maintain optimal CPAP.

11AP07-9

A case with huge anterior mediastinal mass in which we avoided general anesthesia by inspection of the CT image on a day before the operation

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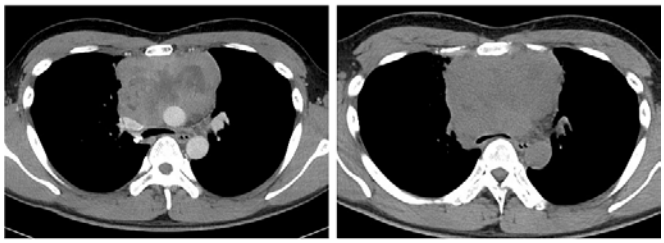
Background: Airway management of huge anterior mediastinal mass is always challenging. We usually predicted the severity of airway narrowing by the patients' symptoms. Of course, it was also judged by the CT images. However, we should pay attention on growing speed of the tumor.
Case Report: A 29-year-old male visited a hospital. His complain was cough and sub-fever. He was pointed out an anterior mediastinal mass by chest x-ray. CT-image revealed that the size of tumor was 6 cm x 8 cm and left main bronchus was compressed in some extent. He only felt slight dyspnea in supine position, and there were no restriction in daily ordinary life. Two weeks later, he was introduced to our hospital. For pathological diagnosis, biopsy under video-assisted thoracoscopy was scheduled a week later. CT-image obtained a week after his first visit to our hospital revealed that the size of the tumor increased to about 6.5 cm x 9 cm and airway stenosis was progressed (fig1a). However, we predicted that we could intubate a tracheal tube through the narrowed airway to right bronchus and we could execute one-lung ventilation. We ordered to get CT-image a day before the operation considering the tumor growing. The latest CT-image revealed that compression of the airway was further progressed, and we judged that general anesthesia was dangerous. We decided to avoid general anesthesia, and biopsy was undergone under local infiltration analgesia. Even the airway compression was progressed, the patient still had little symptom. He only felt slight dyspnea in supine position. Pathological examination revealed that the tumor was diffuse large B-cell lymphoma of the mediastinum.
Discussion: The huge anterior mediastinal mass sometimes grew very fast. So, we have to pay attention on its growing speed. We always get the latest CT-image for adequate airway assessment. We had considered that a patient with little symptom was not so severe. However, this patient showed little symptom although the airway narrowing was very severe, which was quite surprising. We learned that little symptom didn't always indicate that airway narrowing was not severe.



(Fig.1a) 8days before operation (Fig.1b) 1day before operation

11AP08-1
Airway management during anesthetic induction of patients with a history of video-assisted thoracoscpic esophagectomy (VATS-e) in prone position: A Cases series

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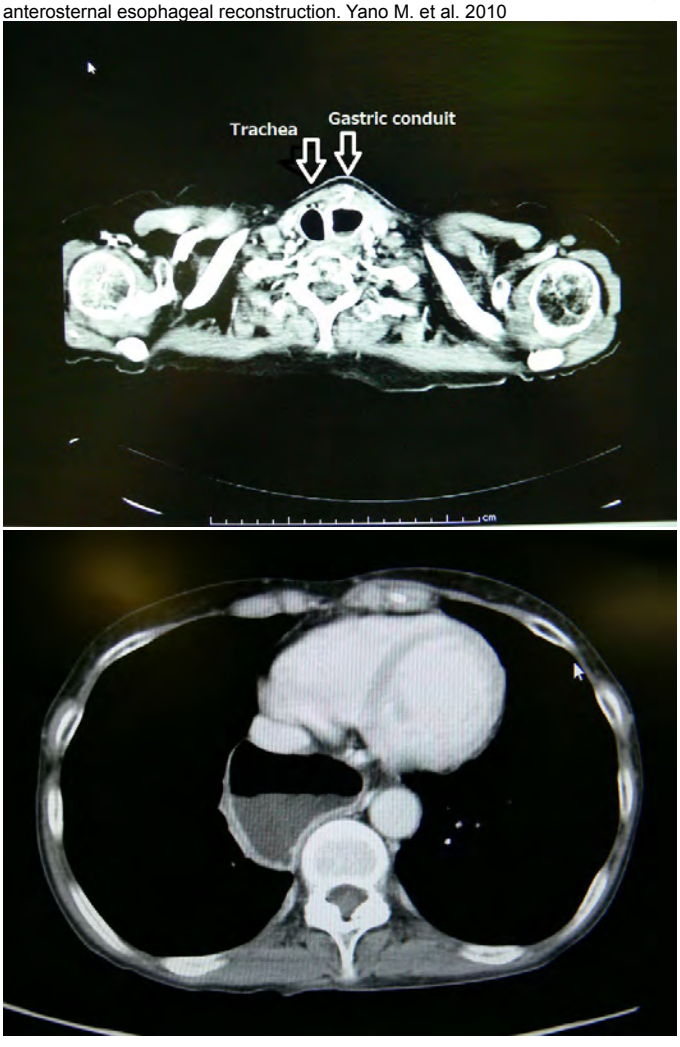
Background and Goal of Study: Recently, postoperative survival of patients with esophageal cancer has increased. We investigate the anesthetic management of patients with a history of minimally invasive esophagectomy (VATS-e) and its associated airway complications.
Materials and Methods: From 2007 to 2018, 33 patients with esophageal cancer were operated in our hospital. We collected data regarding patient characteristics, airway change by VATS-e, anesthetic methods of induction, surgical factor, and airway complications using an electoronic chart.
Results and Discussion: There were 33 patients who underwent noncardiac surgery after VATS-e in our hospital. The median age was 65 years (42-83 years), and 23 of the patients were male (33%). The surgery was conducted in via the posterior mediastinum route in 30 cases (91%). There were one case of antrosternal reconstruction and two cases postosternal reconstruction, respectively. Lung cancer was the cause in 5 cases (15%). Of the 33 cases, 4 in whom neuraxial anaesthesia with light sedation was performed (12%). Among the 29 cases with general anaesthesia, only 11 (38%) received cricoid pressure. Airway complications included desaturation in 4 cases (12%), There were two cases of reflux from gastric conduit. There were no cases of aspiration peumonia. The two case of reflux had reconstructed via postosternal route by CT scan. Cricoid pressure may not be effective on the postosternal reconstruction (fig. 1).
Conclusion: In the anesthetic induction of patients with history of VATS-e, it is important to prevent aspiration during induction of anesthesia. CT scan is helpful to evaluate the degree of remunat food and anatomy of the airway can be altered by VATS-e.
References:
[1] Unexpected vomiting during anesthetic induction in a patient with a history of anterosternal esophageal reconstruction. Yano M. et al. 2010



11AP08-2
An Evaluation of Double Lumen Tube Placement Using a Rigid Video Laryngoscope (Airway Scope®) in Simulated Difficult Airway Scenarios: Comparison with Airtraq® and Macintosh Laryngoscopes

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Background and Goal of Study: Placement of double lumen tubes (DLTs) may be considerably difficult. The Airway Scope® (AWS, Hoya co., Tokyo, JAPAN) used together with a specialized blade (Intlock®) and the Airtraq® (AT, Podol Meditec SA, Vizcaya, SPAIN) are laryngoscope designed to provide a view of the glottis without requiring alignment of the oral, pharyngeal, and tracheal axes. A newly designed Intlock® (M-ITL-LL) so that the 35-37 F DLT can be set in the guide groove of it was introduced in 2016. We evaluated DLT placement using AWS together with M-ITL-LL, AT for DLT and Macintosh Laryngoscope (ML) in simulated difficult airway scenarios.
Materials and Methods: Thirteen anaesthesiologists participated in this study. Each participant intubated DLT to the manikin with limited neck flexibility Airsim® airway management trainer (Trucorp, Belfast, Ireland) with three different devices: AWS, AT and ML. The order of use of the devices by each participant was randomized. The success rate, total intubation time, the percentage of glottic opening (POGO) score and difficulty score evaluated by using a visual analog scale (VAS; 0 mm: easy, 100 mm: difficult) were recorded. Statistical comparisons of values were performed using the Kruskal-Wallis test followed by Dunn's post hoc test. $P < 0.05$ was considered to be statistically significant. Data are expressed as medians (range).
Results and Discussion: Intubation time with AWS and AT (27 (6-152) and 28 (14-56) sec, respectively) were significantly shorter than that with ML (53 (15-162) sec). The difficulty scores for AWS and AT (17 (1-96) and 45 (0-85) mm, respectively) were significantly lower than that for ML (74 (21-74) mm), moreover, difficulty score for AWS were significantly lower than that for AT. The POGO scores with AWS and AT (90 (50-100) % and 90 (60-100) %, respectively) were significantly higher than that with ML (50 (20-80) %). The success rates were 100% with all three devices. AWS shows superior vision of the vocal cords on the monitor, which may lessen the difficulty in intubation compared with AT.
Conclusions: DLT placement using the AT and AWS proved to be significantly less requiring time for intubation and higher POGO score compared with intubation using the ML. Simultaneously, the difficulty score was significantly lower for AWS than that for AT and ML. Therefore, we concluded that the AWS together with M-ITL-LL appears to be an effective and safe intubating device for placement of DLTs.

11AP08-3
Effect of remote ischemic preconditioning on lung function after surgery under general anesthesia: a systematic review and meta-analysis.

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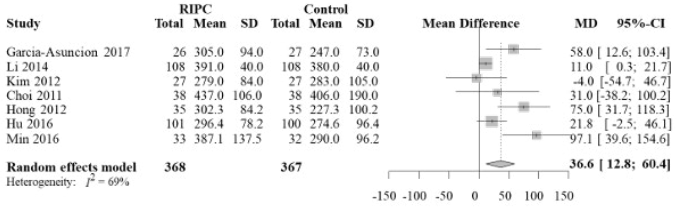
Materials and Methods: Remote ischemic preconditioning (RIPC) is a technique to protect organs from ischemic events by exposing the limb distant from the target organ to several ischemia-reperfusion cycles. Although the underlying mechanism has not been elucidated, recent studies have suggested the involvement of RIPC on pro-inflammatory responses. RIPC has been shown beneficial effect to several organs including heart and kidney under cardiac surgery. Additionally, recent trials demonstrated that RIPC improved gas exchange in patients undergoing pulmonary lobectomy. However, few meta-analyses on RIPC refer to lung or respiratory function. We performed meta-analysis to investigate the respiratory effect of RIPC in surgical procedure under general anesthesia. We searched MEDLINE, Embase, CENTRAL, Web of Science, Clinical Trials.gov, EU Clinical Trials Registry and UMIN for Randomized Controlled Trials (RCTs) involving RIPC for surgery under general anesthesia. The primary outcome of interest was the P_aO_2/F_IO_2 (P/F) ratio 24h after surgery. The secondary outcomes were serum cytokine levels 24h after surgery. Continuous data was summarized using the random effects model and results were presented using mean difference (MD) or standardized mean difference (SMD) and a 95% confidence interval (CI); heterogeneity was quantified using the I^2 statistic. We plan to conduct subgroup analysis to explore the cause of heterogeneity when the heterogeneity was significant (i.e., the I^2>50%).
Results and Discussion: Seven RCTs with 735 patients were included in the final analysis for the primary outcome. Patients with RIPC demonstrated significant higher P/F ratio compared to control (MD [95% CI]: 36.6 [12.8–60.4]; I^2=69%, see Figure). Similarly, serum TNFα level was significantly lower in RIPC group (SMD [95% CI]: -0.8 [-1.3–-0.2]; I^2=88%) but not significant in IL-6, 8 and 10. The cause for heterogeneity was not identified by the subgroup analysis.
Conclusions: Based on our meta-analysis, RIPC provides improvement of oxygenation after surgical procedure under general anesthesia that is associated with lower level of TNFα.



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11AP08-4
Improved airway management and ventilation with a cuffed endotracheal tube with an outer diameter of 4.4 mm for laryngeal surgery - a randomized controlled trial

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Background and Goal of Study: Laryngeal surgery and the related implications for airway management yield major risks like tracheal aspiration and desoxygenation. The Tritube ([TT], Ventinova medical B.V., Eindhoven, The Netherlands) with its outer diameter of 4.4 mm in combination with flow controlled ventilation (FCV) might offer good laryngeal view combined with controlled ventilation via an inner diameter of 2.4 mm with a sealed trachea. This randomised controlled study aimed to compare the TT and FCV to a conventional microlaryngeal tube (MLT) and volume controlled ventilation (VCV) in regard to concealment of laryngeal structures, surgical conditions, and ventilation parameters.
Materials and Methods: After ethical approval, 43 patients scheduled for elective laryngeal surgery were randomly allocated to either intubation with TT and ventilation with FCV (TT-FCV group) provided by Evone ventilator (Ventinova medical B.V.) or intubation with MLT 6.0 and ventilation with VCV (MLT-VCV). Primary endpoint was the concealment of laryngeal structures by the endotracheal tube. Secondary endpoints were surgical conditions [categorical rating scale: Optimal (O), Good (G), Acceptable (A), Poor (P)], respiratory system compliance and inspiratory plateau pressure.
Results and Discussion: Two patients were excluded in the TT-FVC group (software malfunction, n=1; tube dislocation, n=1) and one in the MLT-VCV group (data loss). Concealment of laryngeal structures was lower in the TT-FCV group (7±2 vs. 22±8 %, p<0.001). Surgical conditions were rated comparable in the groups (TT-FCV 13/5/1/1 vs. MLT-VCV 5/8/5/2, n O/G/A/P; p=0.064). A subgroup analysis of patients treated by residents in-training showed better surgical conditions in the TT-FCV group (9/2/0/0 vs. 2/7/3/0; p=0.0061). Respiratory system compliance was higher (63±14 vs. 46±8 ml·cmH_2O^{-1}, p<0.001) and inspiratory plateau pressure was lower (14±2 vs. 17±2 cmH_2O, p<0.001) in the TT-FCV group.
Conclusions: The TT achieves better surgical conditions for surgeons with a lower level of expertise by a reduced concealment of laryngeal structures compared to an MLT. FCV improves alveolar recruitment and consequently enhances respiratory system compliance compared to VCV.
Acknowledgements: This work received funding from the European Union's Horizon 2020 research and innovation programme, grant no. 691519. We thank Prof. Dietmar Enk (inventor of FCV) for sharing his thoughts with us.

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11AP08-5
Zero Gravity Intubation Device "Z-GID" for airway management training in Space emergent surgery situations.

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Background and Goal of Study: space is a thousands of billion trades since Barack Obama signs in 2015 U.S. Commercial Space Launch Competitiveness Act (1). Space miners will be young and healthy subjects in almost perfect health, free of any known chronic conditions. However, they will be exposed in a hazardous environment far from Earth, potential work accidents that may require trauma interventions, or to acute medical processes that require urgent general surgery interventions.
Materials and Methods: a systematic review was conducted to identify principles to guide decision making about airway management in space inhospitable environment surgical emergences.
Results and Discussion: a comparison of airway devices in space has been developed in water immersion model or during free-floating conditions based on experience during parabolic flight (2). Tartan Intubation for Microgravity (TIM) is a NASA collaboration to address the lack of Airway management capability in space at the patient interface (3). The Crew Medical Restraint System (CMRS) aboard the ISS is designed for patient restraint and transport, spinal stabilization, and electrical isolation for defibrillation (2).
Conclusions: anything that can happen on Earth can happen in space, and if the situation is really dire, the ailing space miner and astronaut may not have the luxury of waiting fora return to Earth to receive medical attention. Medical events in this inhospitable environment may require specifically emergency medical care skills and continuous training in crew members. Establishing and maintaining a patent airway is essential to ensuring a successful outcome from cardiopulmonary resuscitation or respiratory failure secondary to trauma or acute illness. We believe that second generation supraglottic airway devices, that have almost eliminated the need of routine ETI in ambulatory anesthesia, could be the future, and especially the Total track VLM will be a good airway option. For this reason, we have designed an intubation training device to perform simulations in 'artificial gravity' with the intention of carrying out comparative studies between different devices, both in their effectiveness as well as in their ease of use and weight
References:
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11AP08-6
Comparison of the effectiveness of two techniques of selective intubation in thoracic surgery: Intubation in lateral decubitus position versus intubation in supine decubitus position

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Background and Goal of Study: In recent years, the quantity and complexity of non-intubated thoracic surgeries has increased exponentially. Anesthesiologists are required to be able to manage the airway in the lateral decubitus (LD) if intubation is required.
Objective: evaluate if the intubation in the LD position would not be technically more difficult than the one in the supine decubitus (SD) position.
Materials and Methods: Descriptive observational study carried out at the Hospital General Universitario de Alicante which describes our routine clinical practice. The patient selection included patients over the age of 18 scheduled for thoracic surgery over a period of 8 months who required general anesthesia with one-lung ventilation and did not show any exclusion criteria (difficult airway predictors and/or ASA >3). A preoperative airway assessment was undertaken. The selected position for intubation was decided according to the anesthesiologist criteria. The success of the intubation was confirmed through the capnography curve. We collected the data of the number of intubation attempts, necessity of the BURP manoeuvre, use of rescue devices and the final position of the double-lumen tube (DLT).
Results and Discussion: We included 124 patients (40 women and 84 men). All of them were intubated with left DLT, 59 in LD position (left LD: 28; right LD: 31) and 65 patients in SD position. The average age was 59 ± 16.8, and the BMI average was 26. Rescue devices were used on 40 patients (LD: 16; SD: 24), in 37 of which we use Frova® guide (LD: 15; SD: 22) and Airtraq® videolaryngoscopy in 3 (LD: 1; SD: 2). No patient showed any complications. 76.61% of the patients were intubated at the first attempt. The BURP manoeuvre was necessary in 26 patients (LD: 13 and SD: 13). No patient needed to be placed in the SD position to achieve intubation.
Conclusion: The intubation and ventilation in DL position is not more difficult compared to DS. No complications were observed. The correct training of this technique is important to manage correctly intraoperative complications. Randomized trials are needed to define more precisely the results of this observational study.
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11AP08-7
Endotracheal video-laryngoscope guided intubation with a 2.4 mm cuff'ed tube and active expiration by a dedicated ventilator versus a standard tube/ventilator. A randomized single blinded study in patients with a predicted difficult airway. - A paradigm shift in airway management?

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Background and Goal of Study: Tracheal in- and ex-tubation remains a challenge in difficult airways
The goal is to
a) examine the feasibility of ventilation through the 2.4 mm i.d. Tritube (Fig) with a novel type ventilator, the Evone, that provides expiratory ventilatory assistance
b) (primary endpoint) compare intubation conditions between Tritube and a standard, 6 mm, ETT when using angulated video-laryngoscopy.
c) compare surgeons' access to the surgical field
d) compare patients' acceptance of the Tritube vs a tube-exchange catheter after anaesthesia
Materials and Methods: Patients for head/neck surgery with predictors of difficult laryngoscopy were randomised to:
Group A: Intubation with Tritube and ventilation with the Evone respirator. Upon recovery of anaesthesia the Tritube was left in place with the cuff emptied.
Group B: Intubation with a standard 6.0 mm ETT. A Cook Tube-exchange catheter was left in place after extubation.
We present the preliminary findings with median(range), Fishers exact /Chi square test and confidence intervals for the binomial distribution.
Results and Discussion:
a) Feasibility: All patients, weight 77.5 (65-149) kg, in the Tritube/Evone group (n=18) had successful maintenance of the airway and ventilation for 89.5 (39-310) min.
b) Intubation conditions were "excellent"1in 14/18 (52-94%) (95% CI) in the Tritube group and in 4/17 in the standard tube group (6.8-50 %).
c) For procedures in larynx/pharynx with the Tritube in place the surgeons judged the Tritube to be "slightly better" in 2/14 (14%) and "much better" in 12/14 (86%)
d) In the Tritube group 13/17, 76% (50-93%) patients tolerated the tube in the trachea until arrival in post-anaesthesia-care versus 6/17, 35% (14-61%) in the standard-tube-exchange-catheter group.
With angulated video laryngoscopy it is often difficult to pass the tube despite sufficient view, the use of the ultrathin and malleable Tritube seems to partially overcome this challenge.
Conclusions: With expiratory ventilatory assistance, the 2.4 mm i.d. Tritube can be utilised also in very large humans (149 kg), in predicted difficult direct laryngoscopy and for > 5 hours. Intubation conditions and surgeons' access to the airway were better with the 2.4 mm Tritube than with a standard tube. After anaesthesia the Tritube and a tube-exchange catheter were accepted equally well.
Acknowledgement: The work is funded by the EU's Horizon 2020 research and innovation grant no. 691519

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11AP08-8
Anesthetic challenges in cancer patients: considerations for airway management for temporary tracheal stent insertion in Hyalinizing spindle cell tumor with giant rosettes.

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Background: The temporary tracheal stent insertion in patients with Hyalinizing spindle cell tumor is a challenge to the anesthesiologist, who despite the abnormality of the anatomy of the airway, potentially obstruction, pressure effect of mass on the airway and endoscopic manipulation must keep the patient with spontaneous ventilation, normoxemia and normocapnia without pain and stress response while surgeron inserts the stent.
Case Report: A 52 year old female weighing 55 Kg with a cervical mass (Hyalinizing spindle cell tumor with giant rosettes) who cannot tolerate the decubitus position, developed a progressively worsening dyspnea, dysphagia and stridor. Under sedation with dexmedetomidine in sit position the self-expandable covered stent was inserted via bronchoscopy. In the intensive care unit patient received chemo and radiotherapy until mass reduce to stent removal.
Discussion: In the intraoperative, considering that these patients are difficult airway the anesthesiologis must be prepared. Avoid general anesthesia is recommended, patients spontaneus breathing drecease the risk of bronchoaspiration and loss of airway control. Total intravenous anaesthesia (TIVA) using dexmedetomidine is recommended provides the ability to sustain spontaneous ventilation in patients with airway compression without pain, is a safe and reliable anesthetic. The oxygen administration should be titrated to the minimum tolerable by maintaining an adequate flow of fresh air.
References:
Semin Cardiothorac Vasc Anesth.2017;21:357-359.
Learning points: The anaesthesiologist should avoid muscle relaxation, positive pressure ventilation, and inhaled agents.

11AP08-9
Anesthetic challenges in cancer patients: considerations for airway management for temporary tracheal stent insertion in malignant lymphoma.

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Background: The temporary tracheal stent insertion in patients with malignant lymphoma is a challenge to the anesthesiologist, who despite the abnormality of the anatomy of the airway, potentially obstruction, pressure effect of mass on the airway and major vessels, and endoscopic manipulation must keep the patient with spontaneous ventilation, normoxemia and normocapnia without pain while the pneumologist inserts the stent and dilates the tracheal stenosis with balloon.
Case report: A 57 year old patient weighing 90 Kg with malignant lymphoma who cannot tolerate the decubitus position, developed a progressively worsening dyspnea and stridor, was scheduled for balloon dilatation surgery and tracheal stent insertion. The computed tomography shows evidence of a round ovalated mediastial anterior mass with compression of the distal trachea, carina, mainstem bronchi and superior vena cava. Before induction the patient was preoxigenated with FiO2 100%, Under sedation with remifentanil and using inhalational induction the spontaneous ventilation was maintained, the obstruction was observed via nasosibro-bronchoscopy, a self-expandable covered stent and liberated in the midldle third of trachea was introduced by mouth, then they introduce a 18 mm balloon to dilate it, reaching 15mm of diameter (previous 5 mm).Clinical improvement of dyspnoea was noticed immediately. In the intensive care unit, blood gases normalized. Patient received chemotherapy, the mass was reduced and two weeks later the stent was retired.
Discussion: Anaesthesia for Tracheal stenting is a challenge due to fear of loss airway control and cardiovascular collapse, prevailing recommendation are to avoid general anaesthesia. In the intraoperative, considering that these patients with decreased lung compliance and function, pressure effect of mass on the airway and major vessels should be avoided muscle relaxation, oxygen administration should be titrated[1].Inhalational induction can be used but Total intravenous anaesthesia using propofol, remifentanil or dexmedetomidine is recommended to prevent environmental air contamination[2].
References:
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Learning points : The anaesthesiologist should avoid general anesthesia to prevent airway and major vessels collapse, the temporary tracheal stent insertion is a valuable strategy in symptomatic patients with malignant lymphoma until chemotherapy reduce the stenosis.

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11AP08-10
Endotracheal tube cuff pressure in laparoscopic bariatric surgery – a prospective audit

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Background and Goal of Study: Endotracheal tube (ETT) cuff pressure measurement during anesthesia is recommended to limit complications however it is not a common practice in our institution. The primary goal of this study was to evaluate quantitatively the ETT cuff pressure after the qualitative evaluation by experienced personnel in patients submitted to bariatric surgery.
Materials and Methods: A prospective audit, after institutional approval, was performed from May to July 2018 in patients submitted to laparoscopic bariatric surgery. Demographic and peri-operative variables were recorded. After intubation and cuff insufflation cuff pressures were recorded with the KRUUSE AG Cuffill (and Mallinckrodt Medical® manometer, when available). The cuff pressure was then adjusted, when excessive, to 30 cm H2O and again measured in the end of the procedure, before sugammadex administration. A descriptive analysis of the data was performed.
Results and Discussion: Twenty-one patients submitted to bariatric surgery were included. Sixteen (76%) were female and 19 (90.5%) classified as ASA3. The mean (standard deviation) age, BMI and neck circumference were 44.1 (10.9) years, 42.9 (4.4) kg/m2 and 48.5 (4.8) cm, respectively. On average the ETT cuff was inflated with 7.9 ml of air which corresponded to an average pressure of 49.4 cm H2O recorded with the Cuffil. The average pressure recorded in the end of the procedure was 32.7 cm H2O which translated to a 4.3 cm H2O variation from the initial set pressure. In 12 cases pressures were also recorded with the manometer. In this subset the mean volume of inflated air was 8.5 ml correlating to an initial pressure of 51.6 cm H2O. In this group the average final pressure was 28.8 cm H2O, a 3.8 cm H2O differential. After intubation an excessive pressure (>30 cm H2O) was recorded in 81.0% of the cases. In the manometer sub-group the same was true in 66.7% of the patients. In this subset the agreement with the Cuffil measurements was 83.3% (10/12).
Conclusions: The authors observed that most patients had cuff pressures greater than recommended after a qualitative validation by experienced personnel. This finding supports the importance of cuff pressure monitoring by quantitative methods in patients with endotraqueal intubaton.

11AP09-1
Impact of an electromyographic (EMG) tube for postoperative laryngeal oedema and reintubation: a case-control study

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Background and Goal of Study: An EMG tube is sometimes used for intraoperative neuromonitoring in neurosurgery. Some of the characteristics of an EMG tube, such as the material and the inside and outside diameter ratio, are different from those of a normal tube. Although postoperative laryngeal oedema occurred and reintubation was necessary in some patients in whom an EMG tube was used, the relevance of an EMG tube to postoperative laryngeal oedema and reintubation has not been investigated in detail. Our goal was to determine the relevance of an EMG tube to postoperative laryngeal oedema and reintubation.
Materials and Methods: A case case-control study was conducted on 900 patients after neurosurgery between 2012 to 2018. We exclude patients under 15 years old or who was not extubated or died after surgery. The primary outcome was the occurrence of postoperative laryngeal edema and secondary outcome was that of postoperative reintubation.We used Fisher's exact test for comparisons of postoperative laryngeal edema and reintubation between EMG tube and normal tube. To identify independent predictors of outcomes, we performed multiple logistic regression analysis. A P value of less than 0.05 was considered to indicate a statistically significant difference.
Results and Discussion: The incidence of postoperative laryngeal oedema (n=3/26, 11.5%) in the EMG tube group was significantly higher than that (n=7/874, 0.8%) in the normal tube group (p=0.015). The frequency of postoperative reintubation (EMG n=2/26, 7.7%) in the EMG tube group was also significantly higher than that (n=5/874, 0.57%) in the normal tube group (p<0.002). Independent risk factors for laryngeal oedema were the use of an EMG tube [odds ratio (OR) = 6.7, 95% confidence interval (CI)=1.2-35.9] and the intraoperative position (prone vs supine, OR=6.8, CI=1.2-40.7).
Conclusions: Higher frequencies of both postoperative laryngeal oedema and reintubation were significantly associated with the use of an EMG tube.

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11AP09-2
Fibreoptic intubation: Are we losing skills with new disposable devices?

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Background and Goal of Study: Awake fibreoptic intubation is the gold standard for anticipated difficult airway, however acquiring and maintaining the technical skills can be challenging. In our department, the number of elective fibreoptic intubations performed has decreased since disposable fibreoptic scopes were introduced. 16 disposable fibreoptic scopes have been used in the non-emergency setting over the last year, which equates to 0.6 elective fibreoptic intubations per anaesthesiologist per year. We conducted a survey to investigate possible reasons for this.
Materials and Methods: We distributed a survey amongst anaesthesiology consultants and non-consultant hospital doctors (NCHDs) in our department. This survey was anonymous. Questions focused on how much practice is thought to be required to maintain fibreoptic intubation skills, the respondent's actual frequency of intubating using the disposable fibreoptic scope, comfort level with its use and the main factors that deter the anaesthesiologist from using the device.
Results and Discussion: A total of 18 people completed the survey out of a possible 27 (response rate 67%). 9 of the respondents were consultants, 9 were NCHDs. To maintain their skills, 11 (61%) of respondents said that they should be using the fibreoptic scope for intubation at least 10-20 times per year. 6 (33%) said that 5-10 elective fibreoptic intubations were sufficient. Despite 94% of respondents stating that they should be doing at least 5 elective fibreoptic intubations per year to maintain their skills, 6 (33%) had not used the disposable fibreoptic scope in the last year and 9 (50%) had only used it once or twice. When asked to rate their confidence with using the device, 6 (33%) gave a low confidence score and 8 (44%) gave a high score. Reasons for not using the device included cost (28%), preference for other equipment such as videolaryngoscopy (39%), while 22% had not thought of using it. Half of the respondents see videolaryngoscopy replacing the need for fibreoptic intubation in the future.
Conclusions: Perceived high cost of the disposable device and preference for other equipment appear to be the main reasons for the reduction in elective fibreoptic intubations performed amongst our colleagues. With this information we intend to encourage use and implement practical teaching sessions with the disposable fibreoptic scope in our department.

11AP09-3
Analgesia Nociception Index and hemodynamic response for laryngoscopy in bariatric surgery with the use of conventional and video laryngoscopes.

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Background and Goal of Study: Laryngoscopy is often associated with tachycardia, hypertension, and arrhythmias. Increasing of pulse rate and blood pressure is usually hard to predict. Most of the time these changes are tolerated by healthy patients. However rapid hemodynamic respond may be serious issue for patients with cardiovascular disease and hypertension which is often associated with obesity. Study was done to compare hemodynamic response and analgesia nociception index(ANI) changes to laryngoscopy with different laryngoscopes. ANI is an index (0-100) deliver from heart rate variability algorithm provides analgesia/ nociception balance during general anesthesia.
Materials and Methods: Randomized study of 40 patients, aged 18–60 years undergoing bariatric surgery, require general anesthesia and tracheal intubation. Patients were randomly divided in to four groups (n=10) depending on which laryngoscope has been used. Group1 – Airtraq Avant+WiFi Camera; 2- McGRATH™ MAC VL; 3– Intubrite VLS600 Edge; 4 – conventional laryngoscope – Covidien Laryngobloc Macintosh. Blood pressure, heart rate and ANI were measured. Measurements were taken after induction of anesthesia and during laryngoscopy after vocal cords visualization. Anesthesia was induced with 1 mg/kg Lignocaine, FNT 1-1,5 mcg/kg, Ketamine 0,5 mg/kg, Propofol 2-3 mg/kg, Rocuronium 0,6mg/kg.
Results: Group 1 changes of HR by +13,7%, sRR by +8,2% ,dRR +12,3% and ANI -27,8; Group 2 changes of HR by +12,1%, sRR +5,4% ,dRR +14,53% and ANI -9,7; Group 3 changes of HR by +12,1%, sRR +6,9%, dRR +14,9% and ANI-25,2, Group 4 changes of HR by +18,6%, sRR +13,1%by ,dRR +12,4 and ANI -31,7.

In Direct laryngoscopy (group 4) with Covidien Laryngobloc Macintosh hemodynamic response was greater compare VL groups (group 1,2,3). The baseline hemodynamic parameters were comparable in Airtraq Avant, McGRATH™ MAC VL, Intubrite VLS600 Edge groups.
Conclusions: Less hemodynamic changes was associated with use of video laryngoscopes in most obese patient cases. Use of VL also allows to reduce decrease of analgesia nociception index to laryngoscopy. However, study group was small so further research on larger group is needed.

11AP09-5
Is ultrasound a new tool to predict the unpredictable? An observational study about airway evaluation in operating room.

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Background: In clinical practice unexpected difficult airway may occur in 25-30% of cases.[1] Accurate airway assessment should always be performed, but the common clinical screening tests have shown low sensitivity and specificity with a limited predictive value. Ultrasound (US) of the upper airway may prove to become a useful adjunct to conventional predictors of difficult airway. The primary endpoint of this observational study is to evaluate if anterior neck soft tissue thickness at hyoid bone (distance from skin to hyoid bone - DSHB) and thyrohyoid membrane (distance from skin to epiglottis - DSEM) are useful to predict difficult direct laryngoscopy and difficult intubation with Macintosh blade. Comparing these measurements to commonly used clinical predictors of difficult airway will be a secondary endpoint.
Materials and Methods: Patients scheduled for elective surgery in general anaesthesia are evaluated by two independent investigators: first by evaluating modified Mallampati test, interincisor distance, thyromental distance, maxillary prognathism, and neck mobility; then by recording DSHB and DSEM with patient supine and head and neck in neutral position. General anaesthesia is administered according to a standard protocol. The Cormack-Lehane grade of vocal cords viewed by direct laryngoscopy is documented by an expert anaesthetist blinded to previous assessments. Data are being collected from September 2018 to August 2019.
INCLUSION CRITERIA:
- Patients undergoing general anaesthesia for elective surgery in General Surgery Unit - AOU "L. Vanvitelli ", Naples.
EXCLUSION CRITERIA:
- Clinical criteria of predicted difficult intubation.
- Congenital or acquired airway abnormalities.
- Edentulousness.
- Presence of cognitive or psychiatric history.
Results: We expect to evaluate a sample of about a thousand patients. According to previous studies, we expect a median DSEM cut-off value of ~2.7 cm and a median DSHB cut-off value of ~1.4 cm as predictors of difficult airway.
Conclusions: The correlation between US measurements and Cormack – Lehane grade laryngeal view and its ability to predict easy or difficult laryngoscopy will be evaluated. Future results of our study will clarify whether ultrasound airway evaluation will become useful for airway evaluation.
Reference
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11AP09-6
Usefulness of Dams TuLip-i® for fiberoptic orotracheal intubation in simulated difficult airway scenarios

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Background and Goal of Study: Fiberoptic intubation (FOI) is an effective technique for establishing airway access in patients with difficult airways. To facilitate the orotracheal FOI, specific airways have been used, including the Ovassapian® Fibreoptic Intubating Airway (OV; Teleflex, Buckinghamshire, UK). Meanwhile, Dams TuLip-i® (DT; Senko Medical Instrument, Tokyo, Japan), a newly designed assisting airway device for orotracheal FOI, was introduced in 2017. The aim of this study is to evaluate the usefulness of DT in fiberoptic orotracheal intubation in simulated difficult airway scenarios.
Materials and Methods: Fifteen residents participated in this study. Each participant intubated the manikin with limited neck flexibility Airsim® airway management trainer (Trucorp, Belfast, Ireland) with no specific airway (FOI), OV (FOI-OV) and DT (FOI-DT). The order of device trialed by each participant was randomized. The success rate, total intubation time (from starting FOI to confirmation of lung inflation) and difficulty score evaluated by using visual analog scale (VAS; 0mm: easy, 100mm: difficult) were recorded. Statistical comparisons of values were performed by Kruskal-Wallis test followed by Dunn's post hoc test. P< 0.05 was considered to be statistically significant. Data are expressed as medians (range).
Results and Discussion: Intubation time in group FOI-OV and FOI-DT (54 (15-191), 41 (29-208) sec, respectively) were significantly shorter than in group FOI (71 (26-154) sec), and the difficulty score in group FOI-OV and FOI-DT (34 (6-69), 21 (4-43) mm, respectively) were significantly lower than those in group FOI (52 (24-82) mm). FOI-DT was superior to others in regard to intubation time and the difficulty score. The success rates were 100% in all groups.DT is a silicone oral airway, which has a groove in the center for guiding the fiberoptic bronchoscopy, and has a mechanism in which the epiglottis floats up when the tip is inserted

down to the bottom of the arytenoid region. It is designed so that FOI can be easily performed even in difficult intubation cases where neck retroflexion is difficult. From our results, DT may lessen the difficulty of intubation when compared with FOI and FOI-OV.
Conclusions: Our results showed that DT is useful device for FOI in difficult airway situations. The use of DT may enable the operator to perform FOI much faster and easier, which may lead to safer and more reliable FOI.

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11AP09-7
Survey on Use of Ultrasound for Peri operative Airway Management

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Background and Goal of Study: The use of Ultrasonography (USG) for Airway management has become increasingly popular. It can be used as a diagnostic tool and to guide procedures like cricothyroidotomy which can be lifesaving. It is a quick, simple, safe, repeatable and non-invasive. It provides invaluable details by real time imaging of airways and surrounding structures for perioperative airway management. Difficult airway society guidelines recommend use of ultrasound for airway management. The aim of this study was to understand the current ability and comfort of anaesthetists to identify various structures surrounding the airway in order to proficiently use it for airway management.
Materials and Methods: A 15-question based survey was developed by literature review of identifiable clinical applications of ultrasound for airways and given to practicing anaesthesiologists with access to ultrasound in department of anaesthesia. Responses were limited to only one institution.
Results and Discussion: The survey was completed by 45 respondents, which included consultants, fellows, trainees and staff grade. 71% had not attended any course on use of USG for Airways. 88.88% didn't use the USG for difficult airway prediction or anticipation. 66.66% agreed being able to identify tracheal rings on the USG scan. 33.33% were able to identify oesophagus on the USG scan. 28.88% were able to identify correct placement of endotracheal tube on the USG scan. 17.77% felt they would be able to identify vocal cord mobility on the USG scan. Only 11.11% felt they could measure glottic diameter for appropriate size of ETT. None were able to identify oedema/swelling on the USG scan to predict post-extubation stridor. 80% were unable to do gastric ultrasound to assess risk of aspiration during intubation.
44.44% of respondents worked in the ITU frequently but used the USG for percutaneous dilatational tracheostomy infrequently.54.54% were able to identify pneumothorax using ultrasound.
86.66% respondents wished to have training on USG for airway management.
Conclusions: The ultrasound as a tool for perioperative airway management is highly underutilized by anaesthesiologists, in spite of easy access to it. It would be recommended for the anaesthetists to upgrade their knowledge and skills by attending a workshop based on airway ultrasound training, followed by its routine use for perioperative airway management.

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11AP09-8
Pentax airway scope . A modified technique for tracheal intubation

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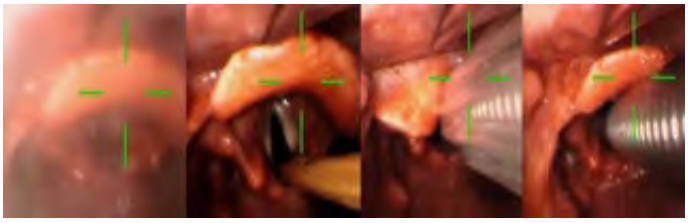
Background: In order to overcome fogging of the image and improving first attempt intubation success with the videolaryngoscope Pentax AWS, we describe a technique combining an Eschmann introducer and high-flow oxygen administered through the blade's suction channel to achieve orotracheal intubation in a patient with restricted neck movement.
Case Report: A 45 year-old woman, ASA II, BMI 35.49, with cervical osteoarthritis, and obstructive sleep apnea syndrome was scheduled for mastectomy. Preoperative airway evaluation showed Mallampatti III, Thyroid-mental distance 5 cm, Mouth opening > 3 cm and moderate restricted neck movement. Pentax AWS laryngoscope was selected with the following modifications: high-oxygen flow tubing introduced inside the suction channel of the disposable blade, leaving the conduit for the tracheal tube intentionally empty. Preoxygenation was followed by induction of general anaesthesia with fentanyl and propofol. Adequate face-mask ventilation was confirmed and muscular blockade produced. The neck was kept in neutral position and laryngoscopy showed a Cormack-I laryngeal view. When the image on the screen became blurred by fog, oxygen flow was increased, and although the epiglottis was not successfully elevated, an Eschmann introducer was directed towards the vocal cords. A reinforced tracheal tube 7.5 was later railroaded along the bougie and inside the blade's channel. Successful tracheal intubation was achieved on the first attempt. `



Discussion: Modifications have been reported in which an Eschmann introducer is passed through the endotracheal tube that is already loaded on the blade. In our report, we describe a modified technique in order to prevent the view from becoming fogged by administering continuous high-flow oxygen through the suction channel of the blade. In addition, the channel enables passive oxygenation during the procedure. During laryngoscopy the intubating channel was left intentionally empty to allow better manipulation of the introducer. As the epiglottis was not reached, the Eschmann introducer was first advanced towards the vocal cords and later, a tracheal tube railroaded inside the intubating channel.

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11AP09-9
Tracheal intubation with the McGrath MAC X-Blade videolaryngoscope in morbidly obese and lean patients

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Background and Goal of Study: The aim of this prospective randomized study was to compare the McGrath MAC X-Blade in morbidly obese (BMI>35) and lean (BMI<30) patients.
Materials and Methods: After Research Ethics Committee approval and written informed patient consent was obtained from all patients, 80 patients undergoing elective surgery requiring endotracheal intubation were enrolled in this prospective randomized study. Demographic and airway variables of patients were recorded. Optimization and tube insertion maneuvers such as; re-insertion of the device, slight removal the device, cricoid pressure and handling force, 90° anti- clockwise rotation, use of stylet and head flexion maneuvers were recorded. Cormack-Lehane grades, insertion times, intubation and total intubation times were also recorded. Hemodynamic changes and postoperative minor complications were recorded.
Results: All lean and obese groups were ventilated and intubated successfully with the McGrath MAC X-Blade in first or the second attempt. Height, weight, body mass index, sternomental distances, neck circumferences, Mallampati scores and ASA physical status were statistically different between the groups. Cormack-Lehane grades were comparable among the groups. Obese patients required more re-insertion and cricoid pressure maneuvers during intubation than lean patients (p=0.019 vs p=0.012). Slight removal of the device, handling force, use of stylet, 90°anti- clockwise rotation and head flexion maneuvers were also helpful in both groups. Although the device insertion times were similar between the groups, intubation and total intubation times were longer in the obese group (p=0.009 vs p=0.034; respectively). Groups were comparable regarding hemodynamic changes and postoperative minor complications.
Conclusions: McGrath MAC X-Blade videolaryngoscope could be used both in lean and morbidly obese patients with the aid of some key maneuvers.

11AP09-10
The use of McGrath videolaryngoscope for orotracheal intubation by experienced anesthiesologists and residents in elective abdominal surgery

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Background and Goal of Study: The videolaryngoscopy can improve visibility of the airway structures during tracheal intubation by up to 80% as compared to conventional laryngoscopy. The McGrath laryngoscope is a novel device aiming to facilitate and monitor intubation in real time. The aim of our study was to determine the applicability of McGrath videolaryngoscope for orotracheal intubation in abdominal surgery by experienced anesthesiologists and residents.
Materials and Methods: Thirty patients undergoing orotracheal intubation for elective abdominal surgery were enrolled into a prospective study. The patients were randomized into two groups with intubation performed either by anesthesiologist with experience of work ≥5 years (n = 16) or by first-year resident (n = 14). At 12 hrs before surgery, we evaluated Mallampati score, history of smoking, snoring and sleep apnea. Intraoperatively, we assessed hemodynamics and gas exchange at different stages. During laryngoscopy, anesthesiologist used the Cormack-Lehane grading system. We evaluated duration of intubation, number of attempts, incidence of esophageal intubation and other complications (including mucous and teeth damage). The statistical analysis was performed using Mann-Whitney U-test; in addition, Spearman's rho correlation was calculated. Data are presented as median (25th–75th percentiles). A p value < 0.05 was regarded as statistically significant.
Results and Discussion: There were no significant differences in preoperative airway assessment, hemodynamic parameters, SpO2 and EtCO2 among the groups. The tracheal intubation was successfully performed by videolaryngoscope in 28 patients (93.3%);two (6.7%) patients required conversion to the classic intubation by Macintosh laryngoscope. An intubating stylet was used in 13% of the patients. The average intubation time was 40 (22-60) sec in the group of experienced anesthesiologists and 50 (38-69) sec in the resident (p=0.22). We found correlation between incidence of snoring and complications in both groups (rho=0.509, n=30, p=0.004). Number of attempts of tracheal intubation correlated with complications (rho=0.679, n=14, p=0.008) only in the group of residents.
Conclusions: In elective abdominal surgery, the use of McGrath videolaryngoscopy allows to perform intubation in 93.3% of cases without a significant difference in the intubation time between experienced anesthesiologists and residents.

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11AP10-1
Comparison of pressure-controlled ventilation and manual ventilation during anesthetic induction in difficult airway patients

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Background and Goal of Study: The potential hazards of face mask ventilation during anesthetic induction are inadequate alveolar ventilation and inflation of the stomach with air, leading to subsequent regurgitation and aspiration. These risks become even worse for patients who are anticipated to have a difficult airway. Pressure–controlled ventilation (PCV) has been known to result in reduced peak airway pressures compared to manual ventilation (MV). We aimed to compare the respiratory parameters between PCV and MV in patients who were expected of mask ventilation difficulty during anesthetic induction.
Materials and Methods: 88 patients who were predicted for difficult mask ventilation were enrolled, and they were randomly allocated. After anesthetic induction using propofol (2mg/kg) and rocuronium (0.6mg/kg), face mask ventilation was initiated using 100% O_2 at 2L/min mixed with 8% desflurane. In the MV group, a mask was held with one hand and ventilation was performed using a reservoir bag in the circle system. In the PCV group, a mask was held with two hands and PCV was applied using an anesthetic machine. All patients were ventilated to maintain a tidal volume of 6-8ml/kg, respiratory rate of 10-15/min, and end-tidal carbon dioxide ($EtCO_2$) of 30-35mmHg. After 120 seconds of mask ventilation, endotracheal intubation was performed. Respiratory parameters including peak inspiratory pressure, tidal volume, respiratory rate, minute volume, and $EtCO_2$ were recorded every 30 seconds during the 120 seconds of mask ventilation. Real time sonography on the gastric antrum was performed to detect gas insufflation during mask ventilation.
Results and Discussion: There was no significant difference in the demographic data between the groups. PCV was associated with lower peak airway pressures compared to MV at each point of 30-second (p<0.001). Gastric insufflation was positive in 36.2% patients (17/47) receiving MV, whilst 7.3% patients (3/41) in the PCV group had this finding (p=0.001). There was no difference in minute ventilation. $EtCO_2$(mmHg) was comparable between the groups during mask ventilation, however significantly higher in the MV group immediately after intubation(43.8±4.9 vs 40.8±4.4; p=0.004).
Conclusions: In anticipated difficult airway patients, PCV resulted in significantly lower peak airway pressure, gastric insufflation and $EtCO_2$ when compared with mask ventilation, thus providing better safety and efficacy during face mask ventilation.

11AP10-2
Predicting difficult airway still remains a challenge- a retrospective study of 149 difficult tracheal intubations

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Background and Goal of Study: There are many tests widely used to anticipate difficult intubation. However, question still remains as to whether a combination of tests may improve predictive accuracy or whether predictive accuracy differs forspecific groups of patients, such as an obstetric, obese patients or demography (1).
Materials and Methods: In this retrospective study we analyze difficult intubation report forms from years 2012-2018 from 2ndDepartment of Anesthesiology and Intensive Care, Medical University of Warsaw. We analyze 149 difficult intubation cases. We excluded patients with a past history of difficult intubation who were prepared for elective awake fiberoptic intubation (AFOI) from further analysis. We investigated following predictors of difficult intubation: the Mallampati score (MPT), Interincisal distance (IID), Thyromental distance (TMD), Upper Lip Bite Test (ULBT), movement of the neck. We defined cut-off points as MPT class III, IV; TMD below 6,5 cm; IID below <3,5 cm; ULBT grade 3; movement of the neck less than 90 degrees. In our study we calculated the frequency of the risk factor and sensitivity of tests.
Results and Discussion: Our results showed low sensitivity values for all tests alone which were not different with values in literature (1). Only 5% of patients enrolled in the study did not have any of the predictive factors (MPT, IID, TMD, ULBT and movement of the neck). We found that the combination of tests significantly improve the sensitivity. Only all 5 tests used together provided 95% sensitivity.
Conclusions: Combination of screening tests for difficult intubation can have a better predicting value. Reliability of commonly used predictors of difficult intubation remains limited.
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11AP10-3
Which kind of Videolaryngoscope are you using in your practice?

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Background and Goal of Study: Videolaryngoscopes (VL) increase the intubation success rate in patients with intubation difficulties. Thanks to new technology, wide range of videolaryngoscopes are on the market for our clinical practice. Difficult airway guidelines recommend the use of videolaryngoscopes but we do not know what kind of VL are being used and how their use differs throughout the European countries. The primary outcome of this survey was to determine the types of videolaryngoscopes used in anesthesiology. The secondary aim was to determine the preferred characteristics of videolaryngoscopes.
Materials and Methods: Following Ethics Committee approval, a multiple-choice questionnaire consisting of 20 questions, was distributed among anesthesiologists in Europe through the European Airway Management Society's network. Responses to the questions were analysed using descriptive statistics. Answers were also evaluated according to the countries.
Results and Discussion: A total of 791 anaesthesiologists were invited to participate in the survey, of which 155 returned the questionnaire (19.5%). Participants age ranged from 27 to 66 years (mean 46 ± 10), 48% were female. The frequency of VL use was 24.5 ±27.5%. Countries with the most participants were Finland (18%), Turkey (11%) and Italy (7%) (Figure 1). 86.5% of the respondents stated that they do not use VL in all cases. Of these, 88% only use VL as a rescue device. Only 33% of the respondents stated that they use unchanneled devices. C-MAC was used in 16% and in 15%, GlideScope was the manufacturer of the VLS available at the participants' workplace (Figure 2). While 55% of the respondents preferred hyperangulated blades, 44% of them were using Macintosh-like blades. While 8% of the respondents stated that beginners should use hyperangulated blades, 55% were against this, the rest was undecided. More details are being shown at the poster presentation.
Conclusions: The study showed that still, most users would use VLS only as a rescuetechnique in difficult airway, and not as thier primary choice. Most often unchannelled VLS are used in clinical practice.

11AP10-4
Comparison of early and late administration of rocuronium before and after checking mask ventilation in patients with normal airways: a randomised controlled trial

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Background and Goal of Study: During induction of general anaesthesia, it is common practice to delay neuromuscular blockade until the ability to deliver mask ventilation has been confirmed. However, the benefits of this approach have never been scientifically validated. We thus compared the early and late administration of rocuronium before and after checking mask ventilation to investigate the efficiency of mask ventilation and the time to tracheal intubation in patients with normal airways.
Materials and Methods: Patients (n = 114) were randomised to receive intravenous rocuronium either before (early rocuronium group, n = 58) or after (late rocuronium group, n = 56) checking mask ventilation. Expiratory tidal volumes were measured at 10, 20, 30, 40, 50, and 60 s after apnea during mask ventilation. We graded the ease of mask ventilation and measured the time from apnea to tracheal intubation. The primary outcome was the average of tidal volumes measured at 10, 20, 30, 40, 50, and 60 s after apnea. The main secondary outcome was the time from apnea to tracheal intubation.
Results and Discussion: The average of mask tidal volumes measured at 10, 20, 30, 40, 50, and 60 s after apnea was larger in the early rocuronium group than in the late rocuronium group [552 (165) ml breath-1 vs 393 (165) ml breath-1, mean difference (95% CI) 160 ml breath-1 (98 to 221 ml breath-1), P < 0.001, unpaired t-test]. Because the interaction between time and group was significant in tidal volumes measured at 10, 20, 30, 40, 50, and 60 s after apnea (P < 0.001, linear mixed effects model), pairwise comparisons were performed at the six time points. The differences in tidal volumes between the groups were significant at 10, 20, 30, 40, and 50 s after apnea (P < 0.001 each, unpaired t-test). The time from apnea to tracheal intubation was shorter in the early rocuronium group than in the late rocuronium group [116 (42) s vs 195 (41) s, mean difference (95% CI) -79 s (-96 to -64 s), P < 0.001].
Conclusions: The early administration of rocuronium before checking mask ventilation resulted in a larger mask tidal volume and earlier tracheal intubation than the late administration of rocuronium after checking mask ventilation in patients with normal airways.
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11AP10-5
The risk factor of postoperative sore throat: Contribution of the intubation devices for nasotracheal intubation.

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Background and the goal of study: Postoperative sore throat is relatively frequent complication after general anesthesia. In the case of difficult airway, anesthesiologists prefer to video laryngoscope or fiberscope for tracheal intubation. We have experienced postoperative sore throat in patients after oral maxillofacial surgery under general anesthesia intubated nasotracheally. However, there are few reports about postoperative sore throat in nasotracheal intubation. In this study, we investigated the risk factors of postoperative sore throat in nasotracheal intubation, retrospectively.
Materials and Method: Anesthesia records of the patients (16-80 yrs) with nasotracheal intubation were checked. Patients underwent oral maxillofacial surgery from February 2015 until September 2018. Patient's background (gender, age, height, weight), airway device, intubator experience, tube size, the intubation time, the number of intubation attempts, postoperative sore throat, anesthesia time, administration of fentanyl and/or remifentanil were investigated. In the univariate analysis, Fisher's exact test and the $\chi 2$ test were used, and a multivariable analysis was performed using stepwise logistic regression to determine the risk factors of postoperative sore throat.
Results and discussion: In this study, 169 cases were investigated, and were divided in the presence or absence of sore throat. 114 patients (67.4%) complained of postoperative sore throat; Sore throat group and Non-sore throat group, respectively. The occurrence of postoperative sore throat was correlated with airway devices; Sore throat group: Mackintosh laryngoscope (n=36), video laryngoscope (n=45) or fiberscope (n=34) vs Non-sore throat group: Mackintosh laryngoscope (n=14), video laryngoscope (n=36) or fiberscope (n=4) (p<0.001). Anesthesia time and duration of intubation were also correlated; Sore throat group: 239.8 ± 115.2 min vs Non-Sore throat group: 227.9 ± 89.6 min (p=0.03), and Sore throat group: 225.2 ± 114.3 min vs Non-Sore throat group: 219.8 ± 95.7 min (p=0.04), respectively. Fiberscope had the strongest influence on the incidence of sore throat (Odds ratio=3.23; 95% CI=0.96-10.85, p<0.001). Advancing the tracheal tube over the fiberscope might give damage around the vocal code, as it is a blind procedure.
Conclusion: Fiberscope is a useful device for nasotracheal intubation, but we have to consider the risk of postoperative sore throat.

11AP10-6
Effect of magnesium sulphate after reversal of rocuronium-induced deep neuromuscular blockade with sugammadex

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Background and Goal of Study: A clinical study has demonstrated that recurrence has occurred with the use of magnesium sulphate after the neuromuscular blockade (NMB) reversal with neostigmine. In addition, there are two case reports of recurrence with magnesium sulphate following reversal of rocuronium induced NMB with sugammadex. The aim of this study was to determine the effect of magnesium sulphate after reversal of rocuronium-induced deep NMB with sugammadex.
Materials and Methods: After approval of the protocol by the Hospital Ethics Committee on Human Rights in Research (Clinical Trials Register NCT 02932254) and obtaining an informed consent from the patients, 30 adult patients, ASA class 1-2, aged 18-65 yr were enrolled in this randomized controlled trial. Patients were randomly distributed electronically into two groups, according to the solution infused: 100 mL solution containing 60 $mg.kg^{-1}$ magnesium sulphate (DM) and 100 mL of saline (DS), intravenously. After anesthetic induction and loss of consciousness, contraction of the adductor pollicis muscle in response to ulnar nerve train-of-four (TOF) stimulation was acceleromyographically quantified using a TOF-Watch SX™, with calibration and signal stabilization. All patients received rocuronium 0.6 $mg.kg^{-1}$ and tracheal intubation was performed after maximum NMB. Anesthesia was maintained with remifentanyl infusion and target controlled infusion of propofol. When two post-tetanic counts were obtained, NMB was antagonized with 4 $mg.kg^{-1}$ sugammadex bolus. The study solution was administered after a TOF>0.9 or more. After infusion of the study solution, TOF <0.9 of the base value was considered clinically relevant. In case of TOF <0.9 beyond 60 min, sugammadex was readministered. Categorical data were compared using Fisher's exact test.
Results and Discussion: We analyzed 28 cases. TOF<0.9 occurred in 9 (DM) and 1 (DS) patients, P <0.0044. Readministration of sugammadex was required in four patients. There was no recurrence of NMB until 24 hours postoperatively. Magnesium acts at the neuromuscular junction and potentiates minimal amounts of rocuronium.
Conclusions: Magnesium sulphate treatment significantly affects the TOF ratio in the reversal with sugammadex of rocuronium-induced deep NMB.
References:
Hans GA, et al. Eur J Anaesthesiol 2012; 29: 95–9.

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11AP10-7
Effect of magnesium sulphate after reversal of rocuronium-induced moderate neuromuscular blockade with sugammadex

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Background and Goal of Study: A clinical study has demonstrated that recurrence has occurred with the use of magnesium sulphate after the neuromuscular blockade (NMB) reversal with neostigmine. In addition, there are two case reports of recurrence with magnesium sulphate following reversal of rocuronium induced NMB with sugammadex. The aim of this study was to determine the effect of magnesium sulphate after reversal of rocuronium-induced moderate NMB with sugammadex.
Materials and Methods: After approval of the protocol by the Hospital Ethics Committee on Human Rights in Research (Clinical Trials Register NCT 02932254) and obtaining an informed consent from the patients, 30 adult patients, ASA class 1-2, aged 18-65 yr were enrolled in this randomized controlled trial. Patients were randomly distributed electronically into two groups, according to the solution infused: 100 mL solution containing 60 mg.kg-1magnesium sulphate (MM) and 100 mL of saline (MS), intravenously. After anesthetic induction and loss of consciousness, contraction of the adductor pollicis muscle in response to ulnar nerve train-of-four (TOF) stimulation was acceleromyographically quantified using a TOF-Watch SX™, with calibration and signal stabilization. All patients received rocuronium 0.6 $mg.kg^{-1}$and tracheal intubation was performed after maximum NMB. Anesthesia was maintained with remifentanyl infusion and target controlled infusion of propofol. When two responses to TOF were achieved, NMB was antagonized with sugammadex 2 $mg.kg^{-1}$ in bolus. The study solution was administered after a TOF>0.9 or more. After infusion of the study solution, TOF <0.9 of the base value was considered clinically relevant. In case of TOF <0.9 beyond 60 min,

sugammadex was readministered. Categorical data were compared using Fisher's exact test.
Results and Discussion: We analyzed 29 cases. TOF<0.9 occurred in 11 (MM) and 0 (MS) patients, P <0.0001. Readministration of sugammadex was required in two patients. There was no recurrence of NMB until 24 hours postoperatively. Magnesium acts at the neuromuscular junction and potentiates minimal amounts of rocuronium.
Conclusions: Magnesium sulphate treatment significantly affects the TOF ratio in the reversal with sugammadex of rocuronium-induced moderate neuromuscular block.
References :
Hans GA, et al. Eur J Anaesthesiol 2012; 29: 95–9.

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11AP10-8
Time taken by novice anaesthetists to perform flexible bronchoscopic orotracheal intubation with and without the Bartlet airway device in a simulated patient

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Background and Goal of Study: Bronchoscopic tracheal intubation is a common method of intubation when there is difficulty. The Bartlet airway is a novel oropharyngeal assist device, developed to aid fibreoptic intubation in anaesthetised patients. It has a different design to other intubation assists, as it has an open channel, a longer tail, and is metal. The aim of this study was to compare the time taken to successful bronchoscopic orotracheal intubation with and without the Bartlet airway, on an AirSim® X Airway manikin.
Materials and Methods: 10 novice anaesthetists with <18 months experience of anaesthesia and no prior experience of fibreoptics were recruited. Participants received a short introduction to scope orientation. Each participant then performed 10 oral fibreoptic intubations on a manikin, 5 with the Bartlet airway and 5 without. Randomisation of the order of intubations for each participant was performed. Time to carina and to ventilation were recorded.
Results and Discussion: There was a significant reduction in median time to carina and time to ventilation between the 1st and 10th intubation (Table 1).
Table 1: Time to carina and ventilation for all intubations

	1st intubation	10th intubation	p =
Median time to carina (secs)	68	17	0.03
Median time to ventilation (secs)	144	35.5	0.001

Overall, there was a greater decrease in time to carina without the Bartlet airway device compared to with the Bartlet airway when comparing the 1st and 5th intubations (42 seconds to 19 seconds, vs. 41 seconds to 13.5 seconds, p value = 0.8). However, there was a greater decrease in time to ventilation with the Bartlet airway (102 seconds to 38 seconds vs 88 seconds to 36 seconds, p value =0.7), indicating the possibility that the Bartlet airway was superior in facilitating tube insertion after practice (Figure 1 & 2). This difference however was not statistically significant.
Conclusions: There was no statistically significant difference in time to visualisation of the carina and time to ventilation in intubations with and without the Bartlet airway device. The improved timing of intubations from the 1st to 10th intubation indicates the success of repetitive practice in the skill acquisition of fibreoptic intubation for novice anaesthetists.

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11AP10-9
Emergency cricothyroidotomy: Are Swiss pocketknives as useful as commercial scalpels? A RCT in a porcine cadaver model.

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Background and Goal of Study: International guidelines feature cricothyroidotomy (CRICO) as life-saving procedure in complete ventilation failure. Commercially available sets facilitate surgical CRICO. The study goal was to evaluate a simple, ubiquitously available field CRICO method. The primary hypothesis postulates that a trained person can perform a CRICO equally fast and successful with a Swiss pocketknife (SP) compared to with a commercially available CRICO set.
Materials and Methods: We compared the ScalpelCric™ set (scalpel, 14-F bougie and tracheal tube; VBM, Germany) with a sharp SP (short blade of Huntsman™, Victorinox, Switzerland together with a pen casing) in this crossover RCT. Pig larynges including trachea covered with 4 mm pigskin served as cadaver model. Residents and attending anaesthesiologists trained in CRICO were included. A short training session in both techniques was provided prior to the study start. Primary outcome was the time necessary until position of either tracheal tube or pen casing in the trachea. Other parameters were success rate, preference of device and self-evaluated competence level before and after training.
Results and Discussion: 30 participants, aged 36±9 years, 37% female participated. The SP was significantly faster and equally successful as the ScalpelCric set (compare table). Self-perceived competence level was lower for SP before the training, and increased after the training session in both groups to comparable values. Cutting the skin and perforation of the cricothyroid membrane was similar effective, however the pen casing caused more tissue damage during introduction compared to the cuffed tracheal tube of the ScalpelCric set. 87% of participants preferred the ScalpelCric set.

	SP n = 30	ScalpelCric n=30	p-value
Success rate n(%)	25(83)	23(77)	0.93
Time sec±SD	19±9	38±15	<0.01
Competence level before NRS 1-10±SD	4.2±1.7	5.3±1.4	<0.01
Competence level after NRS 1-10±SD	6.1±1.8	6.7±1.6	0.06
p-value	<0.01	<0.01	

Conclusion: After short training, sharp Swiss pocketknives performed equally fast and successful as a commercial scalpel CRICO set, but tracheal tubes caused less tissue damage compared to a pen casing.

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11AP10-10
Cases of anesthesia-related aspiration of gastric contents: A retrospective review and take home messages

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Background and Goal of Study: Aspiration of gastric contents is a major cause of anesthesia-related morbidity and mortality. [1] Approximately 10% of respiratory complications leading to death or permanent brain damage are related to aspiration.[2] Moreover, techniques to prevent aspiration have become a focus of growing interest in recent years.[3,4] The aim of the study was to identify the incidence and the characteristics of recent cases of anesthesia-related aspiration of gastric contents within a university hospital.
Materials and Methods: We retrospectively review 1640 medical records from January 2016 to June 2017 in order to identify cases of gastric aspiration during anesthesia management. Patient and case characteristics and mortality outcomes were collected. Data are presented as absolute numbers, percentages and mean values with standard deviations (SD).
Results and Discussion: Forty cases of aspiration were identified.(Table 1) Four (10%) patients died during the same admission. The majority of patients (75%) were designated American Society of Anesthesiologists Physical Status III or higher. Nine (22.5%) patients had one or more predictors of difficult airway on physical exam and only two patients (5%) had a difficult airway during the anesthetic case. Gastroesophageal reflux disease was documented in 25 (62.5%) cases. Locations outside of the operating room accounted for 23 (57.5%) cases of aspiration. Endotracheal tube was the initial airway in 80% cases.
Conclusions: Among cases of intraoperative aspiration, more than half occurred in locations outside of the operating room and nearly three out of four patients who aspirated had a known gastroesophageal reflux disease. Predictors of difficult airway and difficulty with airway management were documented in a minority of cases of aspiration. Efforts should be made to identify predictors of aspiration with the goal of developing practice improvement strategies for our institution.
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Transfusion, Haemostasis and Thrombosis

12AP01-1
Antiapletelet therapy in kidney transplant

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Background and goal of the study: Antiplatelet therapy (APT) is relatively frequent in patients who are candidates for renal transplantation. Decrease of platelet aggregation and inhibition of thrombus formation, increases the risk of bleeding, anemia, blood transfusion and postoperative complications[1].Despite this, it has been safely used during kidney transplantation (KTx)[2].The goal of our study was to describe the effect of APT in bleeding and transfusion in patients who underwent KTx.
Materials and Methods: We retrospectively reviewed all KTx recipients during 2015-17 period who received APT.The variables examined were: antiplatelet drug, pre and postoperative hemoglobin (HB), estimated blood loss according to Nadler´s modified formula, transfusion requirement and number of packed red blood cells. T-test was used to compare HB, blood loss and transfusion requirements between APT and no-APT. Mann-Whitney test was used to compare aspirin (ASA) versus clopidogrel (C), alone or in combination with aspirin (C/C+ASA). Chi-square was used to compare transfusion requirement.
Results: Overall, 292 patients underwent KTx, 155 men (56%) and 137 women (44%), aged 56±14. Main results are shown in table.

	No APT	*APT*	*ASA 100mg*	*C/C+ASA*
Patients number	226	66	54	10
HB, preKTx (g/dL)	11.3	11.2	11	11.6
HB, post-KTx day-1 (g/dL)	9.8	9.7	9.7	9.7
HB, post-KTx day-7 (g/dL)	9.1	8.7*	8.7	8.8
Estimated bleeding (mL)	1.508	1.933*	1.800	2.700
Transfusion (%)	45%	55%	50%	70%
Packed red blood cells(n)	1.3	1.9	1.6	3.4

2 patients receives ASA 300 mg, not included in statistical analysis *p<0.05 APT vs no-APT. Rest of values are statistically non-significant
Conclusions: Patients who underwent KTx under APT treatment had higher blood loss and lower HB at day-7 than those no receiving APT, and a trend to higher transfusion requirements. Clopidogrel treatment, alone or in combination with ASA determines greater bleeding and transfusion than aspirin, although no statically significant, in contrast to previously described findings[2].Further studies are need to confirm our findings
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12AP01-2
Does deep hypothermic cardiac arrest affect platelet function?

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Background and Goal of Study: It is often difficult to stop bleeding during the procedure of aortic arch replacement. This difficulty may be attributable to prolonged cardiopulmonary bypass (CPB) and deep hypothermic cardiac arrest (DHCA), which influence platelet function[1]. To investigate this possibility, we retrospectively allocated patients who had undergone cardiac surgery into two groups according to implementation or not of DHCA and compared platelet numbers and function and volumes of transfusion and bleeding between the groups.
Materials and Methods: We reviewed patients who had undergone cardiac surgery within the previous three years and selected those who had undergone DHCA. We then selected the same number of matching cases who had not undergone DHCA and used propensity matching scores to approximately match durations of CPB. We then compared the platelet counts and function, clot elasticity, fibrinogen, and, bladder temperature on weaning off CPB together with peri-operative transfusion and bleeding. Platelet function was calculated by subtracting the amplitude of FIBTEM from that of EXTEM.[2] A10 denotes the amplitude at 10 min. Clot elasticity (CE) was also calculated using the Solomon et al.'s formula.[3] Statistical analyses were performed using Mann-Whitney U and Student's t-tests.
Results and Discussion: Fifteen of the 72 cardiac surgery patients within the previous three years had undergone DHCA. We identified 15 patients who had not undergone DHCA and used propensity matching to approximately match duration of CPB. As shown in the Table, there were significant differences between the groups in Extem−Fibtem A10, clot elasticity, bladder temperature on weaning off CPB, and significantly greater FFP, PC, and bleeding in the DHCA group. Platelet function and clot elasticity are generally reduced by DHCA.
Conclusions: Our findings indicate that patients undergoing DHCA may have been weaned from CPB at lower a temperature and this may have affected platelet function, such as Extem−Fibtem A10 and clot elasticity.
References :
1□J Trauma 2004;56:1221-28
2□Cardiovascular Anesthesia 2015;19: 49-54
3□Anesth Analg 2015;121:868-78

	DHAC (N=15)	Non DHAC (N=15)	*P*
CPB time (min)	218±56	199±52	0.33
End of CPB			
*Platelet (x10^5/mℓ)	8.2±3.4	11.0±4.0	**0.049***
Fibrinogen (mg/dl)	141±59	171±38	0.11
*ROTEM(Extem-FibtemA10) (mm)	27±7	35±67	**0.005***
*ROTEM(Clot Elasticity)	47±20	76±30	**0.004***
*Bladder temperature (°C)	36.1±0.4	36.5±0.5	**0.037***
Allogenic transfusion (Unit)			
RBC	8 (2-12)	6 (0-6)	0.18
*FFP	8 (0-10)	0 (0-3)	**0.001***
*PC	20 (10-20)	0 (0-0)	**0.0002***
*Bleeding in operating room (mℓ)	1324±999	493±358	**0.012***
Bleeding in ICU(mℓ)	990±149	601±149	0.07
CPB; Cardio-plumonary bypass, RBC; red blood cell, FFP; fresh frozen plasma, PC; platelet concentrate			
	Mean±SD or Median (interquatile) *P<0.05		

12AP01-3
The Impact of Allogeneic Blood Transfusion on Cancer Recurrence after Hepatocellular Carcinoma Resections: a propensity score analysis

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Background: The impact of perioperative allogeneic blood transfusion on cancer recurrence and mortality in hepatocellular carcinoma remains inconclusive.
Materials and Methods: We used a large cohort to assess the effect of perioperative blood transfusion on oncologic outcomes following hepatocellular carcinoma resections. Patients with primary hepatocellular carcinoma without lymph node involvement or distant metastasis undergoing resection surgery at a medical center between 2005 and 2016 were evaluated through September 2018. Postoperative disease-free survival (DFS) and overall survival (OS) were analyzed using proportional hazards regression models with inverse probability of treatment weighting.
Results: A total of 1,469 patients were analyzed with the median follow-up interval of 44.6 months; 447 (30.4%) and 179 (12.2%) of them received 1 to 4 units and > 4 units of packed red blood cells during surgery or within 7 days after surgery, respectively. The weighted Cox regression models showed patients with transfusions of red blood cells have higher risks of cancer recurrence (1-4 units vs. none, adjusted HR: 1.19, 95% CI: 1.06 – 1.33; > 4 units vs. none, adjusted HR: 1.31, 95% CI: 1.12 – 1.54) and all-cause mortality (1-4 units vs. none, adjusted HR: 1.39, 95% CI: 1.14 – 1.69; > 4 units vs. none, adjusted HR: 1.81, 95% CI: 1.42 – 2.30).
Conclusion: A significant dose-response relationship was observed between the amount of perioperative erythrocyte transfusions and the risk of cancer recurrence and death after curative hepatectomies for hepatocellular carcinoma. Patients undergoing cancer surgery should be optimized medically before surgery to minimize intraoperative blood loss and reduce transfusion requirements.

12AP01-4
The possibility of increasing the current maximum volume of platelet apheresis donation

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Background and Goal of Study: We anesthetists have been called the last perioperative bastion for not only the patients under operations but also surgeons. Often enough, we have to decide how much proper volume of blood transfusion and blood products against blood loss during the operation. However, we will face the difficult situation within 10 years. Japan's aging society and its declining birth-rate are threatening to upset the balance of supply and demand of blood products. This is the first large-scale investigation in Japan through the present apheresis donation data which includes 675,406 donors for the possibility of increasing the current maximum volume of platelet apheresis donation (PA, 400ml) up to 600ml which is the current maximum volume of plasmapheresis donation (PP), without changing the maximum number of platelets collected. Increasing the volume of PA would ensure that there is enough source plasma to supply the required plasma derivatives with fewer donors. This study aimed not only to contribute to the stable supply of blood products but also to improve the efficiency of PA.
Materials and Methods: We analyzed PA and PP anonymized data (675,406 donors) according to gender. We focused only on initial side effects, such as vasovagal reaction (VVR) and so on; the incidence of any of these was defined as "side effects 1." Past reports indicate VVR is the most common complication associated with blood donation. Then, we classified the donors with side effect 1 into two categories, VVR and non-VVR. The incidence of each category above was compared using the independence test (by the chi-squared or Fisher's exacts test).
Results and Discussion: Side effects were neither significantly different nor relatively high in donors both aged 30-69 years with weighing 65- <70kg in male apheresis donors and aged 25-54 years with weighing 55-<70kg in female apheresis donors. Past study shows up to 600ml of plasmapheresis can be collected safely depending on the weight. And as the number of platelet would recover within a week, the limiting factor of platelet apheresis is volume of plasma.
Conclusions: It seems there is the possibility that the both maximum volume of male PA aged 30-69 years with weighing 65-<70 kg and female PA aged 25-54 years with weighing 55-<70 kg can be considered to increase as the subject sample on a trial basis. We expect this increase will make the risks of having fewer donors in the future reduced.

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12AP01-5
Lonomia obliqua accident and anesthesia. A case report.

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Background: Lonomia obliqua is a specie of caterpillar that lives most commonly in the south region of Brazil. This caterpillar is also called the fire insect because of the hair that cover all the body is full of a toxic venom. The venom causes disseminated intravascular coagulation and a consumptive coagulopathy, which can lead to a hemorrhagic syndrome. It contains toxins with procoagulant, anticoagulant and antithrombotic activities, affecting also the endothelium.
Case report: A 45-years-old male entered the emergency room with extreme pain and edema in the ankle and left calf. He had no history of trauma, was previously healthy, and his symptoms started slowly two days ago. The patient had no foot pulse and the orthopedist made the compartment syndrome diagnosis and brought the patient to the operation room for a fasciotomy. Staff anesthesiology did not know the lonomia accident and made a 27 gauge pencan raquianesthesia with 13 mg heavy bupivacaine and 100 mcg morphine. The surgery did well and the blood flow returned the foot. Six hours after the surgery the patient was gratefully full recovered from anesthesia, but started with extreme blood loss in the leg wound. Blood samples showed 9.3 RNI, 130 000 platelets and 4.3 creatinine. Neurological examination was performed every 6 hours without alterations. He had no urination since he was admitted to the hospital. The patient did not remember anything different from his routine to justify such clinic. In the ICU, the coagulopathy got worse, despite transfusion and antifibrinolytic treatment. After a long inquisition, they discovered that he worked with wood (the place that the caterpillar lives) and started Lonomia antivenom. He got better, the bleeding stopped and all his exams got normal in 36 hours.
Discussion: Lonomic accident is very dangerous and can lead to disseminated intravascular coagulation. Neuroaxial block is contraindicated in these patients. If a patient came from this endemic region and starts with spontaneous bleeding is always important to remember that this accident might have happened before anesthesia.
References:
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12AP02-1
Effectiveness of prophylactic treatment with tranexamic acid in patients undergoing Transurethral resection for benign prostatic hyperplasia. A meta-analysis and trial sequential analysis

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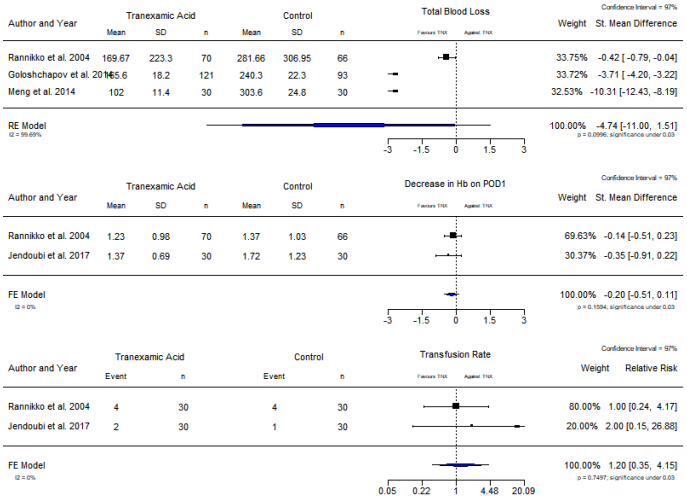
Background and Goal of Study: Tranexamic acid is an indirect antifibrinolytic agent used from treating bleeding patients to the prophylactic usage for procedures with risk of bleeding. The objective of this study was to review the effectiveness of prophylactic treatment with tranexamic acid in patients undergoing TURP for benign prostatic hyperplasia.
Materials and Methods: We searched Embase and PubMed to August 2018 for studies published in any language. We included randomized clinical trials of tranexamic acid versus placebo or no intervention to prevent intraoperative bleeding in patients undergoing TURP for benign prostatic hyperplasia. The primary outcome was the intraoperative bleeding volume. Secondary outcomes were transfusion rate, perioperative hemoglobin difference, surgical time and length of stay. We used trial sequential analysis (TSA) to determine the statistical significance of differences in outcome between tranexamic acid or not, which adjusts the size of difference required to reach statistical significance with the addition of each trial, thereby controlling the false discovery rate.
Results and Discussion: We included 5 randomized controlled trials with a total of 480 participants. Tranexamic acid did not reduce total blood loss or other outcomes at the adjusted p value of 0.03. The trial sequential analysis confirmed that the pooled data had insufficient power. No studies reported thrombotic events.



Conclusions: our systematic review has found no significant differences between tranexamic acid and non-tranexamic acid for the prophylactic use in patients undergoing TURP, but the TSA noted that this lack of evidence was due to a lack of sample size.

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12AP02-2
Effect and safety of antifibrinolytic in oncologic surgery: a meta-analysis and systematic review

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Background: The administration of antifibrinolytics has been shown to be effective in reducing blood loss and the need for transfusions in surgeries such as orthopedic, cardiac, urologic, liver transplantation, among other procedures. However, its efficacy and safety in oncologic surgeries remain uncertain. The objective was to review the existing literature with an interest in the efficacy and safety of the treatment with antifibrinolytics in patients who underwent oncologic surgeries.
Materials and Methods: An electronic bibliographic research was conducted in PubMed, OVID, MEDLINE, EMBASE, EBSCO and in the Cochrane Library data basis in order to identify randomized clinical trials performed in any type of oncologic surgery. The data evaluated were blood loss, need for transfusion and incidence of arteriovenous thromboembolism.
Results and Discussion: Five randomized controlled trials (RCTs) evaluating 838 patients met the inclusion requirements. In the analysis of the incidence of thromboembolic events in the five RCTs, there was no statistically significant difference between the administration of tranexamic acid when compared with the placebo (RR = -0.76. IC 95%: -1.81; 0.29, p=0.9779; I2 = 0%). However, when analyzed for total estimated blood loss, the use of tranexamic acid was associated with a significant reduction over placebo (DM: -148.29, 95% CI: -190.52, -106.05, p = 0.0198, I2 = 65.8%). In the RCT of Celebi 2006, tranexamic acid was able to significantly reduce the total blood loss in relation to colloid (DM: -120, 95% CI: -140.43, -99.57, p <0.0001) and to the epsilon aminocaproic acid (DM: -85, 95% CI: -106.54, -63.46, p <0.0001), respectively. In the same RCT epsilon aminocaproic acid was also associated with a significant reduction of total blood loss when compared to the placebo (DM: -50, 95% CI: -71.74, -28.26, p <0.0001), and colloid (DM: -35, 95% CI: -55.43, -14.5, p <0.0008), respectively. However, the need for blood transfusion, analyzed in four RCTs, tranexamic acid did not differ significantly when compared to the placebo (RR = -0.72, 95% CI: -1.36, -0.08, p = 0.077, I2 = 56.17%).
Conclusions: This meta-analysis found no evidence that the administration of antifibrinolytics increases the risk of thromboembolic complications in patients submitted to oncologic surgery, and has shown evidence that it is effective in reducing total perioperative blood loss.

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12AP02-3
Does the timing of tranexamic acid administration really matter in reducing perioperative bleeding? Final results of a randomized clinical trial in total knee arthroplasty.

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Background and Goal of Study: The efficacy and safety of tranexamic acid (TXA) in reducing blood loss and transfusion have been demonstrated for decades[1] but it remains unclear the best moment for its administration in total knee arthroplasty (TKA) with tourniquet. The goal of this study is to clarify if the perioperative bleeding in TKA is modified by the time of TXA administration (at ischemia induction or before tourniquet release).
Materials and Methods: A prospective, double-blind, placebo-controlled clinical trial (EudraCT 2016-000071-24) on 176 consecutive adult patients scheduled for unilateral TKA was conducted in Hospital del Mar (April 2016- May 2018). Patients were randomized in two groups: Group 1 (TXA 20 minutes before ischemia) and Group 2 (TXA 20 minutes before tourniquet release). Blood loss was measured as haemoglobin (Hb) at 24h and at discharge, visible drain blood loss (ml), calculated blood loss (ml) and transfusion. t-Student and Chi2 were used as statistic tests for continuous and quantitative variables Statistical significance was p<0.05.
Results and Discussion: Both groups are comparable in gender, weight, age, ASA, preoperative Hb and length of surgery. Results are shown in the table:

	Group 1 (n=85)	Group 2 (n=91)	p
Basal Hb (g/dL)	14.2±1.1	14.0±1.3	0.5
Hb 24h (g/dL)	11.7±1.2	11.7±1.3	0.8
Hb discharge (g/dL)	10.6±1.0	10.5±1.3	0.6
Visible blood loss (ml)	182.6±147.4	219.8±132.8	0.1
Calculated blood loss (ml)	1563±494.5	1632±542	0.5

Data: mean±standard deviation, proportions and numbers. Calculated blood loss includes preoperative Hb, 4th day after-surgery Hb and anthropometric parameters of the patient. No statistically significance was found in visible/calculated blood loss, 24h after-surgery and at discharge Hb nor transfusion. Due to Patient Blood Management Programme transfusion is unusual.
Conclusion: A clinical impact was not found according to the main studied variables. It appears that both moments of TXA administration are equally valid to reduce perioperative bleeding, without statistical significant differences.
References:
1. Kim C., et al. J Blood Med,2015
Acknowledgements: TXA use in TKA is effective regardless its moment of administration.

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12AP02-4
Post-operative bleeding and blood transfusion rate after unilateral primary total knee arthroplasty: the role of intra-articular tranexamic acid administration.

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Background and Goal of Study: To study the efficacy on the reduction of postoperative bleeding and safety of intra-articular tranexamic acid (ATX) in unilateral primary total knee arthroplasty (TKA).
Materials and Methods: A retrospective study comparing patients undergoing unilateral primary TKA in our hospital between May and November 2015 in those we didn´t use any therapeutical intervention comparable with de ATX, versus those submitted to the same procedure in the period from May 2016 to January 2017 with administration of intraarticular ATX. A total of 95 patients are included, 46 in the no ATX group and 49 in the ATX group.
Results and Discussion: There were no statistically significant differences regarding age and sex between groups. Statistically significant differences were observed in the comparison of the lowest post-operative hemoglobine (Hb) (9.8g/dl vs 12.2g/dl, p <0.001) as well as comparing the difference between pre-operative Hb vs post-operative Hb (4g/dl, To 2.8g/dl, p <0.001). There were also differences with statistical significance when comparing the transfusion rate (23.9% n = 11 versus 2% n = 1, p 0.001).
Conclusions: Based on these results, the intra-articular administration in the TKA of 1gr of ATX once closed the wound and later clampaje of the drainage during 20 minutes has supposed a 12-fold reduction in the transfusion rate and 30% in the decrease of post-operative Hb vs the no ATX group with no significant side effects.
References:
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12AP02-5
Can MSBOS protocol optimize blood product use-our experience.

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Background and Goal of Study: Maximum surgical blood ordering schedule (MSBOS) is a scheduled list of a number of units of blood to be cross-matched for different elective surgical procedures. Friedman et al. proposed the concept of MSBOS early in 1976. With increasing number of surgical procedures worldwide and reduced pool of potential donors the concept of MSBOS has been revisited in a number of studies. The advantages of MSBOS are: reduction in unnecessary blood preparation and wastage, better availability of blood products for emergencies, reduction in blood bank workload and reduction in cost for unnecessary cross-match. As head and neck surgery has numerous different surgical procedures in rich vascular supply region and bleeding risk, we wanted to recheck our institutional MSBOS protocol introduced in 2015.
Materials and Methods: Total number of surgical procedures at the Department of ENT and Head and Neck Surgery at the UHC Zagreb were included from 2013 till 30.11.2018., with special recheck for the predetermined bloody procedures according to local experience. Blood bank was asked to check for the total preordered red packs, number of transfused packs and C/T ratio was calculated for each year separately. Trend in C/T ration in years before and after MSBOS protocol were compared.
Results and Discussion: In the years preceding MSBOS cross matched red packs were preordered for every surgery with bleeding risk according to anesthesiology in charge (almost 1:1 Ratio). After introduction of MSBOS protocol in 2015. things changed. Details are in Figure1.
Conclusions: According to our results MSBOS can optimize blood product use and reduce costs, but it is a LIVE process and needs periodical reviews and modifications according to local settings.

UHC Zagreb,

	2013		2014		2015		2016		2017		2018 (I-XI)	
	N	%	N	%	N	%	N	%	N	%	N	%
Total number of operations	2622		2570		2832		2951		2843		2387	
Operations with bleeding risk	296		298		314		392		456		419	
Ordered Red packs	246	100	229	100	139	100	107	100	158	100	134	100
Out of blood bank	76	30,89	56	24,45	70	50,36	37	34,58	75	47,47	61	45,52
Transfused	66	26,83	43	18,78	60	43,16	33	30,84	66	41,77	56	41,79
C/T ratio*	3,73		5,32		2,32		3.24		2,39		2,39	
Price (kn)**	18.450,00 (180 IRR)#102.5 kn		19.065,00 (186 IRR) #102.5 kn		22.151,81 (79 IRR)#280.4 kn		18,797.48 (74 IRR)#254.02 kn		23,369.84 (92 IRR)*254.02 kn		19.813,56 (78 IRR)*254.02 kn	
No of T&S			7		16		13		4		9	

MSBOS ; * C/T ratio = Number of units cross-matched/number of units transfused, our aim <2,5;
** Price of pretransfusion testing for unused blood

12AP02-6
Tranexamic acid for haemostasis in breast cancer surgery

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Background and Goal of study: Complications after breast cancer surgery include haematoma, surgical wound infection, nerve lesions, etc.[1] In the last four years, some of our patients suffered haematoma after mastectomy, thus taking them to re-intervention. Antifibrinolytic drugs had shown their efficacy by reducing bleeding in orthopaedic surgery[2]. The objective was to asses tranexamic acid (TXA) as prophylaxis of haematoma after mastectomy.
Materials and Methods: Patients who underwent breast cancer surgery between 2014 and 2018 in our centre were analysed, but only mastectomies (n=139) were selected. Patients were divided in 2 groups: patients who had haematoma (H) and patients who had no haematoma (NH). We mainly analysed if they received TXA or not. TXA was administered during surgery and 3 hours after. The dosage was 10 mg/kg, with 1 gram as maximal dose. We also reviewed if surgeon performed lymphadenectomy and prosthetic implants at the same surgical time, thinking about mechanical factors. Chi-square and Fisher's test were used to compare discrete variables and ANOVA test to compare continuous variables with R studio v.1.1.463.
Results and Discussion: All the patients were women with similar demographic conditions as shown on Table 1. None of them had coagulopathy and blood tests were normal. Intraoperative haemostasis was made by the surgeon as usual. The 8% of the patients got complicated with haematoma (n=12). The 83% of them didn't receive TXA (n=10). Statistical differences between the use of tranexamic acid and incidence of haematoma were founded (Odds ratio = 0.1, IC 95% (0.01-0.5), p=0.001). Lymphadenectomy (p=0.06) and prosthetic implants (p=1) didn't show statistical differences.
Conclusion: It seems that the administration of TXA is a protective factor for haematoma after mastectomy. So, we recommend TXA as a prophylactic measure in order to avoid this complication.
References:
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12AP02-7
When platelets transfusion in liver transplantation is needed?

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Background and Goal of Study: Blood platelets are of critical importance in the first step of normal haemostasis. In patients with severe liver disease and during liver transplantation, multiple changes in haemostasis occur. Changes in platelet count and function may increase blood loss. The aim of study is to indefinite trigger for platelets transfusion in liver transplantation surgery
Materials and Methods: We studied 108 cases of liver transplantations between 2012 and 2018 in our Centre. We studied platelets count (PLT), thrombelastography (MA; K; R; α angle; LY30), activated partial prothrombine time (APPT), international normalized ratio (INR), fibrinogen A (FGA), platelets transfused perioperatively, bleed during and after surgery, ICU stay and in-hospital stay duration.
Results and Discussion: We find 6 of patients (5.55%) who had PLT. These patients had moderate or severe thrombocytopenia prior surgery 48.3±26.7 $\times 10^9$/l (40-70). Mean MELD score was 26.4±3.9. Rationale for PLT transfusion was perioperative active bleeding. In 1 patient PLT were transfused intraoperatively. 6 patients received PLT transfusion after surgery.

	Prior transfusion	Post transfusion
PLT ($\times 10^9$/l)	42.3±39.6	65.2±39.3
MA (mm)	18.3±4.4	35.7±9.1
R (min)	8.1±2.3	7.5±1.9
K (min)	6.6±3.6	5.3±2.4
Alpha angle (deg)	48.2±16.9	50.4±11.7
APPT (sec)	77.2±24.9	41.5±17.2
PI (%)	40.8±15.4	48.6±9.7
INR	2.9±0.8	2.5±0.7
FGA (g/l)	1.5±1.7	2.3±1.5

Mean blood loss prior to transfusion was 1102.4±289.7 ml. Mean volume of transfused PLT was 257.3±87.1 ml. Mean duration of ICU stay was 16.5±3.4 days. Mean in-hospital stay was 24.7±12.4 days. One patient has died due to multiorgan failure associated with massive bleeding and hemorrhagic shock.
Conclusion: Platelets transfusion may require in high MELD-score (26.4±3.9) patients underwent liver transplantation when thrombocytopenia 42.3 $\times 10^9$/l associated with low MA 18.3 mm and active bleeding.

12AP02-8
Correlation between fibrinogen and D-dimer levels with low-frequency piezoelectric thromboelastography (LPTEG) data in patients with confirmed prostate cancer.

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Background and Goal of Study: Prostate cancer is one of the most common malignant tumors in men, it ratio increases greatly after age of 65. Studies had proved that patients with prostate cancer have significantly higher D-dimer level with normal fibrinogen data(1). The aim of this study is to establish correlation between fibrinogen and D-dimer levels and LPTEG data in preoperative settings.
Materials and Methods: Participants were ≥70 y.o., underwent transrectal ultrasound guided prostate biopsy from October 2017 till October 2018. Plasma prostate specific antigen (PSA), D-dimer, fibrinogen levels and LPTEG data were collected before the procedures. The patients (n=79) were divided into two groups according to the tests results. Group A (n=49) was represented by the patients with benign prostate hyperplasia; group B (n=30) was represented by the patients with clinical, histological and laboratory confirmed prostate cancer.
Results and Discussion: In group A fibrinogen and D-dimer levels were 305.49 ± 71.03 mg/dl and 0.39 ± 0.19 μg/ml; in group B fibrinogen and D-dimer levels were 321.02 ± 58.32 mg/dl and 2.01 ± 1.54 μg/ml. As shown, plasma D-dimer level was higher in patients with prostate cancer. Blood coagulation constants checked by LPTEG were: Intensity of contact coagulation (ICC), Intensity of coagulation drive (ICD), clot maximum density (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRCL). We received slight increase of all measurements in group A: ICC by 13.13 ± 8.56%, ICD by 22.43 ± 10.93%, MA by 44.11 ± 19.31%, IRCL by 61.18 ± 31.18% above the norm; in group B - moderate increase in all the measurements: ICC by 25.32 ± 10.26%, ICD by 42.11 ± 19.14%, MA by 78.39 ± 24.53%, IRCL by 98.56 ± 46.21% above the norm. After statistical analysis we received strong overall correlation (r = 0.9894, rho= 0.996) between fibrinogen and D-dimer levels with corresponding LPTEG data (p <0.00001).
Conclusions: The present study demonstrated that LPTEG have high utility for preoperative coagulation disorders evaluation in patients with prostate cancer and correlates with fibrinogen and D-dimer levels in corresponding points. Further studies are needed to establish correlation of LPTEG data in perioperative settings.
References:
1. Çalışkan S, Sungur M. Fibrinogen and D-dimer levels in prostate cancer: Preliminary results. Prostate Int. 2017 Sep;5(3):110–2.

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12AP02-9
"Risk factors of transfusion in femur fracture. Prospective observational study"

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Background & Goals: Femur fracture in the elderly population is a prevalent pathology with a high morbidity and mortality. According to our reports transfusion is related to higher mortality 30 days after surgery and during the first year. The aim of this study is to describe the evolution of hemoglobin and perioperative transfusion needs and to identify transfusion risk factors.
Material & Method: A prospective unicentric observational study including consecutive patients over the age of 65 with the diagnosis of femur fracture and indication of surgical treatment was carried out. The study was approved by the local Ethics Committee and informed consent was requested from the participants. The main variables analyzed were: demographic and anthropometric data, type of fracture (intra VS extra-articular), haemoglobin evolution until 4th postoperative day estimated bleeding, use of tranexamic acid, chronic treatment with anticoagulants and antiplatelet agents and delay of the surgery (hours).
Results: Eighty-eight patients were included in the study. Were predominantly women (77.27%) 78 years old on average, mean BMI 26.28, , mean haemoglobin on admission 12.08 gr/dL and preoperative 11.17 g / dl, mean bleeding 1568ml and mean dalay of surgery 43. 21% were on chronic treatment with oral anticoagulants, and 10% clopidogrel. Preoperative tranexamic was administered in 39%. Of the total fractures, 53.41% were extracapsular VS 46.59% intracapsulard. The total percentage of transfusions was 44.32%.

Variable	*Univariable analysis*			*Multivariable analysis*		
	Odds ratio	95% CI	P-value	Odds ratio	95% CI	P-value
IMC	1.0311	[0.9402-1.1308]	0.514			0.716
Bleeding	1.0006	[1.0001-]	<0.01	1.0008	[1.0002-1.0015]	0.007
Hb						
Admission	0.503	[0.349-0.726]	<0.01	0.9644	[0.5099-1.8240]	0.091
Preaperative	0.3048	[0.1832-0.5072]	<0.01	0.2574	[0.1138-0.5824]	0.001
Type of fracture	0.375	[0.156-0.898]	0.028			
Intra-articular				1.3976	[0.305-6.4982]	0.669
Extra-articular				1		
Tranexamic	0.7466	[0.3143-1.7732]	0.508	0.4672	[0.1000-2.1825]	0.333
Anticoagulants			<0.01	3.9399	[0.6164-25.1821]	0.147
Antiplatelet agents			0.994	0.5164	[0.0527-5.0572]	0.570
Delay of surgery	1.021	[1.005-1.037]	<0.01	1.0118	[324.96-7.55e+08]	0.383

Conclusion: Our effort has to be oriented to reduce and prevent anaemia: early therapy with iv iron and tranexamic acid during surgery. More studies are needed in order to validate other therapies such as recombinant erythropoietin or tranexamic acid on admission. Multivariable analysis does not prove statistical relation between delay time in surgery treatment and transfusion. Despite that, it has to be taken in consideration because of the implications in morbi-mortality described in other studies.

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12AP02-10
Validation of hemostatic impairment induced by hydroxyethyl starch (HES) in vivo

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Background and Goal of Study: Past studies suggest that HES may inhibit blood coagulation. However, resolution by α-amylase or the possibility of ´effective´ dilution was not considered at the same time. We hypothesized that HES has a coagulation inhibitory effect exceeding dilution effect *in vivo* by adherance to the vascular endothelium and damage to glycocalyx.
Materials and Methods: We performed hemodilution in 3 groups of 16 rats by physiological saline (PS), 6%HES130 in PS and 10%HES200 in PS with continuous monitoring of blood pressure, avoiding shock. Three blood samples were collected from each rat when the hematocrit was 26-30%. Activated clotting time (ACT), clot rate (CR), and value of platelet function (PF) were recorded. The amount of factor X, heparan sulfate proteoglycan (HSPG), syndecan 1 (SDC1), thrombomodulin (TM) from plasma and GPIIb/IIIa from homogenized platelet cells were assayed by ELISA. We also investigated the endothelial effect when the fluorescein isothiocyanate (FITC)-HES130 and the FITC-HES200 were infused in the isolated aorta. Statistical analysis was performed using the Kruskal-Wallis H-test followed by the Newman-Keuls-type test for multiple comparisons. P values < 0.05 were considered statistically significant.
Results and Discussion: CR was significantly reduced by the larger molecular weight HES despite equal dilution (Fig. 1A). PF was relatively high in the HES groups (Fig. 1A). Factor X was reduced by HES200 (Fig. 1B), but there was no significant difference in GPIIb/IIIa and HSPG (Fig. 1B) . SDC1 and TM were low in the HES200 (Fig. 1B). HES molecules (Fig. 2). HES adhered to the endothelium (Fig. 2).
Conclusions: Larger molecular weight HES can impair coagulation exceeding the dilution effect, but it can promote platelet function. HES adheres to the endothelium but protcets glycocalyx rather than sheds.

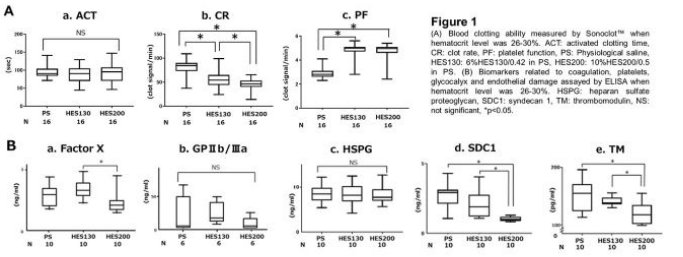

Figure 1
(A) Blood clotting ability measured by Sonoclot™ when hematocrit level was 26-30%. ACT: activated clotting time, CR: clot rate, PF: platelet function, PS: Physiological saline, HES130: 6%HES130/0.42 in PS, HES200: 10%HES200/0.5 in PS. (B) Biomarkers related to coagulation, platelets, glycocalyx and endothelial damage assayed by ELISA when hematocrit level was 26-30%. HSPG: heparan sulfate proteoglycan, SDC1: syndecan 1, TM: thrombomodulin, NS: not significant, *p<0.05.

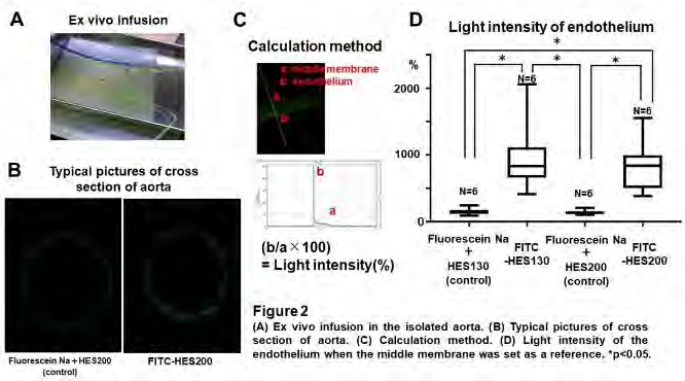

Figure 2
(A) Ex vivo infusion in the isolated aorta. (B) Typical pictures of cross section of aorta. (C) Calculation method. (D) Light intensity of the endothelium when the middle membrane was set as a reference. *p<0.05.

12AP03-1
Perioperative coagulation changes for adults live donor liver transplant recipients with genetic compared to acquired predisposition to thrombophilia. A multicenter clinical trial

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Background and Goal of Study: Genetic and acquired thrombophilia can lead to thromboembolic events. To assess Rotational thromboelastometry, (ROTEM) and conventional coagulation tests (CCT) among transplant recipients with thrombophilia.
Materials and Methods: Multicenter clinical diagnostic test accuracy trial (PACTR201712002847839). 113 screened preoperatively. Inherited thrombophilia: abnormal Factor V Leiden mutation and/or increased homocystein IgG/IgM. Acquired thrombophilia: three of following low protein C and/or low protein S, low antithrombin III, increased anticardiolipin, increase lupus anticoagulant. ROTEM and CCT perioperative and on postoperative days 1, 3 and 7. Blood transfusion guided by ROTEM. Postoperative IV Heparin 3 days (60-180 U/kg/day) followed by low molecular weight heparin (20 mg/12 h).
Results and Discussion: Only 48 recipients analyzed. 23 with inherited thrombophilia and 25 with Acquired thrombophilia. Demographics, preoperative CCT-ROTEM and MELD scores (<20) were comparable, (p>.05). Vascular thrombosis incidence were comparable in Inherited vs Acquired (3/23 (13.04%) vs 8/25 (32.0%), p=0.119). 3 month survival rate were not different with Inherited (14/23 (60.9%) vs Acquired 19/25(76%), p=0.259)), but a higher mortality rate with graft vascular thrombosis (8/11 (72.7%) compared to others without 7/31 (22.6%), p=.004). FIBTEM MCF on POD 7 were significantly higher with thrombosis (total 11/48) vs. those without (n=37/48). (27[24-32] vs 15[9-23] mm p=.003), despite normal and comparable blood fibrinogen levels (142.50 [123.00-271.00] vs. 150 [123.00-193.00], mg/dl, p>.05, respectively. FIBTEM MCF on POD 7 was found to be a significant discriminator for thrombosis with an area under the ROC curve (AUC) = 0.790 (95% CI 0.648 to 0.894) (Z=4.065, p<0.0001). The diagnostic criterion (Youden index) is >18 mm, with a sensitivity of 90.91% and specificity of 67.57%. Positive predictive value of 45.5% and negative predictive value of 100.0%. A Negligible correlation existed between ROTEM and CCT (tau=0.03, p<0.05).
Conclusions: The incidence of thrombosis and survival were comparable whether thrombophilia is of genetic or acquired origin, but the mortality risk increases with thrombosis. FIBTEM MCF was able to discriminate vascular thrombosis among thrombophilic recipients, but needs to be tested further as a predictor with in a larger population.

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12AP03-2
Clinical significant FXIII deficiency in Von Willebrand Disease type 3 with Factor VIII inhibitors

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Background: Persistent or uncontrolled bleeding is a life-threatening condition. Transfusion algorithms are often empirical. Bed-side testing using rotational thromboelastometry (ROTEM) could help to find the cause of excessive perioperative bleeding disorders. Factor XIII (FXIII) is a plasma clotting protein involved in clot stabilization. Its deficiency may cause fatal bleeding. Routine coagulation assays may be normal and only specific FXIII assays will detect the abnormality. This case report discusses a massive bleeding in order to highlight the clinical challenges associated with establishing the diagnosis and treatment approach to this coagulation factor.
Case Report: A 19-year-old female with Von Willebrand Disease (VWD) type 3 with factor VIII (FVIII) inhibitors, ASA 2E, was submitted to an ovarian cyst rupture laparoscopic excision under general anesthesia. The patient was admitted in hemorrhagic shock. Estimated blood losses during the surgery were 1500ml. Transfusional support was guided by thromboelastography. Red blood cells, platelets, fresh frozen plasma, fibrinogen and tranexamic acid were given. rFVIIa was administered, finally resulting in the normalization of the hemogram and ROTEM. In the postoperative period, despite normal results in coagulation tests and ROTEM, the patient showed active bleeding again. A specific FXIII assay revealed a marked reduction in FXIII levels (26%). The patient stopped bleeding after reposition of this factor.
Discussion: VWD is the most common human inherited bleeding disorder with type 3 being its most severe type. This patients can produce FVIII inhibitors. ROTEM doesn't detect primary hemostasis disorders, but was an important instrument in the management of these patient with consumption coagulopathy in the context of massive bleeding and inhibitors production. Acquired FXIII deficiencies can occur after large volume transfusions or be caused by coagulopathies and should not be dismissed, since they may be undetectable by ROTEM. This case shows that FXIII low levels can be clinically relevant for the patient's hemostasis.
Learning points: Hemorrhagic diseases like VWD type 3 with FVIII inhibitors make the approach to hemorrhagic emergencies more challenging. In perioperative hemorrhage with normal coagulation tests and ROTEM, it's important to monitor FXIII levels. FXIII low levels can be clinically significant in perioperative patients.

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12AP03-3
Disturbances of Coagulation Factors and Platelets in Patients Undergoing Major Liver Resection

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Background and Goal of Study: Conventional blood clotting tests such as PT, INR appear to indicate hypocoagulability after major liver resections. Overall, however, the disturbance of the balance between pro-coagulants and anticoagulants appears to shift to a potentially pro-thrombotic condition. [1] We evaluated the serial changes of conventional coagulation factor levels and platelet function over time in patients undergoing major liver resection. The protein C/factor VIII ratio was also calculated as a surrogate marker of anticoagulant and procoagulant balance. [1]
Materials and Methods: Appropriate for the study were patients with primary or secondary liver neoplasm with no evidence of cirrhosis who have met who the criteria for major liver resection. The percentage activity of the pro-coagulant and anti-coagulant factors (II, V, VII, VIII, IX, X, vWF, D-Dimers, Fibrinogen) (Pr: C, S, ATIII) were calculated preoperatively and on postoperative day 1 (POD1), 5 (POD5) and 10 (POD10) after surgery. The platelet aggregation was also studied after activation with ADP (20μM) and arachidonic acid (AA) (500μM) in platelet rich plasma (PRP) at the same time.
Results and Discussion: In total, 15 patients, 67 ± 12 years of age, 10 men and 5 women, were included in study. Levels of pro-coagulant factors (II, V, VII, X) decreased significantly on the POD1. Factors II, V and X returned to normal range on POD5, while on the POD10, factor V exceeded preoperative values (Figure 1). Factor VIII was above normal values at baseline and continued to be on the POD10(Figure 2). Anticoagulant proteins C and S significantly decreased on POD1 and returned to normal levels on POD5 (Figure 1). Furthermore, platelet count reduction was observed on POD1, but ADP and AA-induced platelet aggregation does not appear to change significantly at different time points. The ratio of the anticoagulant protein C to the procoagulant factor VIII was lowest on POD1, remained low on POD5 and approached the baseline values on POD10. This ratio was low in patients with an INR ≥ 1.2,(Figure 2).
Conclusions: After major liver resection, there appears to be a dynamic dysfunction of the pro-coagulant and anti-coagulant factors of blood coagulation. Platelet count and function does not change significantly.
References:
Mallett, S. V. et al. Alterations in coagulation following major liver resection. Anaesthesia 71, 657–668 (2016).

12AP03-4
Isolated factor V deficiency in polytraumatized patient after thromboelastometry-guided coagulation management - a case report.

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Background: Acquired factor V (FV) deficiency is suspected to be an important driver of trauma induced coagulopathy. In congenital FV deficiency, severity of bleeding poorly correlates with the plasma FV level. Physiologic effect of FV is an increase in thrombin building and can be detected by thromboelastometry (TEM) clotting time (CT).
Case report: We present a case of polytraumatized 65-year-old male patient with high grade liver injury who remained FV deficient despite adequate TEM - guided resuscitation. Previously healthy patient presented to our emergency department after traffic accident in a state of decompensated hypovolemic shock. CT scan showed numerous injuries, including grade IV liver injury. Patient was rushed to the operating theatre for damage-control surgery with liver packing and drainage. 10 hours later, due to persistent bleeding, he underwent resection of liver segments VI and VII. Postoperative management was complicated with haemodynamic instability, loss of liver and renal function and severe coagulopathy. He continued bleeding on surgical drains despite TEM - guided repletion of coagulation factors (CF). Control laboratory and TEM tests demonstrated satisfactory correction of all CF, except for extremely low levels of FV. The only aberrant TEM reading was slightly prolonged CT in INTEM and EXTEM. The cause of FV deficiency was unexpected and not explained. Despite our resuscitation efforts, the patient died of multiorgan failure within 50 hours of admission.
Discussion: The question remains of why the patient was exclusively FV deficient after correction of other CF. FV concentrates are not currently commercially available. Patient was resuscitated with both FFP and PCC. Was our dose of PCC, which does not contain FV, disproportionate to that of FFP and patient's needs? Did patient have previously undiagnosed congenital FV deficiency which became apparent after major trauma? Even so, were low plasmatic FV levels relevant for his final outcome, since the severity of bleeding is only partly related to the degree of FV plasma levels?
References:
1. Haas T, Cushing MM, Asmis LM (2014). Influence of Factor V Deficiency on ROTEM® Clotting Time. Blood, 124(21), 5039.
Learning points: In substituting CF deficiencies, one must keep in mind PCC-s specific content, and not disregard the role of FFP. The role of decreased FV in trauma-induced liver injury is unclear and requires further investigation.

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12AP03-5
Severe thrombocytopaenia in Epstein Syndrome – is it just a low count?

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Background: Epstein syndrome (ES) is one of the MYH9 related diseases, a group of autosomal dominant disorders with estimated prevalence of 1-9/1000000. Macrothrombocytopaenia is present in all affected individuals varying between $3x10^9$/L and above $150x10^9$/L. As platelets play a pivot role in haemostasis, we correlate bleeding risk with their count, ignoring that automated cell counters recognize platelets by their size. Giant platelets in ES are classified as erythrocytes underestimating it`s count to 10-fold than those measured in a counting chamber. Rare high-quality data approaching safe platelet count (PC) and shape for every surgery is available, but we know that a low PC is associated with bleeding and macrocytosis is per se associated with an increased risk of thrombosis, challenging the perioperative approach in terms of thromboembolism and haemorrhage prevention. Our case points out the anaesthetic management of a patient with ES, a disease characterized by macrothrombocytopaenia, renal failure and hearing loss.
Case Report: 72y male, ASA III, with ES with persistent very low PC, proposed for vitrectomy. Pre-op hemogram showed a $5x10^9$/L PC, with microscopic evaluation estimating it in $25x10^9$/L. Patient already had been under desmopressin and corticoid therapy without success, so transfusion of 3 platelet pools was performed 1 hour before surgery to achieve a $100x10^9$/L PC, recommended for this procedure. General anaesthesia was administered and compression stocks were used perioperatively. No record of uncontrolled bleeding nor thrombotic episodes.
Discussion: A microscopic PC was key to assess patients' bleeding risk. Although no study approached the safe PC for surgery in ES, we guided our transfusion protocol by general recommendations, without complications. We considered that patient´s low Caprini risk score underestimated thrombotic risk upon ES macrocytosis. Considering the catastrophic outcome of a bleeding event *vs* thrombosis we decided to preclude enoxaparin and apply only mechanic measures.
Learning points: ES patients challenge our practice as they present with both high bleeding and thrombotic risk. As one cannot rely on usual tests, microscopic PC is mandatory to assess bleeding risk. Platelet transfusion practices targeting general population recommendations and non-pharmacological thromboprophylaxis in an otherwise low risk patient lead to a good outcome. Guidelines regarding platelet transfusion in this kind of disorders are lacking.

12AP03-6
Type III asystole, new liver donor profile. Impact on the transfusion of blood products.

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Background and Goal of Study: The traditional liver donor has been a patient with diagnosis of brain death (BD). Due to the shortage of organs, the profile of donors has changed and new alternatives have been sought, such as living donors (Split type) and currently, cardiac death donors (asystole). The goal of the study is to analyze the intraoperative transfusion rate (associated with a greater morbidity and mortality) in patients receiving a liver from a donor in BD and type III asystole.
Materials and Methods: Retrospective, unicentric study comparing the intraoperative transfusion rate in patients receiving a liver from a donor in BD (group 1) and asystole type III (group 2) from January 2013 to December 2016 in the University Hospital "Virgen del Rocío" from Sevilla, Spain. The anesthetic protocol was the same for all patients. The management of haemostasis and coagulation was carried out guided by thromboelastometry (TEM) without preoperative correction of conventional coagulation tests and plaquetopenia, a restrictive fluid therapy and early use of vasopressor support was performed. Tranexamic acid was not administered prophylactically as recommended by the National Transplant Organization (ONT).
Results and Discussion: 231 patients were included. 92% received a BD liver, 8% type III asystole. The patients of group 1 had a mean age of 52 ± 10 years, 75% were men and the MELD was 17 ± 7, in group 2 the average age was 56 ± 5.5 years, 83% were men and the MELD was 15 ± 7.1. Regarding the transfusion of blood products, group 2 was transfused with more packed red blood cells (RBC) (2 vs 1.7, p = 0.6), fresh frozen plasma (FFP) (0.28 vs 0.08, p = 0.06) and platelets (0.39 vs. 0.18, p = 0.08) and less fibrinogen (1 vs 1.10, p = 0.8). The non-transfusion rate of RBC was 43% in group 1 and 56% in group 2, p = 0.01.
Conclusions: Patients who received a liver from an asystolia type III and who were managed with TEM, restrictive fluid therapy and early use of vasopressor support, did not have a higher transfusion rate, according to our results.
TABLE 1.

	GROUP 1	GROUP 2	p
RBC	1.7	2	0.6
FFP	0.08	0.28	0.06
PLATELETS	0.18	0.39	0.08
FIBRINOGEN	1.10	1	0.8
NO-TRANSFUSION RATE	43%	56%	0.01

12AP03-7
Russian bleeding assessment tools for identifying bleeding disorders

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Background and Goal of Study: Identification of patients with high risk of bleeding among those, who are exposed to invasive procedures, is still a relevant task for clinicians. The study of personal and family history of excessive bleeding is a key factor for diagnosing inherited and aquired bleeding disorders. In recent years, researchers have been actively working to standardize hemorrhagic history by better formulation of questions that would allow to distinguish between patients with bleeding disorders and healthy individuals. Today there are about ten variants of Bleeding Assessment Tools. We use the bleeding questionnaire with 10 questions. The aim of study is to evaluate effectiveness of instruments that are used in diagnosing inherited and acquired bleeding disorders.
Materials and Methods: The questionnaire that we use, include the following:
1. Are bruises formed easily?
2. Do you have an epistaxis?
3. Do you have any post-dental extraction bleeding?
4. Do you have a gum bleeding?
5. Do you have any bleeding when injured?
6. Menstruation – number of days _; painful, painless; excessive, with blood clots, scanty, moderate; additional characteristics:
7. Menarche: juvenile bleeding?
8. Do you have any pain in the middle of the cycle?
9. Objective assessment of menstrual blood loss: _scores.
10. Family hemorrhagic history? Description:
Test with Desmopressin is not included in the questionnaire because this drug is not used in Russia as hemostatic. The Bleeding Assessment Tools is probed among women, complaining on excessive bleeding. Condition of including in the research were the following: at least 3 positive answers to questions from 1 to 7 or 2 positive answers from questions from 1 to 7 and at least 100 scores by results of assessing menstrual blood loss. 180 scores or more by results of assessing menstrual blood loss is the separate criteria for including in the research.
Results and Discussion: 83% of women, included in the research, have von Willebrand disease of type I, which is proved by laboratory tests. The sensitivity of questionnaire was 83%.
Conclusions: Thus, the study of hemorrhagic history using this Bleeding Assessment Tools allows the doctor to suspect disorders in the hemostasis system and timely perform laboratory studies to stratify the risks of hemorrhagic complications during invasive procedures.

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12AP03-9
Low molecular weight heparin bridging for perioperative DOAC management? A Spanish prospective multicentre observational study

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Background-Goal: Direct oral anticoagulants (DOACs) (apixaban, dabigatran etexilate edoxaban and rivaroxaban) pharmacokinetic favours stopping the drug without bridging during the perioperative period in the vast majority of patients. Nevertheless, current lack of experience and unsuitable monitoring have moved to write dissimilar recommendations and to propose bridging therapy with low molecular weight heparin for high thrombotic risk patients1,2. In order to know real-life DOAC management and thrombotic/bleeding events incidence, we conducted an open observational registry in Spain (RA-ACOD). This subanalysis of RA-ACOD study assesses real life bridging therapy use and its outcome.
Materials-Methods: Ra-ACOD study (NCT03182218) is an observational, prospective, multicentre study including adult patients under DOAC scheduled for surgery.
Data: demographics, personal history and treatment, thrombotic and haemorrhagic risk (low-moderate-high), type of surgery, anaesthesia management, DOAC treatment, perioperative management and incidence of thrombotic (cumulative of acute coronary syndrome, stroke or venous thromboembolism), bleeding (major and minor) events and exitus in 30 days follow-up.
We performed an exploratory data analysis. Possible relationships between bridging therapy and the covariates were assessed by univariate analyses, using the Chi-square and Mann-Whitney U tests and by logistic regression with stepwise covariate selection adjusted for a set of covariates. Hypothesis tests were bilateral using a significant level of 0.05. The statistical analysis was performed with R (https://www.r-project.org/).
Results-Discussion: 901 patients were enrolled in 26 hospitals, bridging in 312 (34.7%), 83% as prophylactic dosage. The global incidence of thrombotic events was 1.6%, not related to bridging. Major bleeding events occurred in 17 (1.9 %) patients, significantly related with use of bridging (p=0.004), meaning OR 4.68 (95% CI 1.63,13.41). From 14 deaths, 1 was considered of thrombotic aetiology, and 3 haemorrhagic. Thrombotic risk (p=0.013) and bridging (p=0.039) were significant, with an OR to die for bridging 3.27 (95% CI 1.08,9.91). These results agree with Dresden registry3.
Conclusion: Our results support the last recommendations against the use of bridging therapy in periprocedural management of DOACs
References:
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12AP04-1
Comparison of main risk factors for microvascular thrombosis between patients with and without recent trauma undergoing microvascular flap surgery

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Background and Goal of Study: Although numerous factors have been demonstrated to influence the free flap thrombosis rate, the risk factors might differ for separate patient groups. We compared the main thrombogenic risk factors between patients with and without recent trauma undergoing microvascular flap surgery.
Materials and Methods: Patient demographics and main thrombogenic risk factors, including recent trauma, smoking, thrombogenic comorbidities were collected. Rotational thromboelastometry (RTE) was performed on the preoperative day; functional fibrinogen to platelet ratio (FPR) ≥42 in addition to main RTE parameters was set as the indicator of hypercoagulation. Incidence of flap thrombosis was defined as primary outcome; secondary main risk factors for microvascular thrombosis were evaluated.
Results and Discussion: 103 patients were included in the prospective observational study and subdivided into two groups: Recent trauma group (36/103) had surgery early after trauma (<1 month) or Elective group (67/103) had surgery on an elective basis. Demographics did not differ between groups. FPR ≥ 42 was detected for 24 patients, statistically more often in trauma group 16/36 (44%) vs 8/67 (12%); p <0.001. In recent trauma group prolonged surgery correlated with higher flap thrombosis risk (r = 0.338; p = 0.044), while in elective group the predictive value of FPR ≥ 42 was confirmed (r = 0.285; p=0.019). For all included patients FPR ≥ 42 was associated with development of microvascular flap necrosis – AUC 0.6; p = 0.033, sensitivity 41.2%, specificity 79.8%; MCFextem (r = 0.236; p = 0.017) and MCFfibtem(r = 0.197; p = 0.047) demonstrated correlation with increased rate of flap thrombosis. Microvascular flap thrombosis developed in 21,necrosis in 17 patients on average the 1st postoperative day. Association with flap thrombosis was not found for other factors such as smoking, advanced age, comorbidities, thrombocytosis or higher fibrinogen level.
Conclusions: Recent trauma was revealed to be one of the main factors for hypercoagulability. Moreover, hypercoagulability detected by Rotational thromboelastometry and prolonged surgery time might indicate predisposition to develop microvascular thrombosis, particularly in patients with recent trauma.

12AP04-2
Storage-dependent increase in phosphatidylserine exposure does not augment in vitro pro-coagulant properties of packed red blood cells

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Background and Goal of Study: Recent findings question the quality of packed red blood cells (PRBCs) towards the end of cold storage, and propose an impact of storage duration of PRBCs on transfusion-related pathology. The aim of this study was to investigate phosphatidylserine as a marker for storage quality of PRBCs. Furthermore, we tested the influence of phosphatidylserine exposed on PRBCs on in vitro coagulation properties.
Materials and Methods: We collected 36 PRBC units from 18 male and 18 female volunteer donors between 19 and 63 years old. All units were leucodepleted and stored in saline-adenine-glucose-mannitol-solution for 6 weeks according to Austrian blood banking standards. Hemolysis and percentage of cells expressing phosphatidylserine were measured weekly. Prediction of end-of-storage (week 6) hemolysis was assessed by receiver operating characteristic (ROC) curve analysis. In vitro coagulation properties of PRBCs recombined with autologous platelet-rich plasma were assessed by viscoelastic coagulation analysis using a ROTEM® device at weeks 2, 4, and 6.
Results and Discussion: End-of-storage hemolysis remained within the approved range (<0.8%), with values greater than baseline at week 4 (0.26±0.07, p=0.03), week 5 (0.34±0.1, p<0.001), and week 6 (0.54±0.14, p<0.001). Similarly, the percentage of phosphatidylserine-exposing cells increased over baseline values at week 4 (0.62±0.25, p<0.001), and remained elevated at week 5 (0.76±0.33, p<0.001) and week 6 (1.06±0.52%, p<0.001). ROC analysis indicated similar predictability values for early time points of hemolysis and phosphatidylserine exposure for end-of-storage hemolysis. Areas under the curve for both parameters were >0.7 at weeks 4 and 5. In viscoelastic coagulation analyses, clotting times of PRBCs stored for 6 weeks were longer than those of fresh blood samples in INTEM (343±106 vs. 194±17 s, respectively, p<0.001) and EXTEM (99±16 vs. 69±13 s, respectively, p<0.001).
Conclusion: Phosphatidylserine and hemolysis increase during storage of PRBCs. Both parameters can predict end-of-storage hemolysis at earlier time points of storage. Furthermore, prolonged clotting times in viscoelastic coagulation analyses indicate that PRBCs at the end of storage period could alter the initiation of clot formation.
Acknowledgements: The research project was supported by a Young Investigator Start-Up Grant from the European Society of Anaesthesiology to DMB.

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12AP04-3
Markers for thrombosis prediction in free flap surgery.

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Background and Goal of Study: Thrombosis is a key factor in the advancement of flap failure in reconstructive surgery. Apprising markers to predict thrombosis is crucial. We aimed to evaluate the role of the standard coagulation profile and thromboelastography in thrombosis prediction.
Materials and Methods: We collected data from 105 patients undergone free flap microvascular surgery, period 2016-2018. We analysed plasma fibrinogen concentration (Clauss, g/L), prothrombin activity (Owren,%); activated partial thromboplastin time (APTT, s); platelet count (Plt 10e9/L) and thromboelastography (ROTEM) was performed for MCF (Maximal Clot Firmness) Fibtem (mm), CT (Clotting time) Intem and Extem (s) and FPR (fibrinogen/ platelet ratio) evaluation.
Results and Discussion: We found correlation between flap thrombosis and prothrombin activity (r = 0.218; p=0.032), mean value in thrombosis group was 101.88 (±19.58 SD; CI 95%,92.91- 109.70) versus 94.11(±19.46 SD; CI 95%, 92.91-109.70) in non-thrombosis group. MCF Fibtem values were increased in thrombosis group 30.12 (±15.94) vs. 23.40 (±10.58), p= 0.031.
Conclusions: Increase in prothrombin activity and Fibtem maximum clot firmness in the thromboelastic assay (Rotem) could suitable parameters in the prediction of flap thrombosis in free flap surgery.

12AP04-4
Joint replacement in a patient with Hemophilia B: case report and anesthetic management

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Background: Hemophilia B is an X-linked bleeding disorder caused by clotting factor IX deficiency. It is a rare disease, affecting 1 in 300.000 males, representing approximately 15-20% of the hemophilic population. Persistent and uncontrolled bleeding during surgery might be a fatal complication and replacement of the clotting factor has been endorsed as an effective therapy to control hemorrhage.
Case Report: We report a case of a 33-year-old man with severe hemophilia B with history of hemophilic arthropathy due to frequent knee hemarthrosis, requiring joint replacement. A detailed perioperative strategy was designed, in a multidisciplinary approach involving surgeons, anesthesiologists, hemotherapists and a rehabilitation team. The surgery, under general anesthesia, took 3 hours and went well. He maintained postoperative IX factor monitoring and antifibrinolytic therapy. The patient was discharged in the eleventh day postoperative. No blood transfusions were needed.
Discussion: Surgical treatment is a safe and reliable choice for handling complications like haemophilia related osteoartrophathy given the possibility to implement effective measures during the perioperative period. The goal in the pre-operative stage is to measure factor IX and correct its deficiency, in order to uphold factor activity above 60% (preferably more than 80%) for major surgery. Antifibrinolytic therapy may be a useful adjuvant and must be considered. Regional anesthesia should be avoided. Adequate hemostasis is essential in order to avoid complications. In postoperative monitoring it is desirable that factor IX activity is maintained between 30-50%.
References:
MS Thiago; Anesthetic strategy for a femur fracture surgery in a patient with haemophilia B (Factor IX Deficiency): A case report; Scholarena, SAJ Case Reports, Vol-. 4, Issue 2 - Shah, U.J.; Narayanan, M.; Smith G.; Anaesthetic considerations in patients with inherited disorders of coagulation; Advance Access publication 24 April, 2014
Learning points: Appropriate resources, perioperative plan and an individualized postoperative rehabilitation program should be previewed and managed to successfully prevent bleeding and complications.

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12AP04-5
Prolonged effect of warfarin despite conversion with PCC and vitamin K after metronidazole treatment in patient requiring urgent operation - a case report.

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Background: Warfarin is vitamin K antagonist (VKA) with average duration of action 72 hours, but minority of patients take over a week to clear warfarin. Genetic factors (activity of the CYP2C9 enzyme) and drug interactions mostly account for differences in warfarin clearance. When urgent VKA reversal is required standard treatment is fresh frozen plasma (FFP), vitamin K (VK) and prothrombin complex concentrate (PCC). Intravenous VK needs 6-24 hours to reach full effect, lasting for days. With PCC faster reversal can be achieved, with duration of 24 hours.
Case report: 71-year old patient was admitted to ER, overdosed on warfarin, necessitating an urgent appendectomy. His INR values paradoxically soared 72 hours after discontinuation of warfarin and 24 hours after reversal with VK and PCC. Patient was on warfarin after prosthetic aortic valve implantation. Initial laboratory findings showed INR value >5.0. Surgery was delayed while patient received 20 mg of vitamin K, 4 doses of FFP, 40mg of furosemide and 2500 IU of PCC. Also, standard daily antibiotic regimen was implemented - ciprofloxacine 2x200 mg i.v. and metronidazole 2x500 mg i.v. At the time of surgery, 28h after last warfarin dose, INR value was 1.5. Surgery was uneventful and patient returned to surgical ward in stable condition. 14 hours later, due to stenocardia, he was admitted to ICU. He had pericardial effusion and his INR was 3.83. In the next 24 hours his INR soared to 6.0 and we decided to correct parameters in case patient should need pericardiocentesis. He received 2500 IU of PCC and 10 mg of VK, after which INR values remained below 1.5. His antiXa value was <0.05 kIU/L and rotational thromboelastometry showed only discrete prolongation of CT in EXTEM.
Discussion: INR increase to 6.0 more than 72 hours after discontinuation and reversal of warfarin is very rare. However, it is known that metronidazole and ciprofloxacine both can cause prolongation of warfarin effect. Also, polymorphisms of CYP2C9 gene can cause reduced rate of drug breakdown.
References:
1. Hunt B J, Levi M. Urgent reversal of vitamin K antagonists. BMJ 2018;360:j5424
2. Piatkov I, Rochester C, Jones T, Boyages S. Warfarin toxicity and individual variability-clinical case. Toxins (Basel) 2010;2(11):2584-92.
Learning points: Interaction of metronidazole and warfarin is often neglected in urgent patients, but it can cause significant prolongation in warfarin action and requires careful consideration and INR monitoring.

12AP04-6
Sonorheometry for point-of-care (POC) assessment of coagulation function in burned patient

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Background: Severe burn injury has an impact on the coagulation system resulting in both hemorrhagic and thrombotic complications. Therefore, management of optimal hemostasis in burned patients is a real challenge that may benefit from dynamic monitoring of the coagulation status to allow goal-directed individualized therapy. Whole blood viscoelastic tests have been shown as a promising tool in this context[1]. The Quantra™ Hemostasis Analyzer (HemoSonics) is a new generation POC device based on Sonic Estimation of Elasticity via Resonance (SEER) Sonorheometry. This technology uses ultrasound to measure changes in viscoelastic properties of whole blood during coagulation ex vivo[2]. It rapidly identifies clot initiation defects, heparin influence, and the impact of fibrinogen and platelets on clot stiffness.
Case Report: We investigated the ability of the Quantra™ to detect hyper- and hypocoagulable states in a severely burned adult patient (40% total body surface area). Serial measurements were conducted during massive perioperative bleeding and results were obtained within 15 minutes of test initiation. Changes in clotting time, clot stiffness and impact of platelets on clot stiffness allowed clinicians to determine when plasma and platelets transfusions were really indicated and to evaluate their impact on the hypo and hypercoagulable states. Moreover, compared with routine coagulation tests (PTT, PT, TT, platelet count), the Quantra™provided a functional measurement of platelet contribution to clot stiffness.
Discussion: We found that the Quantra™ was easy to use and provided a rapid insight into the coagulation states of the patient. It particularly assisted in the decision to refrain from plasma transfusion.
References:
1. Marsden NJ, Van M, Dean S, Azzopardi EA, Hemington-Gorse S, Evans PA, Whitaker IS. Measuring coagulation in burns: an evidence-based systematic review. Scars Burn Heal. 2017;3:2059513117728201. doi: 10.1177/2059513117728201.
2. Ferrante EA, Blasier KR, Givens TB, Lloyd CA, Fischer TJ, Viola F. A Novel device for the evaluation of hemostatic function in critical care settings. Anesth Analg.2016;123:1372-1379.
Learning points: The Quantra™ Hemostasis Analyzer (Hemosonics) is a useful POC device to diagnose both haemorrhagic and thrombotic complications, to guide blood products administration and to limit risk transfusions, overload and hypercoagulable state, the most common adverse events found in burned patients.

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12AP04-7
Validation of a method to predict transfusion requirements in burned patients.

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Background and Goal of Study: Find a formula to anticipate the number of blood units transfused (NBUT) that a burned patient will require during admission to avoid situations where the lack of units could compromise the safety or an excessive resource would increase the blood banks costs. Risk factors of blood transfusion and mortality were also analyzed.
Materials and Methods: The required permission was obtained from the Clinical Research Ethics Commission of La Paz University Hospital to accomplish a three years retrospective observational study: design cohort - A (186 patients) provided the regression model for the estimation equation that was applied on validation cohort - B (189 patients). Demographic data, comorbidities, total body surface area (TBSA) burned, surgical procedure and complications were collected. Hemoglobin and hematocrit variables (Hb & Hto) were recorded during: admission, pre-surgery, post-surgery, the lowest value between interventions and at discharge/death. The total number of packed red blood cells administered was also registered.
Results and Discussion: According to the consulted bibliography, the risk factors of allogenic blood transfusion by OR analysis in cohort A were: TBSA ≥ 15%, Hb pre-surgery 1 ≤ 11.7 g/dl, being subjected to two or more surgeries, suffer cardiovascular pathology and complications. A multiple regression model was developed from cohort A, comparing the number of units (as a continuous dependent variable) against the independent variables that determine the first one.
NBUT=1,77+(0,245 x % TBSA)+(4,766 x nº surgeries)-(0,66 x Hb presurgery 1)
To validate this predictive formula, it was applied to cohort B, although both cohorts were very heterogeneous and surgical techniques had evolved too.
The residual analysis determined: 0.011 ± 5.56 units for cohort A (p = 0.979) and 1.79 ± 6.71 units for cohort B (p = 0.001).
A regression model showed that age, % TBSA, inhalation syndrome and respiratory pathology (AUC 0,974), provide a good prediction of mortality.
Conclusions: TBSA, number of surgeries and Hb presurgery 1, have statistically significant contribution to the equation (determination coefficient 73,4%). The model shows positive correlation with the consumption of units.

12AP04-8
The relationship between cardio-pulmonary bypass time, platelet function, elasticity, bleeding, and transfusion during cardiovascular surgery.

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Background and Goal of Study: Platelet counts and function are affected by absorption and consumption by extracorporeal membranes during cardiopulmonary bypass (CPB). In accordance with Japanese guidelines[1)], we administer platelet concentrates (PC) to achieve platelet counts of 30,000–50,000/μL if CPB time is <3 h The guidelines specify target platelet counts of 50,000–100,000/μL if CPB time is >3 h. We aimed to determine whether 3 h is an appropriate interval before infusing platelets.
Materials and Methods: The study cohort comprised 159 patients who underwent cardiac surgery with CPB. The patients were divided into four groups depending on the CPB time: <1 h, 1–2 h, 2–3 h, and >3 h. Blood samples were taken at four time points: baseline, immediately after starting CPB, while weaning from CPB, and in the ICU and platelet counts, rotational thromboelastometry, and fibrinogen measured. We used subtraction amplitude 10 min of Fibtem from those of Extem to represent platelet function[2)] and clot elasticity (CE) to represent clot strength[3)].
Results and Discussion: There were no patients in <1 h,73 in the 1–2 h, 63 in the 2–3 h, and 23 in the 3 h group. There were no differences between the groups in platelet counts at weaning off CPB; however, platelet function and CE were lower in the >3 h group than in the other groups at weaning off CPB. Furthermore, blood loss in the operation room and ICU and requirements for transfusion components were higher in the >3 h group than in the other groups.
Conclusions: Perioperative blood loss with >3 h CPB time is greater because of decreased platelet function (Extem − Fibtem) and clot strength.
References:
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Comparison of platelet counts, ROTEM, blood loss and transfusion of each CPB time

CPB(time)	1-2	2-3	3-	*P value*
PATIENTS NUMBER	72	61	23	
PLATELET COUNTS ($10^4/\mu\ell$)	10.8±4.2	10.3±4.0	9.7±3.2	0.16
EXTEM - FIBTEM A10 (mm)	35±6	33±6	**28±7***	0.0002
CLOT ELASTICITY (CE)	74±21	70±22	**53±28***	0.0008
BLOOD LOSS DURING OPERATION (mℓ)	164±219	338±410	**1016±1050***	<0.0001
BLOOD LOSS IN 48H DURING ICU (mℓ)	341±150	585±265	**1043±702***	<0.0001
RBC TRANSFUSION (unit)	4.4±3.8	5.2±5.2	**11.5±9.5***	0.0011
FFP TRANSFUSION (unit)	0.5±1.5	1.4±2.3	**9.4±7.1***	<0.0001
PC TRANSFUSION (unit)	0.8±4.0	2.4±5.9	**18.1±15.2***	<0.0001

Mean ± S.D. *significant difference between 1-2, 2-3
RBC:Red Blood Cell FFP:Fresh Frozen Plasma PC:Platelet Concentrated

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12AP04-9
Sus crofa domesticus experimental model with massive hemorrhage employing prohemostatic and whole blood during damage control surgery. Spanish Military Medical Corps, initial experience with 8 animals.

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Background and Goal of Study: Haemorrhage is leading cause of death in combat. The goal of study is to describe our experience with 8 pigs who suffered massive haemorrhage and were treated with prohemostatic and whole blood during damage control surgery
Materials and Methods: After assessing the pig's race, sex and weight, sedation was performed with meloxicam, ketamine, midazolam and atropine. Secondly, anesthetic induction by inhalation with sevoflurane was started. In a third place, a peripheral venous access was obtained in the ear through which propofol, fentanyl and atracurium were administered. At this time endotracheal intubation was performed and mechanical protective ventilation was initiated. The anesthetic maintenance was achieved with sevolfluorane, oxygen, air, fentanyl, lidocaine and ketamine. If the oxygen saturation decreased by 95% and every hour, alveolar recruitment maneuvers were performed. The maintenance fluid therapy chosen was with Ringer Lactate. Surgeries performed were ten per animal. At the time when the systolic blood pressure was lower than 80 mmHg and the heart rate was higher than 100 bpm, colloid, phenylephrine and noradrenaline were administered sequentially. After the splenic lesion, tranexamic acid, fibrinogen, CCP (Octaplex®) and calcium chloride were used initially. In a second step, autologous transfusion of whole

blood was initiated. All pharmacological dosage was adjusted by animal weight. During the procedure, the following monitoring was used: SaO2, electrocardiogram, noninvasive and invasive blood pressure, capnography, core temperature, and baseline and final arterial blood gases. Among the variables analyzed, we highlight hemoglobin, measurement of the volume of blood lost, time of onset of hypotension and the time of death of the animal.
Results and Discussion: The time spent in the procedure was 116 (105-128 min). Seven of eight pigs endured alive during surgical procedures. The average hemoglobin decrease was 4.2 (3.8-4.6 g / dl). Estimated blood loss was approximately 300ml (200-400ml).
Conclusions: Prohemostatic treatment (fibrinogen, calcium and prothrombin complex –Octaplex®-), antifibrinolytics (tranexamic acid), restrictive therapy with colloid, vasoactive drugs and autologous blood transfusion allowed to perform all surgical procedures in live animals (7 / 8)
Acknowledgements: Centro Militar de Veterinaria de la Defensa. Unidad de Cirugía Experimental, HCDGU Spain

12AP05-1
Bloodless curing methods as a part of strategy in anesthesia of geriatric patients

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Background: Bloodless medicine is based on programs of avoiding transfusion treatment, by using pharmacologic alternative medicaments as a change for blood transfusion and harmless techniques (methods), with a high technology which brings bleeding to a minimal quotes.(1).In developing countries as it is Bosnia and Herzegovina bloodless medicine hasn't got yet taken place where it deserve and is still observed suspiciously by patients and by medical personal too.
Case report: In this paper 77 years old female patient who had gone ortopedic surgery (endoprosthesis of a right knee) has been presented. For religious reasons as belonger of Jehovah´s Witnesses this patient refused to receive blood transfusion despite extreme blood loses during operative treatment. According to the legal patient rights to refuse blood transfusion, multidisciplinary medical team have been founded and there were anesthesiolgist, orthopedic surgeon , transfusiologist and haematologist. Anesthesiologic treatment of this patient has been influenced and made worse by many associated diseases (comborbidities). During this operations Cell Salvage autotransfusion has been used. Early postoperative period have been complicated with a higher blood loss which resulted in such blood tests: Eritrocytes 2,03x1012/L, Hematocrit 18 vol % , Haemoglobine 63 g/L. During bloodless treatment crystaloide and coloide solutions , eritrpoetin, ferum supplements and inotropic agents have been administered. Postoperative period lasted 8 days including 3 days stay in Intensive care unit and patient was dismissed in good general condition and without any serious complications.
Discussion: In our country very rarely we have patients with specific legal medical treatment demands like it was in this case and it is educative to present every aspect of bloodless treatment in patients with severe operative and postoperative bleeding. Accent should be put on multidisciplinary medical approach, continuous education and developing skills of bloodless medicine.
References:
1. Ashworth A, Clein A.A Cell salvage as part of a blood conservation strategy in anaesthesia. Br J Anaesth. 2010 Oct;105(4):401-16.
Learning point: Bloodless medicine is based on tested, scientifically proved long lasted clinical experience and is today unavoidable part of modern clinical medicine which gives us excellent results. With all this technology development bloodless medicine is named as a medicine of 21'st century.

12AP05-2
Effects of restrictive transfusion and liberal transfusion on the prognoses of children undergoing cardiac surgery: a meta- analysis with trial sequential analysis of randomized controlled trials

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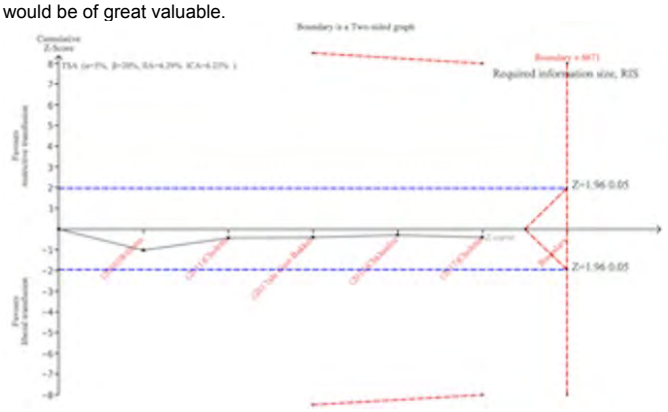
Background and Goal of Study: Despite numbers studies regarding transfusion strategy, there are still lack of adequate attention on transfusion red blood cell (RBC) strategy in pediatric cardiac surgery patients. We performed a meta-analysis to estimate the effect of a restrictive RBC transfusion strategy versus a liberal transfusion strategy on prognosis of in pediatric cardiac surgery patients.
Materials and Methods: We searched the electronic databases Medline, EMBASE, PubMed, and the Cochrane Library until 31th August 2018. A random-effects model or fixed-effect model was used in current meta-analysis. A trial sequential analysis (TSA)-adjusted fixed-effect model was used to pool the results from the enrolled studies for the primary outcomes.
Results and Discussion: Five trials (comparing 497 children) were included. The risk ratio (RR) of in-hospital mortality derived from 198 patients in restrictive strategy group when compared with 192 transfused according to a liberal strategy was 1.18 (95% confidence interval (CI) 0.49 to 2.99, I2 = 0%, P = 0.68). The TSA analysis suggested that current meta-analysis absence of evidence for in-hospital mortality, and the data were insufficient. A restrictive strategy did not have a statistically significant effect on the risk of infection (RR 1.18, 95% CI 0.73 to 1.91, I2 = 0%) and blood loss (RR 8.11, 95% CI -28.97 to 45.19, I2 = 0%) but have a significant difference on mean units difference, the proportion of patients received transfusion, and duration of mechanical ventilation. There was no evidence that liberal transfusion was associated with an extended pediatric intensive care unit (PICU) stay and hospital stay (LOS).
Conclusions: The current evidence about the RBC transfusion strategy of Children undergoing cardiac operation doesn't provide sufficient evidence to make precisely recommendations on transfusion thresholds. Larger multicenter trials are needed to confirm these results, and focus on the clinical outcomes and long-term prognosis would be of great valuable.



12AP05-3
Blood and Fluid Management during scoliosis surgery: A Single Center Retrospective Analysis

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Background and Goal of Study: The present retrospective observational study was designed to evaluate the effects of a protocol based on stroke volume variation on fluid and blood administration in patients scheduled for scoliosis surgery.
Materials and Methods: The study was approved by Scientific and Ethics committee of G. Papanikolaou Hospital. We collected data from 35 patients with Cobb Angle >70 degree, who had undergone scoliosis surgery. Patients were divided in two groups. Patients in Group noPro (n=18) received liberal fluid therapy. Intraoperative strategies in patients in Group Pro (n=17) included: fluid therapy according to stroke volume variation, tranexamic acid infusion, permissive hypotension, restrictive RBC trigger and use of cell savage. Data (mean±SD) were collected from anesthesia records and included: infused crystalloid and colloid, units of allogenic RBCs, volume of autologous or cell savage blood, preoperative and postoperative hemoglobin and hematocrit, diuresis and vasopressors administration. Statistical analysis was performed with t-test, Mann-Whitney test and Chi-Square test. P value < 0.05 was considered significant.
Results and Discussion: Demographic data were comparable between groups. Patients in Group Pro received less units RBCs (0.76±0.97 vs 1.39±0.5 units, p=0.015, Mann-Whitney test) and lower amount of crystalloids (19.22±6.19 vs 26.29±6.98 ml/kg/hr, p=0.003, t-test) compared to Group noPro. The amount of administered colloids (0.76±1.11 vs 1.94±2.22 ml/kg/hr, p=0.112, Mann-Whitney test) and of cell saver or autologous blood (157.65±178.69 vs 138.89±260.4 ml, p=0.305, Mann-Whitney test) were no significant different betwwen groups. No significant difference between groups in preoperative haemoglobin (14.26±1.54 vs 13.74±1.05, p=0.360, t-test), postoperative haemoglobin (9.54±2.09 vs 9.4±0.83, p=0.798, t-test), preoperative haematocrit (41.08±4.02 vs 39.34±3.66 %, p=0.380, t-test) and postoperative haematocrit (28.69±6.86 vs 27.43±3.14 %, p=0.496, t-test). Significant more patients in Group Pro received vasopressors (9(69.2%) vs 4(30.8%), p=0.042, Chi-Square test) and had better diuresis (6.59±3.14 vs 1.89±0.8 ml/kg/hr, p=0.000, t-test) than in Group noPro.
Conclusions: Intraoperative blood and fluid management protocol based on stroke volume variation substantially reduced crystalloid fluid administration and the need for allogenic RBC transfusion.

12AP05-4
Use of cadaveric donor blood in orthoptic liver transplantation

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Background: Liver transplant (LT) can be associated with large volume blood loss and subsequent transfusion.1. Allogenic transfusion of bank blood (BB) has been associated with increased morbidity and mortality. In addition, BB has increased cost implications2. In our center cadaveric donor blood (DB) is collected in all instate recipients who are ABO and CMV compatible. Briefly, DB is collected by inserting a 32Fr Pleurex drain into the inferior venacava and draining under suction into a cell saver reservoir prior to aortic cross clamping. Following a full cross match, the DB is then processed by the cell saver and transfused into the recipient in preference to BB. A retrospective review of transfusion requirements for all patients undergoing LT was conducted to see the effects of DB on transfusion requirements in LT.
Materials and Methods: The anesthetic records of patients who underwent LT between 11/2009-07/2018 in a single tertiary center were reviewed. The charts were reviewed for: Demographic data; MELD; Number of BB units (PC); volume of DB if applicable; volume of autologous cell saver blood; total volume of fluids infused; units of FFP, cryoprecipitate and platelets; any interoperative events; primary graft failure; Secondary graft failure, hepatic artery thrombosis and returns to theatre. Data was analyzed by Mann-Whitney for non-parametric data or X2 as appropriate. P<0.05 was significant.
Results: 514 records were identified of which 484 were suitable for analysis. 304 received BB only, 180 received DB. There was no difference in gender or MELD (18[13-25]) between groups. Average DB volume was 689 (503-902) resulting in 2 fewer PC transfused 2(0-4) compared to BB 4(1-6) (p<0.01). DB was associated with fewer returns to theatre (31 vs 77 p=0.04) but higher cell saver volumes (1248 vs 947ml p=0.03). There was no difference in other variables including adverse intraoperative events (p=0.97), primary (p=0.75)and secondary graft failure (p=0.76).
Conclusion: Use of DB results in less PC units being used. Patients who received DB had fewer returns to theatre following LT with no difference in adverse outcomes compared to those who received BB only.
References:
1 Blake et al Transplantation 2016;14:405-411
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12AP05-5
Deformability of erythrocytes is maintained after autologous cell salvage

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Background and Goal of Study: Prerequisite for oxygen transport to the tissue is the ability of erythrocytes to change from a discoid into an elongated form in order to pass micro vessels. Cell salvage is highly recommended to decreases blood loss, anaemia, and allogeneic transfusions in perioperative bleeding. The purpose of our study was to assess deformability of erythrocytes at retransfusion.
Materials and Methods: After Ethics Committee approval, informed consent was obtained from 30 patients scheduled for joint arthroplasty with autotransfusion (Xtra, Sorin, Munich, Germany). Six hours after cell salvage initiation, 4.5 ml of blood was withdrawn from the extracorporeal system into EDTA-tubes. Elongation indices (EI) at increments of applied shear stress (SS) were assessed by using Laser Optical Rotational Red Cell Analysis (LORRCA, RR Mechatronics, Zwaak, The Netherlands) after suspending 80 µl of the autotransfusion concentrate in LORRCA iso osmolar fluid.
Results and Discussion: Erythrocytes in autotransfusion concentrates showed a sigmoid EI/SS-curve with a mean maximum elongation index (EImax) of 0.593 ± 0.034 and mean half-maximal deformation (SS ½) of 1.186 ± 0.387 Pa. In order to account for irregular curve shapes and high variability in EI at shear stress < 3 Pa we recalculated outcome parameters which resulted in higher values (EImax 0.610 ± 0.035; SS ½ 1.562 ± 0.346 Pa).
Conclusions: Our study is the first report on deformability of erythrocytes in autotransfusion concentrates, demonstrating that erythrocytes are not stiff but elongate in response to shear stress. Although a difficulty of the cells to align to the shear field at low stresses cannot be excluded, erythrocytes showed the typical EI/SS-curve of human red cells, which indicates that the cells are able to uptake the hydrodynamic forces that act on them during the measurement. LORRCA may be proposed for quality control of evolving autotransfusion methods. Further research is needed to investigate the effect of cell salvage processing on erythrocytes from patients with pre-existing haematological disorders.

12AP05-7
Efficacy of perioperative intravenous iron therapy for the transfusion in orthopedic surgery; A systematic review and meta-analysis

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Background and Goal of Study: Functiona anemia is common in patients undergoing orthopedic surgery. This review aimed to evaluate the efficacy of perioperative intravenous iron therapy (IVIT) on transfusion and recovery profiles during orthopedic surgery.
Materials and Methods: We searched PubMed, Embase, Cochrane, KoreaMed, and Google for eligible clinical trials that compared IVIT group and control group without iron therapy during orthopedic surgery. Primary outcomes were to evaluate the efficacy of IVIT on the ratio of patients transfused and the units of RBC transfusion during perioperative period. Secondary outcomes were to evaluate the efficacy of IVIT on recovery profiles (length of hospital stay, ratio of post-operative infection, and mortality). Subgroup analysis was performed on the basis of iron dose (low dose, high dose) and IVIT periods (pre-operative, post-operative, and peri-operative).
Results and Discussion: We identified 12 clinical trials with 1,869 patients. IVIT group statistically significantly reduced the ratio of patient transfused by 29% (RR, 0.71; P = 0.0005), and the units of RBC transfusion by 0.43 unit/person (MD, -0.43; P = 0.0001) compared to control group. For subgroup analysis by iron dose, IVIT with low- or high-dose statistically significantly reduced the ratio of patient transfused (low-dose; RR, 0.74/ high dose; RR, 0.70)(Fig.1A), and the unit of RBC transfusion (low-dose; MD, -0.47/ high dose; MD, -0.42). For the subgroup analysis by IVIT period, IVIT given at post-operative period statistically significantly reduced the ratio of patient transfused (post-operative; RR, 0.64, P = 0.0005 / pre-operative; RR, 0.74, P = 0.06)(Fig.1B) and the unit of RBC transfusion (post-operative; MD, -0.84, P = 0.001 / pre-operative; MD, -0.29, P = 0.06). For recovery profiles, IVIT statistically significantly shortened the length of hospital stay by 1.6 days (MD, -1.60; P = 0.0006) and reduced the rate of post-operative infection by 33% (RR, 0.67; P = 0.01). However, IVIT did not change the mortality (RR, 0.56; P = 0.33).
Conclusions: Perioperative IVIT, especially at post-operative period, during orthopedic surgery is an effective alternative to the transfusion by reducing the rate of patients and the amount for transfusion with a trend to a shortened the length of stay in hospital and decreased incidence of post-operative infections but no changes in mortality rate.

12AP05-8
Results from a prospective, randomised, controlled phase 2 study of fibrinogen concentrate vs cryoprecipitate in pseudomyxoma peritonei surgery

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Background and Goal of Study: Maintaining adequate plasma fibrinogen levels may help control haemostasis during cytoreductive surgery for pseudomyxoma peritonei (PMP). FORMA-05 compared the efficacy and safety of cryoprecipitate (cryo) with a new highly purified, double virus-inactivated human fibrinogen concentrate (HFC; Octafibrin/FIBRYGA, Octapharma) in patients with acquired fibrinogen deficiency undergoing surgery for PMP.
Materials and Methods: FORMA-05 was a prospective, single centre, randomised, controlled phase 2 study. Patients undergoing surgery for PMP with predicted intraoperative blood loss ≥2 L pre-emptively received HFC (4 g) or cryo (2 pools of 5 units). The composite primary endpoint was intraoperative (assessed by surgeon and anaesthesiologist) and postoperative (assessed by haematologist) efficacy, graded using objective 4-point scales and adjudicated by an Independent Data Monitoring and Endpoint Adjudication Committee.
Results and Discussion: The per-protocol set included 43 patients (HFC, n=21; cryo, n=22). Mean total intraoperative dose of HFC was 6.5 g vs 4.1 pools of cryo (containing approx. 8.8 g of fibrinogen). Median duration of surgery was 7.7 h. Overall haemostatic efficacy was rated excellent or good for 100% of patients receiving HFC and cryo, with similar blood loss. Table 1 shows intraoperative efficacy; postoperative efficacy was rated excellent for all 43 patients. Infusions were initiated 0.4 h earlier with HFC than cryo due to faster product availability. Pre-emptive dosing of HFC led to a greater mean increase vs cryo in FIBTEM A20 (mean±SD 3.43±2.27 mm with HFC vs 1.05±3.29 mm with cryo; p=0.0088) and in plasma fibrinogen (0.73±0.41 g/L with HFC vs 0.36±0.37 g/L with cryo; p=0.0038). There were 6 serious adverse events (SAEs) in the HFC group and 17 in the cryo group, including 7 thromboembolic events (TEEs; 2 deep vein thromboses, 5 pulmonary embolisms). No adverse events (AEs) or SAEs were deemed related to the study drug.
Conclusions: HFC was as effective as cryo, but was available earlier, for treatment of bleeding in patients undergoing surgery for PMP. No related AEs and no TEEs occurred in patients treated with HFC.

Table 1: Intraoperative Haemostatic Efficacy Ratings (HFC, n=21; cryoprecipitate, n=22)

	Assessed by the Surgeon and Anaesthesiologist		Assessed by the IDMEAC	
4-point Efficacy Scale	HFC, N (%)	Cryoprecipitate, N (%)	HFC, N (%)	Cryoprecipitate, N (%)
Excellent	13 (61.9)	12 (54.6)	13 (61.9)	11 (50.0)
Good	7 (33.3)	6 (27.3)	7 (33.3)	5 (22.7)
Moderate	1 (4.8)	4 (18.2)	1 (4.8)	6 (27.3)
None	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

12AP05-9
The effects of preoperative anemia incidence on postoperative morbidity and mortality in patients undergoing thoracic surgery

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Background and Goal of Study: Preoperative anemia is a risk factor for transfusion of blood and blood products in patients undergoing thoracic surgery. There are three major risk factors for development of preoperative anemia in thoracic surgery: hospital-acquired anemia, iron deficiency anemia, and anemia of chronic disease. Our hypothesis in this study was that anemia may be related to increased perioperative complications, bleeding and transfusion rate.
Materials and Methods: Following the Ethics Committee approval, we enrolled consecutive 104 patients between the age of 18 and 79 years (54,87±15,72 years). Patients' demographic data, preoperative and postoperative complete blood count (CBC), rate of blood and blood product transfusions and complications were recorded. Additionally, other laboratory tests, surgery type, re-exploration, length of stay at hospital and intensive care unit (ICU) were determined and recorded. We classified patients into two groups: patients with anemia (n=29) and patients without anemia (n=75). According to the World Health Organization (WHO), anemia is defined as a hemoglobin level less than 12 g/dL in women and less than 13.0 g/dL in men. We took these reference levels into consideration for diagnosis of preoperative anemia in our study.
Results and Discussion: The incidence of preoperative anemia was %30.16. 31% of patients were found to be anemic and 69% were men. The demographic data of the patients included in the study were statistically similar between the groups, while the age and complication rate were significantly higher in patients with anemia. Complications occurred in 9 (31%) patients with anemia and 6 (8%) patients without anemia (p = 0.005). The length of hospital stay was longer in the anemic group (9,62 ± 5,52 vs 7,67 ± 4,67, p = 0.014), and total drainage was higher (1275,86 ± 521,61 mL vs 979,33 ± 520,07 mL, p = 0.001). The amount of perioperative bleeding was higher in the anemic group (435.17 ± 331.58 mL vs 343.2 ± 512.98 mL) and the amount of postoperative RBC transfusion was higher (0.86 ± 1.46 U vs 0.13 ± 0, 48 U, p = 0.001).
Conclusions: Our study revealed an increase in complications and also the transfusion of blood and blood products increased statistically. In order to improve patient safety, the awareness of preoperative anemia should be increased.

12AP05-10
Haemostasis traffic light: the development of a bleeding management tool based on turnaround times and therapeutic resources in a third level medical center

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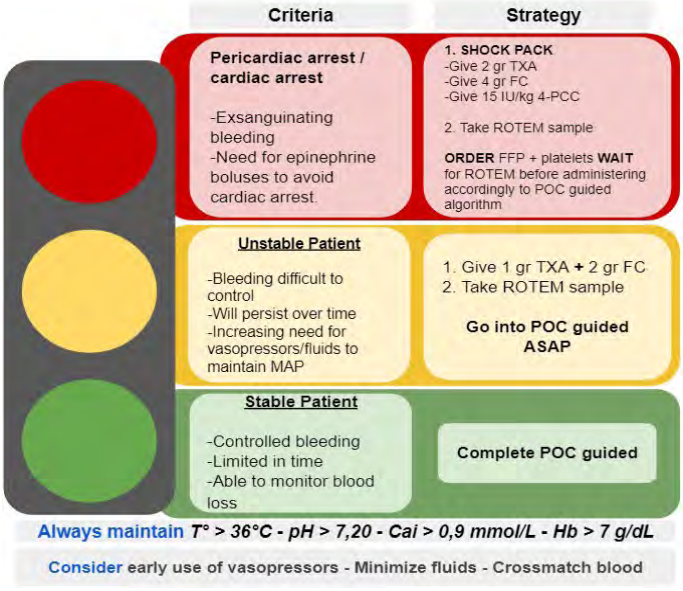
Background and Goal of Study: Time is crucial when treating a bleeding situation. In order to develop a local protocol for bleeding management, we measured the turnaround times (TaT) of available diagnostic methods and therapeutic options at our medical center.
Materials and Methods: We measured TaT for ROTEM™ EXTEM A5 (TaTA5), standard coagulation test (PT/aPTT/Clauss fibrinogen) (TaTSCT), delivery of blood components (TaTBC) and factor concentrates preparation time (TaTFC). TaTA5 and TaTSCT were defined as the time since the sample was sent through the pneumatic system to the central laboratory until values were shown in the electronic medical record (EMR). TaTBC was calculated from the EMR for red blood cells (TaTRBC), platelets (TaTPLT), fresh frozen plasma (TaTFFP) and cryoprecipitates (TaTCRY). Results were expressed as a median and interquartile range (IQR) in minutes. Mann Whitney U test was used for comparisons between groups (TaTA5 vs TaTSCT). Fisher exact test was used for the prevalence (P) of TaTA5 >16 and 20 minutes, TaTSCT>45 minutes, TaTBC>20 minutes.
Results and Discussion: The studied period was November 2017-March 2018. TaTA5 (n=108)=14,05 (12,72-15,98) and TaTSCT (n=62)=37 (29,25-44,75), p<0,0001. P of TaTA5 >16 and >20= 14,1% and 3,85%, p<0.0001. P of TaTSCT>45=25,53%, p<0.0001 when compared to TaTA5>16 and 20. TaTBC were TaTRBC(n=58)=23,45 (12,26-33,66); TaTFFP(n=28)= 25,15 (16,42-40,16); TaTPLT(n=44)=18,88 (12,68-26,52) and TaTCRY(n=5)=37,96 (26,25-42,71). P of TaTBC>20 was TaTRBC=55,93%;TaTFFP=60,71%;TaTPLT=45,45% and TaTCRY=80%. TaTFC might be dismissed as they were readily available at the operating theatre. TaTSCT results are unacceptable for managing bleeding situations compared to TaTA5. Based on our TaTBC, a fixed-ratio approach may not be feasible in the face of a life-threatening bleeding at our institution. Considering the pathophysiology and logistics, we propose a three-colour bleeding management protocol.



Conclusions: Knowing your TaT is essential for implementing a local bleeding management protocol. Incorporating this logistic element allows timely interventions accordingly to the severity of the scenario.

12AP06-2
Point-of-care coagulation tests are more effective for patients with EuroSCORE II 3 undergoing cardiac surgery

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Background and Goal of Study: Few prospective studies have provided evidence that point-of-care (POC) coagulation tests are necessary in low risk patients undergoing cardiac surgery . We aimed to compare the efficacy of hemostatic therapy determined by POC coagulation tests in patients undergoing cardiac surgery who were at different risk according to their EuroSCORE II (<3 versus ≥3).
Material and Methods: Patients scheduled for cardiac surgery with cardiopulmonary bypass (CPB) were randomized to a conventional or POC group. The criteria for conventional coagulation analyses were as follows: hemoglobin>9–10 mg/dL , fibrinogen>100–150 mg/dL, and platelet count> 5–10×10⁴/μL. A heparin dose of 300–400 U/kg was administered during CPB, the target activated clotting time (ACT) being >450 sec. ROTEM and Hepcon HMS were measured in the POC group and the normal range targeted. Hemostatic therapy comprised red blood cell (RBC), fresh frozen plasma (FFP), and concentrated platelets (PC). Samples were collected at four points: baseline, immediately after initiating CPB, weaning from CPB, and the end of surgery. The patients were also allocated to high or low risk groups according to EuroSCORE II 3 or <3. The primary outcomes were the number of transfused units, blood loss during surgery, and the intensive care unit (ICU).
Results and Discussion: Seventy-two patients were enrolled in the study, 30 being in the high risk and 42 in the low risk group. There were no significant differences in blood transfusion and perioperative bleeding between conventional and POC in the low risk group; however, there were significant differences in the high risk group [Table]. Many retrospective and prospective studies have shown the efficacy of POC for cardiac surgery, most participants having been at high risk, such as EuroSCORE 6–7. Our findings indicate that the efficacy of POC depends on EuroSCORE II.
Conclusion: Hemostatic therapy based on POC coagulation tests reduces requirements for allogenic blood and peri-operative bleeding only in high risk patients (EuroSCORE II 3).

Table : The comparison of transfusion and bleeding between High and low risk group

	High risk			Low risk		
	Control (N=14)	POC (N=16)	P値	Control (N=22)	POC (N=20)	P値
Peri-operative transfusion (unit)						
RBC	8 (6-12)	6 (4-8)	**0.02***	0 (0-6.5)	2 (0-6)	0.9
FFP	8 (0-10)	0 (0-3)	0.75	0 (0-0)	0 (0-2.25)	0.3
PC	10 (0-20)	0 (0-15)	0.55	0 (0-0)	0 (0-0)	0.25
Bleeding (ml)	995±978	744±616	0.41	390±432	480±622	0.59
Transfusion in ICU (unit)						
RBC	0 (0-4.5)	0 (0-0)	0.07	0 (0-0)	0 (0-2)	0.33
FFP	0 (0-3.5)	0 (0-0)	0.19	0 (0-0)	0 (0-0)	0.13
PC	0 (0-0)	0 (0-0)	0.48	0 (0-0)	0 (0-0)	0.29
Bleeding in ICU (ml)	1069±748	623±337	**0.04***	470±214	405±192	0.3
ICU stay (day)	3.1±1.7	8.3±15.6	0.23	2.0±0.4	2.0±0.3	0.68

Mean±SD or Median (Interquartile range) *P<0.05
RBC; red blood cell, FFP; fresh frozen plasma, PC; platelet concentrate

12AP06-3
Comparison of thromboelastometry-assessed platelet function during cardiac surgery in patients with or without hemodialysis

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Background and Goal of Study: Patients on hemodialysis tend to consume more antithrombin (AT) in response to preoperatively administered heparin than patients not undergoing hemodialysis.[1] Lower AT concentration decreases heparin function as anti-coagulant, which results to reduce coagulant factors and platelet function during cardio-pulmonary bypass (CPB).[2] We compared AT, hemoglobin (Hb), fibrinogen (Fib) concentrations, platelet counts (Plt) and Plt function (assessed by rotation thromboelastometry [ROTEM]) in patients on or not on hemodialysis.
Material and methods: We enrolled 163 patients scheduled for CPB and divided them into two groups according to hemolytic dialysis status (HD and non-HD groups). Measurements and serial ROTEM tests (EXTEM and FIBTEM) were performed at four time points: (1) control; (2) immediately after starting CPB; (3) weaning from CPB; and (4) upon completion of the operation. Platelet function was calculated by subtracting the amplitude of FIBTEM from that of EXTEM. A10 denotes the amplitude at 10 min. Clot elasticity (CE) was also calculated using Solomon et al.'s formula.[3] Statistical analyses were performed using Student's t-tests.
Results and Discussion: There were 19 patients in the HD group and 144 in the non-HD group. At all four time-points, AT values were lower in the HD than the non-HD group. Extem-Fibtem A10 at the end of CPB and at the end of surgery, and CE at the end of surgery were lower in the HD than the non-HD group. RBC units and allogeneic transfusion rates were higher in the HD (100%) than in the non-HD group (Table). Therefore, the patients on HD require more blood products to prevent possible massive bleeding, particularly when their EXTEM minus FIBTEM A10 is < 30 mm[4] and CE<75.[3]
Conclusion: Patients on HD undergoing CPB have higher rates of allogeneic transfusion than those not on HD because the former have decreased platelet function and CE influenced by lower AT.
References:
1. Analysis of biological material (Japanese) 2009;32: 234–9
2. Perfusion 1999;14: 437–42
3. Anesth Analg 2015;121:868-78
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Table : The comparison of CBC, fibrinogen, ROTEM, antithrombin, and transfusion, with or without hemolysis dialysis (HD).

	HD (N=19)	Non-HD (N=144)	P
Control			
*Hb (g/dl)	11.5±2.0	12.4±1.8	0.044
*Platelet (x10^5/μℓ)	15.6±5.9	19.5±6.7	0.015
Fibrinogen (mg/dl)	297±79	339±106	0.1
ROTEM(Extem-FibtemA10) (mm)	38±3	41±5	0.16
ROTEM(Clot Elasticity)	113±32	126±43	0.55
*Antithrombin (%)	79±18	95±17	0.0002
CPB start			
Platelet (x10^5/μℓ)	9.6±1.6	12.0±0.6	0.14
Fibrinogen (mg/dl)	170±71	187±88	0.41
ROTEM(Extem-FibtemA10) (mm)	34±7	36±5	0.1
ROTEM(Clot Elasticity)	76±35	80±24	0.53
*Antithrombin (%)	48±12	56±13	0.011
CPB end			
Platelet (x10^5/μℓ)	9.4±4.3	10.5±4.1	0.27
Fibrinogen (mg/dl)	180±77	172±78	0.72
*ROTEM(Extem-FibtemA10) (mm)	30±7	34±6	0.041
ROTEM(Clot Elasticity)	65±32	69±22	0.46
*Antithrombin (%)	48±17	55±11	0.021
Ope end			
Platelet (x10^5/μℓ)	9.7±3.5	10.6±3.6	0.38
Fibrinogen (mg/dl)	213±68	232±76	0.32
*ROTEM(Extem-FibtemA10) (mm)	32±4	36±6	0.02
*ROTEM(Clot Elasticity)	65±15	79±23	0.031
*Antithrombin (%)	57±10	65±12	0.01
Transfusion (Unit)			
*RBC	6 (4-10)	4.5 (0-8)	0.011
FFP	2.3 (0-6)	0 (0-4)	0.87
PC	0 (0-0)	0 (0-0)	0.54
*Allogenic Transfusion (%)	100	65	0.012

Mean±SD or Median (Interquatile) *P<0.05

12AP06-4
Rapid Point-of-Care Detection and Classification of Direct-Acting Oral Anticoagulants with a Novel Thromboelastography DOAC Cartridge

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Background and Goal of Study: Common use of direct-acting oral anticoagulants (DOAC) has resulted in new challenges for emergency patient management where reversal strategies may be appropriate to prevent bleeding. This study tested the hypothesis that it is feasible to detect the presence of DOACs as well as distinguish between factor Xa inhibitors (AFXa) and direct thrombin inhibitors (DTI) using the TEG® 6s system with the newly developed DOAC cartridge.
Materials and Methods: Following IRB approval, blood was collected from consenting subjects at 5 sites in a prospective, open-label, observational clinical trial; 190 subjects on DOACs (On-DOAC, apixaban n=54, edoxaban n=4, rivaroxaban n=57 and dabigatran n=75) and 24 subjects not on DOACs (Non-DOAC). An algorithm was established to detect and classify DOACs. Patients were at trough (20-24 hours post-rivaroxaban or post-edoxaban; 9-12 hours post-apixaban or post-dabigatran) or non-trough (<20 hours post-rivaroxaban or post-edoxaban; <9 hours post-apixaban or post-dabigatran). Reference ranges for the R parameter of the TEG® 6s AFXa and DTI assays were established and used to produce an algorithm, the sensitivity and specificity of which were calculated.
Results and Discussion: The TEG® R parameter reference range for the AFXa assay was 0.6–1.5 minutes, while the reference range for the DTI assay was 1.6–2.5 minutes. Using these values, the devised algorithm gave sensitivities of 98.3% and 100% for factor Xa inhibitor and direct thrombin inhibitor detection, respectively, with a specificity of 100%. Both classes of DOAC were detectable, irrespective of trough and non-trough levels. Patient blood concentrations of rivaroxaban and apixaban correlated with R of the AFXa assay (ρ=0.81 and ρ=0.55, respectively; p<0.0001 for both), while dabigatran concentration correlated strongly with R of the DTI assay (r=0.91; p<0.0001). The novel TEG® 6s DOAC tests were highly consistent in the accurate detection and classification of DOACs regardless of trough or non-trough concentrations, underscoring the potential general clinical utility of these tests.
Conclusions: The TEG® 6s DOAC cartridge rapidly detected and classified DOACs with high sensitivity and specificity with correlation to blood drug concentrations. This point-of-care system should be further evaluated for utility in guided dose adjustments or prompt reversal of these agents in a range of clinical settings.

12AP06-5
Clinical assessment of novel dielectric blood coagulometer (SPOTCHEM HS) in patients undergoing cardiovascular surgery using cardiopulmonary bypass; preliminary prospective observational study

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Background: Dielectric blood coagulometer (DBCM) is a recently developed coagulation test. The methodology of DBCM is based on measurement of dielectric permittivity change, which reflects aggregation/deformation of blood cells and fibrin polymerization during coagulation process. The purpose of this study is to evaluate a performance of a new point of care type DBCM [SPOTCHEM HS HS-7710 (ARKRAY, Inc., Kyoto, Japan)]. In this system, clotting start time (CST) and dielectric clot strength (DCS) are measured as variables reflecting clot formation and clot strength respectively.
Methods: Patients undergoing cardiovascular surgery are included. Samples are collected (1) after induction of anesthesia, (2) after the termination of CPBand protamine administration, and (3) after the sternal closure. We evaluated3 assays: (A) CA as a test initiated by calcium supplementation, (B) EX as a test initiated by tissue factor and calcium, (C) IN as a test initiated by ellagic acid and calcium. We studied correlation between the variables from SPOTCHEM and those from laboratory test or ROTEM. Simultaneous reproducibility in SPOTCHEMassay was assessed using some samples. Pearson's correlation coefficient was assessed in the correlation analyses, and coefficient of variations (CV) was measured as a variable reflecting the simultaneous reproducibility. Statistical significance was defined as P < 0.05.
Results: Fifteen patients were included, Samples from 13 patients were used for correlation analysis and the samples from 4 patients were used for simultaneous reproducibility analyses. SPOTCHEM EX CST showed moderate correlation with

PT-INR (R=0.63), and EXTEM CT (R=0.67). SPOTCHEM IN CST test showed weak correlation with APTT (R=0.26) and INTEM CT (R=0.34). SPOTCHEM EX DCS reflecting the fibrinogen concentration showed strong correlation with fibrinogen by Clauss method (R=0.83) and FIBTEM MCF (R=0.71). SPOTCHEM CA DCS showed strong correlation with platelet counts (R=0.80). The simultaneous reproducibility tests showed that CV in all tests were less than 10%. (All P <0.05)
Conclusion: SPOTCHEM showed acceptable performance for the evaluation of coagulability related with extrinsic pathway, fibrinogen concentration, and platelet count. Its precision performance was also acceptable for clinical use. Further large sized clinical trials are needed to establish clinical usefulness of SPOTCHEM.
(This work was supported by ARKRAY Inc. and Sony IP&S, Inc.)

12AP06-6
Thromboelastography-guided haemostatic therapy improves perioperative blood product resource management and patient outcomes in elective and emergency surgery settings: a meta-analysis

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Background and Goal of Study: Thromboelastography (TEG®) is a point-of-care system for analysing the coagulation process that can guide haemostatic therapy in various surgical settings. While viscoelastic monitoring is recommended for perioperative bleeding management, no meta-analysis has specifically evaluated TEG®-guided transfusion outcomes. This meta-analysis compared TEG®- vs control-guided (clinical judgement/standard coagulation tests [prothrombin time ± international normalised ratio, activated partial thromboplastin time, platelet count, fibrinogen level and activated clotting time]) haemostatic therapy in patients undergoing surgery.
Materials and Methods: English language articles reporting relevant randomised clinical trials (RCTs) in a perioperative setting up to Jan-2018 were identified on MEDLINE (PubMed)/EMBASE using the predefined search strings: ((thromboelastography OR TEG OR viscoelastic) AND (surgery OR surgical OR perioperative) AND (transfusion OR haemosta* OR "blood management" OR hemorrhage)). NOT MEDL(YES) was added to the EMBASE string. Eligible RCTs met predefined inclusion/exclusion criteria. The meta-analysis followed the DerSimonian-Laird random effects method. Estimated outcome differences were determined for TEG® vs controls.
Results and Discussion: Ten RCTs were identified (n=9 elective, included in meta-analysis; n=1 emergency surgery, results summarised). In the elective surgery meta-analysis, platelet (p=0.004), plasma (p<0.001) and red blood cell transfusion (p=0.14), operating room length of stay (LoS) (p=0.005), intensive care unit (ICU) LoS (p=0.04) and bleeding rate (p=0.002) were all reduced with TEG®-guided transfusion vs control. Although blood product use was reduced, mortality rates were similar between groups. In the emergency surgery study, the mortality rate (p=0.049), and platelet (p=0.04) and plasma (p=0.02) transfusions were lower for TEG® vs control. Also, the probability of survival at 28 days (log-rank, p=0.032; Wilcoxon, p=0.027) was greater, and the number of ventilator-free (p=0.10) and ICU-free (p=0.09) days was numerically greater, with TEG® vs control. Although complication rates were higher for TEG® vs control, this difference was not statistically significant (p=0.06) and was likely due to survival bias.
Conclusions: This meta-analysis indicates that TEG®-guided haemostatic therapy enhances blood product resource management and improves outcomes, including LoS, bleeding rate and mortality.

12AP06-7
SEER sonorheometry and platelet function monitoring: a case report

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Background: Coagulation point-of-care tests for coagulation monitoring are commonly used in cardiac surgery. Recently, a new viscoelastic POC device, Quantra®, based on Sonic Estimation of Elasticity via Resonance (SEER) Sonorheometry has entered the market [1]. Previously, we prospectively compared Quantra® PCS to Multiplate® aggregometer ADP and TRAP parameters in a series of 30 cardiac surgery patients, before and after cardiopulmonary bypass. Quantra PCS strongly correlated with platelet count in the overall samples and moderately with ADP-dependent platelet function. Interestingly, we were able to observe a variation of platelet function with Quantra.
Case report: A 60 years old man with no previous antiplatelet therapy underwent a Bentall surgery with an extracorporeal circulation of 98 min. The preoperative platelet count was 121000/µL, the preoperative ADP - 20 U and the Quantra PCS – 11 hPa. After protamine administration the patient showed the following abnormal parameters: low fibrinogen (FIBTEM MCF 7 mm, Quantra FCS 0.9hPa) and platelet dysfunction (ADP 11 U, Quantra PCS 7.7 hPa). Considering the underlying pathology, it was decided to treat low fibrinogen levels with 2 grams of fibrinogen concentrate and correct platelet dysfunction with desmopressin. Desmopressin is thought to moderately enhance platelet function, in particular in patients with aortic valve stenosis. A new Quantra® analysis was run to test the ability of the device to sense the applied corrective treatment with the following results: FCS increased to 2.0 hPa (arriving to normal range) and PCS increased to 9.9 hPa. The patient was brought to Intensive Care from where he was discharged the day after. The overall bleeding in the first 12 hours was 300 mL not requiring any other corrective action.
Discussion: It is generally accepted that conventional viscoelastic tests are not sensitive to platelet function because the employed activation of coagulation cascade (by kaolin, tissue factor or ellagic acid) produces great amounts of thrombin that in turn activates platelets regardless of eventual antiplatelet therapy.
References:
1. Ferrante EA, Blasier KR, Givens TB, Lloyd CA, Fischer TJ, Viola F. A novel device for evaluation of hemostatic function in critical care settings. Anesthesia Analgesia 2016; 123 : 1372-9
Learning points: This is the first time when a viscoelastic test was associated with a parameter of platelet function.

12AP06-8
Thromboelastography point-of-care system for monitoring and quantification of unfractionated and low molecular weight heparins activity as well as therapeutic ranges classification

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Background and Goal of Study: Thromboelastography is increasingly utilized in the management of bleeding and thrombotic complications. The objective of this study was to assess the feasibility of the point-of-care cartridge-based TEG® 6s system to monitor and quantify blood concentrations of low molecular weight heparin (LMWH) as well as unfractionated heparin (UFH). Single TEG® parameters and their combinations were evaluated for their correlation with heparin concentrations. We hypothesized that TEG® combination parameters can accurately classify if heparin concentrations fall into their therapeutic range.
Materials and Methods: Blood samples from healthy participants (n=23, UFH; n=22, LMWH) were spiked with LMWH (enoxaparin; 0–10 IU/mL), or UFH (0–6 IU/mL). Samples with and without heparin were analyzed using the TEG® 6s system including a cartridge containing the Kaolin (CK) and Kaolin with heparinase (CKH) assays. Reaction time R was measured, as well as the combination parameters CK.R-CKH.R, CK.R/CKH.R and CKH.R/CK.R. Nonlinear mixed effect modelling was used to study the relationships between concentrations and parameters, and Bayesian classification modelling for the prediction of therapeutic ranges.
Results and Discussion: CK.R strongly correlated with the activity of LMWH and UFH (p<0.001). Addition of heparinase to CK neutralized the LMWH and UFH effect. Heparin activity could be accurately monitored and quantified in the range between >0.1 IU/mL and <1.5 IU/mL for LMWH and between >0.05 IU/mL and <0.8 IU/mL for UFH with the CKH.R/CK.R ratio. In addition, the three combination parameters effectively classified blood samples in all therapeutic ranges of heparin (subtherapeutic, therapeutic and supratherapeutic) at an accuracy >78%, sensitivity > 65% and specificity >85% for LMWH, and an accuracy of >90%, sensitivity >67% and specificity of >92% for UFH. Furthermore, the combination parameters had a Positive Predicting Value (PPV) of >68% and a Negative Predicting Value (NPV) of >92% for LMWH, and a PPV of >88% and a NPV of >92% for UFH.
Conclusions: This study suggests that TEG®6s could be used to effectively monitor and quantify anticoagulation with both LMWH and UFH. The combination parameters CK.R-CKH.R, CK.R/CKH.R and CKH.R/CK.R were found to effectively classify blood samples into therapeutic ranges based on their respective heparin activity.

12AP06-9
Assessment of coagulation and thrombocyte function after discontinuation of ticagrelor in patients who have previously undergone PCI with insertion of coronary artery stent.

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Background and goal of study: Patients with acute coronary syndrome are today often treated by percutaneous coronary intervention (PCI) with insertion of coronary artery stents and subsequently treated with dual antiplatelet therapy (DAPT), usually a combination of a COX-1 inhibitor (aspirin) and a P2Y12 inhibitor (e.g. ticagrelor). Not seldom the question arises as to when DAPT should be discontinued

before interventional surgery. This decision rests on balancing the risk of bleeding with coronary artery stent thrombosis. The exact duration for which these drugs should be discontinued remains unclear, and a period of 3-7 days is recommended, based on the pharmaco-kinetics and dynamics of the P2Y12 inhibitor. This study was done to investigate coagulation and thrombocyte function prior to and after discontinuation of ticagrelor, in patients who underwent PCI, are taking ticagrelor but discontinue it after one year of therapy in accordance with hospital routines.
Materials and methods: This was a prospective, longitudinal, observational study including 24 patients. Blood was taken on day 0, before stopping ticagrelor, and then on day 1, 3, 5 and 8 after discontinuation. All patients except one were also taking aspirin. Samples were analyzed using Multiplate (multiple electrode aggregometry), VerifyNow (a light-transmission aggregometry based method) and TEG (thromboelastography). Multiplate and VerifyNow results, normally distributed, were analyzed using paired-samples t-test and data not normally distributed was analyzed using McNemar's test and Wilcoxon's signed-rank test, as appropriate. P-values shown are compared with baseline. Results were evaluated using SPSS statistics.
Results and discussion: In interventional surgery more than 30 arbitrary units per minute (Multiplate) and more than 200 platelet reactivity units (VerifyNow) is usually acceptable. This is considered approximately 20% platelet inhibition. On day 3 after ticagrelor discontinuation, 100% (p=0.016) and 75% (p=<0.001) of patients had reached these levels on Multiplate and VerifyNow tests, respectively. On day 5 the corresponding figures were 100% (p=0.016) and 91% (p=<0.001).
Conclusion: These results support earlier findings that surgery 3 days after ticagrelor discontinuation can be accepted when bleeding risk is moderate and surgery is life-prolonging. VerifyNow may be used to confirm adequate platelet function before planned surgery due to the interindividual differences.

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12AP06-10
Comparison of data received with low-frequency piezoelectric thromboelastography (LPTEG) in patients with different pneumoperitoneum pressures in intraoperative bariatric settings.

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Background and Goal of Study: Bariatric surgery is well known for obese patients treatment due to it benefits. Postoperative venous thromboembolism (VTE) is less common in this cohort. The aim of this study is to compare LPTEG data received in intraoperative settings from bariatric surgery patients with different pneumoperitoneum sets.
Materials and Methods: Patients aged 25-75 y.o. with BMI ≥35, who underwent laparoscopic bariatric surgery (n=68) were divided on two groups: group 1 (n=43) underwent bariatric surgery with standard pneumoperitoneum pressure presets (12-15mmHg); group 2 (n=25) underwent bariatric surgery with higher than standard pneumoperitoneum pressure presets (≥16mmHg) due to visualization problems. Mean duration of surgical intervention was 60-80 min; duration of pneumoperitoneum was 45-60 min. LPTEG data were collected on 30 minute of surgical procedure.
Results and Discussion: Blood coagulation constants checked by LPTEG were: Intensity of contact coagulation (ICC), Intensity of coagulation drive (ICD), clot maximum density (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRCL). We received slight increase of all measurements in group 1: ICC by 21.01 %, ICD by 34.57 %, MA by 44.11%, IRCL by 74.38 % above the norm; in group 2 - significant increase in all the measurements: ICC by 38.71 %, ICD by 69.03 %, MA by 98.93 %, IRCL by 118.73 % above the norm.
Conclusions: Higher pneumoperitoneum pressure presets significantly affecting LPTEG data in comparison to standard in intraoperative setting; this may increase intra- and postoperative VTE risk. Further studies are needed to create a VTE prevention roadmap for cases, when high intraperitoneal pressure required.

Perioperative Medicine

13AP01-1
Preoperative coagulation tests are we using the resources appropriately?

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Background and Goal of Study: In April 2016, we conducted an audit to identify areas of improvement in our clinic.
Our Goal was:
1. To reduce the unnecessary coagulation tests in pre-operative clinic patients for Elective Arthroplasty.
2. To educate the pre-operative nursing staff about appropriateness and interpretation of coagulation tests.
3. To reduce the variation of practice which can lead to patient safety issues?
Following this audit & review of the evidence, our unit decided to limit the use of routine coagulation tests and robust processes were introduced. The current audit aimed to identify appropriateness of our screening and reduction in the waste which is in keeping with the policies of our demand optimisation group (3).
Materials and Methods: We looked at the number of coagulation tests done every month from April 2016 to October 2018 along with the indications.
Results and Discussion: Since April 2016, number of monthly tests has been dropped significantly from 24%-4%. Previously, indications of the coagulation tests were unknown, patient son anti-platelets/ anticoagulants, with alcohol excess, liver disease. The main indication now is: Patients on Warfarin, being pre-assesed the day before the operation. It is recognised that inherited coagulation defects are rare & indiscriminate screening by routine coagulation testing will only very rarely identify previously undetected problems (1). Additionally, the British Committee for Standards in Haematology (BCSH) has shown poor positive predictive values for bleeding with an abnormal coagulation test, whereas peri-operative bleeding rates were similar in patients with and without abnormal coagulation tests (2).
Conclusions: Although, the overall number of coagulation tests has been drastically reduced, we still need regular review of our practice. Regular training of the auxiliary staff about coagulation tests, efficient use of resources and improvement in communication within the team is a key to success.
References:
1. van Veen JJ, Spahn DR and Makris M. Routine preoperative coagulation tests: an outdated practice? BJA 2011; 106 (1): 1 – 3
2 Chee YL et al. Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures. British Committee for Standards in Haematology 2008; 140 (5): 496 - 5042.
3. Demand optimisation in Diagnostics. Scottish Government. 22nd February 2017

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13AP01-2
Pre-Commercial Procurement Development in the Perioperative Period. Empowering Patients by Professional Stress Avoidance and Recovery Services" (STARS).

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Background and Goal of Study: The Horizon 2020 project named "Empowering Patients by Professional Stress Avoidance and Recovery Services" (STARS, website: https://stars-pcp.eu/), challenge the industry to develop new personalised eHealth solutions in order to reduce stress related to healthcare procedures. Pre-Commercial Procurement (PCP) is the procurement of research and development of new innovative solutions before they are commercially available.
Materials and Methods: Coordinated by the Maastricht University, a Consortium of five academic Hospitals uses the European Commission's (EC) PCP contractual scheme to challenge and stimulate European industry to design and develop new and alternative resilient support tools, to be applied in the field of patients, planned for surgery, with the aim of reducing stress and anxiety as well as improving the health condition of the patient during the complete care path. The project duration will be 48 months. The preparatory phase (Ph) 0 consisted in the need assessment, uncovered functionalities, prior information notice and open market consultation. Currently we are at the call for tender process, under review by the EC. PCP

involves different companies competing through different phases of development. Next phases will be held in the next two years: solution design (Ph 1), prototype development (Ph 2) and prototype field-testing (Ph 3). Last phase will be done in the clinical setting, comparing at least two devices in each Hospital.
Results and Discussion: From January 2017 to December 2018 the Consortium has been working as a multidisciplinary group, with the contribution of Clinicians from each Hospital and experts on: PCP, Ethics, Financial and Dissemination. The clinical needs have been assessed in the perioperative setting by Anaesthesiologists, Surgeons, Nurses, Psychologists and a Clown (Children's Hospital). Basic commonalities found were: knowledge, information, communication, timely monitoring, personalizing environmental area and ensuring data for research purpose.
Conclusions: The eHealth solution will target the reduction of healthcare related stress as early as in the preclinical phase, proceeding through hospitalization until the end of the aftercare period. We expect that the reduction of stress, experienced by patients, will lower the harmful side-effects of sedating drugs, shorten hospital stay, shorten recovery time and relieve caregivers and related persons from continuous assistance.

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13AP01-3
Pre-anesthetic assessment impact on patient anxiety

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Background and Goal of Study: The majority of the patients feels anxious with the anesthetic-surgical process, with a preoperative prevalence up to 80%. This condition may, among other factors, be due to the lack of knowledge regarding anesthesia. It is known that patients evaluation and pre-anesthetic assessment diminishes anxiety, allows better interaction with the patients and increases their satisfaction throughout the hospital stay. The aim of this study is to evaluate the impact of pre-anesthetic assessment on patients anxiety.
Materials and Methods: This study was developed in the pre-anesthetic assessment of ambulatory surgery. Sixty patients were randomly assigned to group A (n = 30) and group D (n = 30). A socio-economic and anxiety questionnaire was applied, through the Spielberg scale. Group A answered as soon as they arrived at the ambulatory surgery unit. Group D answered after the nursing appointment, of reading a booklet explaining the anesthetic act, and the anesthesiology appointment. The data was analyzed in SPSS with the Mann-Whitney and Chi-Square tests. All patients signed informed consent and the study was approved by the ethic board of the hospital.
Results and Discussion: The groups were homogeneous in relation to socio-demographic data. The mean age was 46.4 years in group A and 54.5 years in group D. In both groups anxiety was verified. When comparing the two groups, it is found that there was no statistical difference in the Spielberg scale. Masculine gender showed greater anxiety in group A, situation that has been reversed in Group D, with the female gender with the highest values, although it had not statistically significant difference.
Conclusions: The pre-anesthetic assessment is of great importance in the perioperative process. Booklets are helpful tools that allow patients to feel more aware of the anesthetic procedure. No differences were identified between the two groups regarding surgery-related anxiety. The application of questionnaires to ambulatory patients, a reduced sample size, and low level of schooling may have hampered other outcomes.

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13AP01-7
Prolonged preoperative fasting induces postoperative muscle protein catabolism and insulin resistance with induction of pro-apoptotic endoplasmic reticulum stress in rats

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Background and Goal of Study: Preoperative fasting (NPO) is one of oldest, but common routines in the modern clinical practice to prevent pulmonary aspiration during anesthesia. However, it is clear that prolonged fasting before surgery triggers systemic metabolic responses to precipitate glycogenolysis and gluconeogenesis. These compensatory mechanisms of increasing blood glucose after prolonged fasting leads to lean muscle wasting and development of postoperative insulin resistance. However, there is a lack of valid experimental models and the underlying pathophysiology of metabolic derangement due to prolonged fasting remains unclear. This study investigated the molecular pathways of skeletal muscle catabolism and impaired glucose metabolism in a rat model of preoperative fasting and surgical stress.
Materials and Methods: Rats were randomly assigned to preoperative fasting (NPO 12h) or liberal (free access to chow and water) group. Following midline laparotomy, cecectomy was performed in these anesthetized animals. Twenty-four hours after surgery, blood samples and left gastrocnemius were obtained for analysis.
Results and Discussion: Compared to sham fasting (fasting+sham operation) animals, blood glucose levels were significantly elevated in animals received cecectomy, indicating that surgery stress is an independent metabolic factor of inducing postoperative hyperglycemia. However, level of postoperative blood glucose was significantly lower in the liberal group (260.2±27.4 vs 218.4±24.9 mg/dl, fasting vs liberal; P=0.03). Serum concentrations of creatine kinase (CPK) and myoglobin were also reduced in surgical rats that had free access to chow before operation (CPK 448±108 vs 282±94 U/L, P=0.018; myogloblin 240±60 vs 138±76 ng/ml; P=0.08). Western blotting showed that the protein expressions of pro-apoptotic markers for endoplasmic reticulum (ER) stress, namely CHOP, TRAF-2 were enhanced, while protein levels of anti-apoptotic ER chaperone proteins (GRP78/BiP) were not different.
Conclusions: We successfully developed a "2-hit" model of fasting with surgical stress, and characterized the dysregulation of glucose metabolism and catabolism of skeletal muscle in rats. Our preliminary results demonstrate that remote muscle protein catabolism after fasting and surgical stress is associated with increased tissue ER stress and the pro-apoptotic reaction.

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13AP01-8
Functional capacity monitoring during a prehabilitation program in patients undergoing elective major thoracic surgery

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Background and Goal of Study: Prehabilitation with high intensity exercise training improves preoperative status and reduces postoperative complications due to an increase in functional capacity. There is still controversy regarding prehabilitation in thoracic surgery. It remains unclear which tests can better distinguish potential beneficiaries and monitor the patient's functional capacity throughout the program. Even though cardiopulmonary exercise testing (CPET) is the gold standard to assess functional capacity, field tests such as the six minute walking test (6-MWT) may be an alternative. The main goal of our study was to assess the effect of prehabilitation on functional capacity measured by field tests.
Materials and Methods: Patients ≥ 18 years old undergoing major thoracic surgery (lobectomy, segmentectomy, wedge resection or pneumonectomy) with a waiting time of ≥ 4 weeks were included. The program consisted of: supervised in-hospital high-intensity exercise training, smoking cessation support, nutritional counseling and supplementation and mindfulness sessions. Baseline and upon termination of the program assessment of the functional status (6-MWT, hand grip, sit-to-stand test), nutritional status, level of physical activity and level of anxiety and depression were performed.
Results and Discussion: 28 patients were enrolled. There were no significant differences between the baseline and presurgical functional capacity field tests except for the sit-to-stand test. The mean 6-MWT distance was 492,2 m (84,3 SD) at baseline and 484,2 (82,8 SD) presurgically (p 0,494), the dominant hand-grip was 30,2 kg (9,1 SD) and 30,9 (8,7 SD) (p 0,506) and the sit-to stand number of repetitions were respectively 12,69 (5,1SD) and 14,5 (6,16 SD) (p 0,029). The 6-MWT was unable to detect an improvement in functional capacity, which is concordant with previous studies where the 6-MWT found no improvement while CPET parameters showed clear differences. Functional capacity monitorization during prehabilitation may be important especially in frail non-oncological patients, given that the appropriate time of surgery could be guided by the result of the intervention.
Conclusions: The implementation of a prehabilitation program in major thoracic surgery patients has not shown an improvement of the functional capacity measured by field tests. Further studies are needed in order to establish which feasible tests can provide a better assessment of the functional capacity.

13AP01-9
Pre-operative dental evaluation in patients undergoing elective cardiac surgery

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Background and Goal of Study: The issue of health-care-associated infections (HCAIs), and the role of the anesthesiologist, is a key issue. In 2007, the Mount Sinai Hospital established a pre-anesthesia evaluation clinic (PEC) for day admission cardiac patients three to seven days before surgery. We evaluated 196 patients seen in the PEC with a main concern for pre-dental clearance. It was recommended that all patients obtain pre-operative dental clearance, and more than half (52%) did so. While the literature suggests that dental infections may be associated with an increased risk of endocarditis in surgical patients, some studies have shown no heightened risk of cardiac infections in patients forgoing dental screenings prior to surgery. We sought to elucidate whether patients seen at the PEC who obtained pre-surgical dental clearance experienced improved outcomes compared to those who did not receive dental clearance prior to their surgical interventions.
Materials and Methods: In order to evaluate a possible pre-surgical dental clearance and infection association, we reviewed the medical records of 196 consecutive patients who were seen at the PEC prior to elective cardiac surgery from July 2017 to late January 2018. 102 patients had dental clearance, while 94 did not have dental clearance (mean age 59 years old vs 61 years old, p=0.28, 41% vs 40% female, p=0.92, ASA class 3.02 vs 3.07, p=0.14). In our population, 50 patients underwent aortic valve replacement (AVR), 3 underwent AVR and CABG, 1 underwent AVR, CABG, and mitral valve replacement (MVR), 4 underwent AVR and MVR, 38 underwent CABG, 9 underwent CABG and MVR, 72 underwent MVR, and 19 had other procedures. Preoperative demographic and comorbidity data were analyzed using independent t-tests.
Results and Discussion: We found no significant differences between the pre-dental clearance group and those who did not receive pre-dental clearance in terms of post-operation infections (zero instances vs one instance, p>0.05), length of ICU stay (2 days vs 2 days, p=0.815), or mortality associated with elective cardiac procedures (zero instances).
Conclusions: In this group of patients evaluated at the pre-anesthesia evaluation clinic, there were no major post-operative infections that can be associated with any dental pathology. Our findings are in accordance with several similar reports. Further evaluation of pre-operative dental clearance and its potential to prevent morbidity is warranted.

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13AP01-10
A retrospective audit of referral of elective surgical patients to the pre-operative assessment clinic

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Background and Goal of Study: Anaesthesiology-led pre-operative assessment clinics (POACs) have many benefits in perioperative care and patient pathway planning [1]. In our hospital, surgical referral of patients to POAC is based on ASA physical status and surgical severity (mild, moderate or severe). Those who are ASA 1 and planned to undergo mild surgery need no anaesthetic assessment prior to admission. Those who are ASA 1 for moderate surgery, or ASA 2 for mild surgery, are telephone-assessed by an anaesthetic nurse. All other combinations of ASA status or surgical severity are booked for POAC anaesthesiologist review. Despite this, many patients with significant comorbidities attend for elective procedures without proper pre-assessment.
Materials and Methods: Two patient groups were examined.
1: We retrospectively reviewed all referral forms received by the POAC during a six-week period to determine: (a) the proportion of complete forms; and (b) the number of patients who met POAC referral criteria.
2: We retrospectively reviewed the electronic records for all patients attending the operating theatres during a one-week period to determine: (a) what proportion of these patients met POAC referral criteria; (b) how many had been referred; and (c) how many of those referred had been assessed prior to their surgery.
Results and Discussion: 1: 159 referral forms were received during the first audit period. (a) Of these, 88 (55%) were complete in providing both ASA status and surgical severity. (b) 86 of the 88 complete forms (98%) met POAC referral criteria. 2: 102 of the 125 patients (82%) who attended the operating theatres during the second audit period were elective cases. (a) 87 of the 102 (85%) met POAC referral criteria. (b) Only 46 of the 87 patients (53%) were actually referred prior to their surgery. (c) Of the 46 patients, 38 (83%) were pre-assessed, either by telephone or in person.
Conclusions: 45% of POAC referral forms in our institution were incomplete, 47% of elective surgical patients meeting POAC criteria were not referred before surgery, and 17% of referred patients were not assessed by POAC before surgery. The results have been used to support changes in the POAC referral system to increase the number of elective patients reviewed before surgery.
Reference:
[1] Jeanna D Blitz et al. Preoperative Evaluation Clinic Visit Is Associated with Decreased Risk of In-hospital Postoperative Mortality. Anesthesiology 2016;125(2):280-294.

13AP02-1
Validity of Edmonton Frail Scale in Identifying Frailty among Elderly Patients undergoing elective major abdominal surgery

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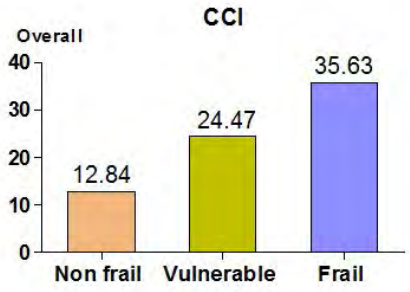
Background and Goal of Study: Frailty is defined as diminished physiological reserve predisposing one to adverse outcomes when exposed to stressors. Currently, there are no standard frailty assessment tools being used perioperatively. Edmonton Frail Scale (EFS), which is validated for use by non-geriatricians is a candidate for this role. Patients are grouped into non-frail, vulnerable and frail. However, there is paucity of data currently validating EFS as a frailty screening tool in the preoperative assessment clinic (PAC) setting. The primary aim of this study is to assess the validity of EFS in identifying elderly frail patients undergoing elective major abdominal surgery in Singapore.
Materials and Methods: This is a prospective observational study, done on patients aged 70 years and above attended PAC in Singapore General Hospital prior to elective major abdominal surgery from Dec 2017 to Sep 2018. The Comprehensive Complication Index (CoCI) and Postoperative Morbidity Survey (POMS) were used to assess their 30-day and 1-week postoperative morbidity respectively. Their length of hospital stay was also recorded.
Results and Discussion: A total of 134 patients with a mean age of 76 years old were recruited. A higher mean CCI score was found in patients in the frail group compared to non-frail and vulnerable group. ($p < 0.0001$). A similar result was demonstrated when POMS analysis was performed. ($p < 0.005$) Frail patients were also found to have longer length of hospital stay compared to non-frail or vulnerable patients. ($p < 0.0001$) This result illustrates the importance of recognizing frail patients preoperatively, allowing adequate time for counselling, patient optimization and hospital resource allocation

Figure 1 Comparison of CCI score among different frailty groups



Conclusions: This study suggests that EFS is a valid tool for frailty assessment in the preoperative setting. Frail patients have an increased incidence of postoperative morbidity and prolonged hospital stay.
References:
1. Dasgupta, et al. Frailty is associated with postoperative complications in older adults with medical problems. ARCH GERONTOL GERIAT 2009; 48, 78–83

13AP02-2
Domains of Frailty among Elderly Preoperative patients in Singapore using Edmonton Frail Scale

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Background and Goal of Study: Frailty is defined as functional reduction in physiological reserves causing increased susceptibility to environmental stresses. The Edmonton Frail Scale (Figure 1, EFS) is a screening tool that has been validated for use by non-geriatricians in the surgical population[1]. EFS assesses nine domains of frailty (cognition, general health status, functional independence, social support, medication usage, nutrition, mood, continence, functional performance). Each of these domains could potentially be optimised prior to surgery. Therefore, we aim to analyse the contribution of the different EFS domains among the elderly Singaporean surgical population. This could guide the design of intervention program targeting specific domains of frailty preoperatively.
Materials and Methods: Patients aged 70 and above are routinely screened with EFS in the Singapore General Hospital's Preoperative Assessment Center (PAC). We prospectively collect this clinical EFS data on patients who attended PAC between April to June 2018 with Institutional Review Board approval. Sociodemographic data, comorbidities (Charlson Comorbidity Index), type of surgery, blood investigations and EFS score were recorded and analysed.
Results and Discussion: There were 458 patients aged 70 and above who attended PAC within that period. 58 were frail (EFS >7) and 87 were vulnerable (EFS 6-7). The most common domains among the frail are Functional Performance (FP), General Health Status (GHS) and loss of Functional Independence (FI). Among the frail patients, the contribution of functional performance to EFS score is 100% as compared to 67% in the normal group (refer figures). The loss of functional independence and polypharmacy (use of >5 types of medicines) are factors which appear only in the frail group. This can be reflective of disease progression.
Conclusion: FP, GHS and FI are the most common EFS domain effected among frail patients. Preoperative interventions programs should include functional prehabilitation and post-discharge activities of daily living planning.
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13AP02-3
Assessment of the Feasibility and Patient Acceptability of Edmonton Frail Scale (EFS) in Identifying Frailty among Elderly Surgical Patients attending Preoperative Assessment Clinic (PAC)

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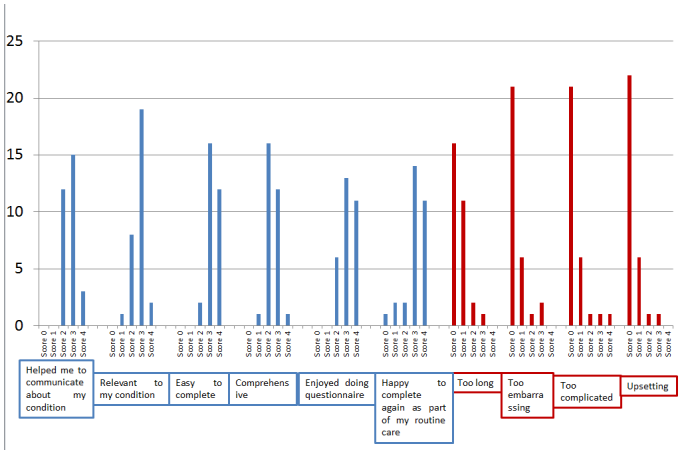
Background: Frailty is defined as reduced physiological reserve, increasing susceptibility to stresses including surgery. The preoperative identification of frailty allows better risk stratification and optimization. There is a need to find a frailty assessment tool that has high validity yet is feasible to administer in a busy PAC. The Edmonton Frail Scale (EFS) was designed to screen frail patients in the primary care setting by non-geriatricians and has been validated in surgical populations.[1] We aim to evaluate the feasibility and patient acceptability of EFS in the Singapore PAC setting.
Methods: This is a single-center, prospective observational study conducted at Singapore General Hospital (SGH). The study protocol was approved by the Institutional Review Board (CIRB 2018/2548). 30 patients aged 70 years and above who attended SGH PAC prior to major abdominal surgery in August 2018 were enrolled. The QQ-10 questionnaire was used to measure patient acceptability of the EFS. It consists of 10 questions- 6 questions assess how patients value EFS, while 4 assesses the burden of EFS. The patient scores each question from a scale of 0 to 4 - 0 being strongly disagree and 4 strongly agree. The mean value score is calculated as an average score of the 6 value questions, while the burden score is calculated from the 4 burden questions. A high value score and low burden score indicates good patient acceptability.[2] Time taken to administer the EFS was recorded.
Results: The overall mean value score was 72% (SD 11.9) and mean burden score was 12% (SD 17.1). This shows good patient acceptance of the EFS. The average time taken to complete EFS was 225 seconds (SD 57).
Conclusion: This study suggests that EFS is a feasible frailty assessment tool with high patient acceptability in the PAC.
Figure 1 Frequency distribution of scores for each question in the QQ-10



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13AP02-4
Prevalence of Frailty and Multimorbidity amongst Elderly South East Asians

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Background: Frailty is defined as functional reduction in physiological reserves, increasing susceptibility to environmental stresses. Multimorbidity[1] is commonly defined as the presence of two or more chronic medical conditions in an individual. Both are associated with poor postoperative outcomes and increased healthcare utilisation. However, there is paucity in the literatures on the common types of comorbidities among the frail patients. This knowledge could help in designing a systematic approach to screen and optimize preoperative frail patients. Our study aims to establish the comorbidity profile among the elderly patients and its association with frailty.
Methods: Patients aged 70 and above are routinely screened with Edmonton Frail Scale[2] (Figure 1, EFS) in the Singapore General Hospital Preoperative Assessment Centre. We prospectively collect this clinical data on patients who attended between April to June 2018 with Institutional Review Board Approval (CIRB 2014/651/D). Sociodemographic data, comorbities (Charlson's Comorbidity Index), type of surgery, blood investigations and EFS score were recorded and analysed.
Results: The incidence of frailty is 13%, while the population at risk comprises another 19%. This represents 32% of patients screened at PEC. The frail population has a higher mean age (80 vs 76 years old overall) and more females (69%). The comorbidities in the frail group which have significantly higher incidence than in the non-vulnerable group are anaemia (58.6% vs 33.5%) (figure 2), diabetes mellitus (DM) (50% vs 24.6%) (figure 3), chronic kidney disease (CKD) (44.8% vs 11.1%) (figure 4), ischemic heart disease (IHD) (24.1% vs 15.3%) (figure 5) and end stage renal failure (ESRF) (22.4% vs 0.01%). Median number of comorbidities increases from 2 in non-vulnerable to 3 in vulnerable and 4 in frail group (figure 6).
Conclusion: There is an association between increasing frailty status and multimorbidity. The most common comorbidities among frail patients are DM, CKD, ESRF, IHD and anaemia. Incorporation of clinical guidelines and pathways targeting optimization of these conditions at the preoperative clinic setting should be encouraged. Further studies on effectiveness of intervention strategies for these patients should be explored.
References:
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13AP02-6
Grip strength as a clinical predictor for the length of stay in patients undergoing elective total joint replacement – a prospective observational Southeast Asian study

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Background and Goal of Study: Handgrip strength (HGS) is a simple, non-invasive and quick bedside assessment, shown to correlate to a patient's physical fitness and frailty status. In perioperative medicine, HGS has the potential to help in risk assessment prior to surgery. However, studies looking at HGS as a predictor of postoperative length of stay (LOS) have been inconclusive. Furthermore, data from Asian surgical populations are lacking. Our primary aim is to evaluate HGS as a predictor of LOS in the Singaporean total joint arthroplasty (TJA) population, and to examine factors that affect preoperative HGS.
Materials and Methods: This is a single-centre, prospective observational study recruiting patients between 65 and 90 years old undergoing elective TJA over a 12-month period. HGS was measured using JAMAR Plus+ Dynamometer in the preoperative evaluation clinic. Postoperative outcomes recorded were LOS and 30-day readmission rates. The relationship between HGS and LOS was investigated via three methods, namely linear regression analyses; one-way ANOVA comparing the average LOS of subjects divided into quartiles according to their preoperative HGS, and 2-tailed Student's t-test comparing age and gender-corrected classification of patients into "weak" and "no weakness" based on previously published population normative values. Separate linear regression analysis was also performed to examine factors that affect preoperative HGS.
Results and Discussion: 315 subjects were recruited (Fig.1). Mean LOS was 5.2 days. All three statistical approaches fail to demonstrate any significant relationship between HGS and LOS. Preoperative haemoglobin had a negative linear association with LOS (B=0.39, p=0.002) while preoperative urea had a positive linear association with LOS (B=0.25,p=<0.001)(Fig.2). Younger age, higher preoperative haemoglobin levels, higher weight, height and BMI and male gender were associated with higher preoperative HGS.
Conclusions: Our study found no meaningful correlation between HGS and LOS in this cohort undergoing elective TJA. Reasons for our negative findings could in part be explained by the contribution of other unmeasured factors that affect LOS, such as social factors determining readiness to discharge. Further studies looking at other outcome measures may shed light on the utility of HGS in the assessment of frailty.

13AP02-8
Validation of the PreOperative Score to predict PostOperative Mortality (POSPOM) in a Dutch cohort of surgical patients

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Background: Surgical risk assessment tools can be used to identify patients at higher risk for postoperative complications and death and who may benefit from additional postoperative follow-up. Recently Le Manach et al. (2016) developed the PreOperative Score to predict the PostOperative Mortality (POSPOM) score which incorporates age, comorbidities and planned type of surgery to predict the risk percentage of in-hospital death. In this study, we validated the POSPOM for in-hospital mortality and analyzed its potential to predict postoperative complications in a heterogeneous Dutch cohort of surgical patients.
Methods: Patients originating from the control cohort of the routine posTsuRgical Anesthesia visit to improve patient outComE (TRACE) study were included in our data-analysis. For each patient the POSPOM score was calculated. The distribution of observed complications among POSPOM values were analyzed and used for calculation of predicted percentages of patients with complications by using logistic regression analysis. Area under a receiver operating characteristic (ROC) curves were calculated for in-hospital mortality and complications, the latter classified as serious when scored grade IV or V, according to the Clavien-Dindo Classification of surgical complications.
Results: In the patient cohort (n = 2424) the median POSPOM score was 24 (IQR 20-28). In-hospital mortality rate was 0.6% (n = 14), which was lower than the 1.286% predicted risk of in-hospital mortality according to POSPOM. No deaths were observed below a score of 24. A POSPOM cut-off value of 24 showed a sensitivity of 100% and specificity of 48% for the prediction of in-hospital mortality. In total 25.9% of patients developed at least one complication and 2.3% of patients developed a serious complication. The POSPOM showed a good discriminative power for in-hospital mortality (AUC 0.86) and a fair discriminative power for the development of a serious complication (AUC 0.74).
Conclusion: The POSPOM is a good model for the prediction of in-hospital mortality in the control cohort of the TRACE study. However, the observed in-hospital mortality rate of 0.6% is lower compared to the predicted 1.286% risk of in-hospital mortality according to POSPOM.

13AP02-9
Use of APACHE II score and ASA-PS in emergency abdominal surgical patients in the InCare trial. A post-hoc substudy.

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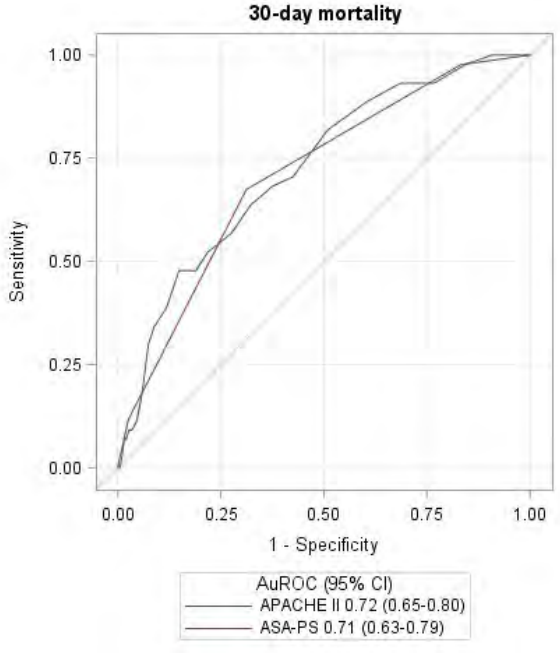
Background and Goal of Study: Patients undergoing emergency major abdominal surgery have high risks of morbidity and mortality. The aim of this post-hoc study was to assess the predictive value of the Acute Physiology and Chronic Health Evaluation (APACHE) II score and American Society of Anesthesiologists Physical Status (ASA-PS) in these high-risk patients.
Materials and Methods: We included patients screened for eligibility in the InCare trial. In brief, in the InCare trial adult patients undergoing major emergency abdominal surgery were randomly allocated postoperatively to an intermediate care unit or standard ward care. We excluded patients with "do not resuscitate" orders. The predictive values of the APACHE II score and ASA-PS were evaluated with area under the receiver operating characteristics curve (AuROC) statistics with 95% confidence intervals (CIs). The primary outcome was 30-day mortality, and secondary outcome was unplanned admission to an ICU within 30 days of surgery.
Results and Discussion: A total of 885 patients with an overall 30-day mortality of 5.0% were included. 7.9% of patients were admitted to ICU's. The AuROC (95% CI) for 30-day mortality was 0.72 (0.65-0.80) for the APACHE II score and 0.71 (0.63-0.79) for ASA-PS. Correspondingly, AuROCs (95% CI) for admissions to the ICU was 0.65 (0.59-0.71) and 0.61 (0.54-0.67) for the APACHE II score and ASA-PS, respectively.
Conclusions: The APACHE II score and ASA-PS predicted 30-mortality reasonably well and unplanned admission to the ICU poorly in this cohort of emergency major abdominal surgical patients.
Acknowledgements: The InCare trial steering committee and site-investigators.

Characteristics	All Patients	Survivors	Non-survivors	P-value
Median age (IQR), n=885	67 (56-76)	66 (55-75)	79 (70.5-86)	<0.001
Median APACHE II index (IQR), n=885	11 (8-15)	11 (8-15)	16 (11-21)	<0.001
ASA-PS ≥3, n=821	272 (33.1%)	234 (31.2%)	29 (67.4%)	<0.001

Mann-Whitney U test for continuous data, χ2-test for categorical data.



13AP02-10
Comparison between the new model SAMPE II, the Revised Cardiac Risk Index and Charlson Comorbidity Index, in the prediction of in-hospital postoperative mortality within 30 days.

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Background and Goal of Study: Identifying the highest risk patient in the preoperative period could improve care and enhance safety. In this context, we developed and revised a preoperative risk stratification model: SAMPE II. This is a statistical model that estimates the probability of in-hospital death within 30 days, by the analysis of four variables: age, ASA-PS classification, nature of surgery (elective vs emergency) and severity of surgical procedure (non-major and major). The patients are classified in 4 classes of probability of postoperative in-hospital death in 30 days: class I (< 2%); class II (2% - 5%); class III (5%-10%), class IV (> 10%). The aim of this study is to compare the acuracy of the SAMPE II model with two widely used risk scores, the Revised Cardiac Risk Index (RCRI) and the Charlson Comorbidity Index (CCI), in the prediction of postoperative in-hospital death within 30 days.
Materials and Methods: We analyzed a cohort of 1206 patients over 16 years old submitted to non-cardiac surgery between January 2016 and August 2018. The variables of SAMPE II, the RCRI and the CCI were collected by the analysis of electronic medical records by a trained research staff. The final outcome was postoperative in-hospital death within 30 days. Statistical analysis was performed by SAS version 9.4 and RStudio version 1.0143. To compare the accuracy of SAMPE II, RCRI and CCI for prediction of in-hospital mortality in 30 days we used the C-statistic. The DeLong's test was used to compare the three AUROC.
Results and Discussion: Mortality in the sample was 3.56% (n = 43). SAMPE II presented a good predictive capacity (AUC 0.88), superior to CCI (AUROC 0.83) and RCRI (0.76). There is a significant difference between AUROC SAMPE II and AUROC RCRI (p = 0.001) and there is no difference between AUROC SAMPE II and AUROC CCI (p = 0.205). SAMPE II showed good accuracy, with the advantage of using few variables that can be easily collected in the preoperative period
Conclusions: The SAMPE II Model is a simple and accurate tool to identify patients at high preoperative risk.

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13AP03-1
Perioperative inverted takotsubo syndrome

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Background: Takotsubo Syndrome is a rare disease that consists in a contractility segmentary alteration induced by stress. It usually affects apical or mesoventricular segments. Inverted Takotsubo is an extremely peculiar variant, where ventricular dysfunction is in basal level.
Case Report: 84 year old woman waiting for orthopaedic toe surgery with locoregional anaesthesia. As a personal medical history, she is hypertensive treated with enalapril/hidroclortiazyde. Previous to any endovenous medications, she presents atrial fibrillation with a wide QRS, hemodynamic instability needing cadioversion, resulting in sinusal rhythm and presenting in EKG (electrocardiogram) a low ST in antero-lateral side and hypotension. Patient is transferred to ICU (intensive care unit) with the suspicion of cardiogenic shock due to ischemic event. Troponin determination results to an important elevation of markers of myocardial damage (TnT(multisensible troponin T): 2300). A cardiac catheterization is performed, and in the ventriculography is noticed an alteration in the segmentary contractility, affecting the total of mediumbasal segments compatible with InvertedTakotsubo Syndrome, that makes a moderate systolic dysfunction. Coronary arteries without injuries. Patient required two days treatment with dobutamine and noradrenaline. In a week after the episode, transthoracic echocardiography showed normal contractility in all segments.
Discussion: Inverted Takotsubo syndrome is caused by stressing situations, but is must be included in the differential diagnosis of myocardial dysfunction. It is frequently caused by stress situations, as the case reported. Treatment does not differ from the conventional Takotsubo Syndrome, consisting in supportive measures for cardiac failure while contractility function is recovered.
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Learning points: Even though is an exceptional case, preoperative anxiety is an important factor to prevent. Stress can trigger disease by itself. Takotsubo syndrome has to be included in the differential diagnosis of perioperative myocardial dysfunction, especially in anxious elderly woman.

13AP03-2
Anesthetic management in patient with dilated cardiomyopathy for major abdominal surgery: a case report

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Background: Dilated cardiomyopathy (DCM) is characterized by cardiac enlargement and impaired systolic function of one or both ventricles. Patients with DCM have impaired systolic and diastolic function, ventricular arrhythmia and may develop congestive heart failure (1).
Case Report: We are presenting a case report of a 61-year-old male patient with dilated cardiomyopathy (LVEF 30%), hypertension, diabetes mellitus type 2, AFF, obesity, gout, NYHA classification III and ASA class IV scheduled for major digestive surgery (Whipple procedure).Preoperatively anti-diabetic drugs, ACE inhibitor, diuretics and anticoagulants were stopped, but carvedilol and statins were continued. Pre-induction vital signs were: BP: 151/83 mmHg, HR: 98/min, RR: 20/min, SpO2=95%.We made preload of 250 ml cristaloid solution and thoracic epidural catheter was inserted at Th8-Th9.Under aseptic condition central venous catheter was placed in right internal jugular vein and right arterial line was inserted. Slow induction to general anesthesia was carried out with midazolam 2 mg, lidocaine hydrochloride 108 mg, fentanyl 50 µgr, propofol 60 mg, ketamine hydrochloride 54 mg and 65 mg of rocuronium bromide. Anesthesia was maintained with sevoflurane MAC 0.7-1 and thoracic epidural analgesia. Infusion with magnesium sulfate 1 gr/hr and 20 mg/hr of ketamine was started after intubation. Intra-operative hypotension will be corrected with infusion of epinephrine 3-6 µgr/min if necessary. Intravenous fluids during the surgery were given 100-150 ml/hr. The surgery lasted for 5 hours and all time during the surgery the patient remained stable.
Discussion: Anesthetic management of patient with dilated cardiomyopathy is associated with high morbidity and mortality. Of utmost importance is having invasive monitoring (IAP and CVP),avoiding drug induced myocardial depression, having adequate pain management, maintaining normovolemia, adequate perfusion and urine output, prevention of increased preload and afterload, and avoiding arrhytmia, hypotension and tachycardia during surgery.
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Learning points: Patients with dilated cardiomyopathy are quite challenging for anesthetic management. Good pre-operative preparation, use of invasive monitoring (CVP and IAP), maintaining normovolemia, well controlled analgesia, avoiding hypotension and tachycardia are very important in the intra- and postoperative period.

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13AP03-3
Chronic hypertension during abdominal aortic aneurysm repair surgery

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Background and Goal of Study: Chronic hypertension has higher incidence in perioperative setting. It increases the risk of complications like acute hypertension, bleeding, myocardial ischemia and stroke. Perioperative management of these patients during vascular surgery could be challenged because the additional co-morbidities like diabetes mellitus, vasculopathy and cardiac disease. For this reason, we conducted a retrospective study to observe the complications and mortality associated with chronic hypertension during abdominal aortic aneurysm repair surgery.
Materials and Methods: After ethical committee approval we retrospectively review medical records of patients undergone abdominal aortic aneurysm repair surgery. Age, sex, ASA physical status, chronic hypertension (controlled or uncontrolled), type of surgery (open or endovascular; scheduled or urgent), anaesthesia type, postoperative complications (acute hypertension, bleeding, acute renal failure, heart failure, stroke and cardiac arrest) and mortality were recorded. A multivariate analysis of chronic hypertension, postoperative complications and mortality was conducted using SPSS Software. A p value <0.05 was statistically significant.
Results and Discussion: Our study included 137 patients undergone abdominal aortic aneurysm repair surgery. 94% was men, mean age of 72 years old, 67% ASA III and IV and 73% have chronic hypertension. Controlled hypertension (defined as values <160/90 mmHg without serious complications related to hypertension) was seen in 83% of these patients. Endovascular surgery was performed in 44% and open procedure in 56% of patients. Surgery was scheduled in 83% and urgent in 17% of patients. General anaesthesia was performed in 73% (combined with

epidural analgesia in 36%) and regional anaesthesia in 27% of cases. Controlled chronic hypertension was not associated with postoperative complications (CI 95% 0,581-2,982 p 0,510) and mortality (1-year mortality CI 95% 0,786-5,240 p 0,144; 2-year mortality CI 95% 0,655-3,845 p 0,306). Our results suggest that perioperative control of chronic hypertension could benefit the outcome in this patients because the lack of postoperative complications and mortality.
Conclusion: Our results suggest that perioperative control of chronic hypertension could benefit patients undergone abdominal aortic aneurysm repair surgery. Nevertheless, further investigation could be done for analyse this association in larger prospective studies.

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13AP03-4
Prognostic value of lung ultrasonography after on-pump cardiac surgery

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Background and Goal of Study: Postoperative pulmonary complications (PPC) are still common after cardiac surgery and associated with worsening of clinical outcomes. Lung ultrasonography (LUS) can be a promising tool to predict PPC but requires further studies. The goal of our study was to assess the prognostic value of lung ultrasonography after on-pump cardiac surgery.
Materials and Methods: Thirty-nine adult patients after elective on-pump cardiac surgery were enrolled into a prospective observational study. All patients received postoperative mechanical ventilation and weaning according to the local protocol. Hemodynamic and respiratory parameters were assessed after ICU admission and at 6 and 24 hrs postoperatively. We calculated the number of B-lines in each of 12 pulmonary quadrants [1], as well as the total sum of B-lines. The reference chest X-ray was performed at 24 hrs after surgery. We also assessed the duration of mechanical ventilation and the length of ICU stay. 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: Lung ultrasonography was possible in all patients. The PaO_2/FiO_2 ratio ≤300 mm Hg was associated with the higher sum of B-lines: 9 (5–15) in comparison with 4 (2–8) in patients with normal oxygenation (p = 0.04). The chest X-ray identified PPC with atelectatic changes in 27 (69%) patients and, additionally, pleural effusion in 18 (46%) patients. The ROC analysis revealed that the sum of B-lines ≥ 10 at 6 hrs after surgery can predict changes on the chest X-ray at 24 hrs with AUC 0.82, sensitivity 86% and specificity 76% (p=0.02). The sum of B-lines, measured at 6 hrs after surgery, was significantly higher in prolonged mechanical ventilation: 15 (14–27) as compared to 10 (3–13) B-lines in patients with tracheal extubation within 12 hrs postoperatively (p = 0.02).
Conclusions: Lung ultrasonography can be a valuable bedside approach to reveal PPC and requirement for prolonged mechanical ventilation in patients after on-pump cardiac surgery.
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13AP03-5
Is intraoperative cardiac arrest rate decreasing in a Brazilian university hospital?

Braz L.[1], Pignaton W.[1], Arthur M.[1], Pacchioni M.[1], Braz J.[1], Braz M.[1], This study was performed by the Anaesthesia Cardiac Arrest and Mortality Study Commission at the Department of Anaesthesiology, Medical School, Universidade Estadual Paulista (Unesp), Botucatu, Brazil

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Background and Goal of Study: Intraoperative cardiac arrest (CA) is distinct from CA occurring elsewhere in the hospital because the CA is always witnessed and recognized quickly[1]. We showed a high intraoperative and anesthesia-related CA rates (34.6 and 3.35 per 10,000 anesthetics, respectively) in our hospital from 1996 to 2004[2]. Since that period, our institution has developed initiatives to improve the care of surgical patients. Then, we examined both intraoperative and anesthesia-related the CA rates, causes and triggering factors in a Brazilian university hospital.
Methods: This observational study was approved by local IRB. We analyzed all reported intraoperative CA that occurred in the operating room and postanesthesia care unit between 2005 to 2016. CA rates were calculated for the following characteristics: ASA physical status classification, sex, age, anesthesia technique, surgical procedure, and surgery specialty. All CAs were reviewed and classified into the following triggering factors: patient's condition; surgery; and anesthesia. The CA rates were expressed per 10,000 anesthetics, and 95% confidence intervals (CIs) were compared with x^2 test or Tukey's test for multiple comparisons among proportions. Data were considered to be significant when P < 5%.
Results: We reviewed 75,112 consecutive anesthetics, and 189 intraoperative CAs represented an overall rate of 25.1 (95% CI: 21.4-29.8) while anesthesia-related CA rate was 1.6 per 10,000 (95% CI: 0.6-2.6). Most of CA rates occurred in ASA physical status ≥ III (P=0.01), neonates and elderly (P=0.02), general anesthesia (P=0.03), emergency surgery (P=0.02), and multispecialty, cardiac and vascular surgery (P=0.04). Sepsis and multiple organ dysfunction syndrome, ruptured aneurysms and trauma were the main causes of patient's condition, which was the main triggering factor of CA rate (P=0.01). The respiratory management was the main cause (88.9%) for anesthesia-related CA rate.
Conclusions: Despite intraoperative CA rates are still high in our hospital, both intraoperative and anesthesia-related have declined in relation of the period 1996-2004. ASA physical status ≥ III, neonates and elderly, emergency procedure, and multispecialty surgery teams had the highest CA rates.
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Acknowledgements: Financial supported: grant# 88881.196780/2018-01(CAPES)

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13AP03-6
Intraoperative and anesthesia-related cardiac arrest according to country´s Human Development Index: a systematic review with proportional meta-analysis and meta-regression analysis

Braz L.[1], Morais A.[1], Gabriel N.[1], Rafael S.[1], Braz M.[1], Braz J.[1], This study was performed by the Anesthesia Cardiac Arrest Study Commission at the Department of Anesthesiology, Medical School, Universidade Estadual Paulista (Unesp), Botucatu, Brazil

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Background and Goal of Study: The spectrum of cardiac arrest (CA) causes in intraoperative period is differentiated from in-hospital CA, because it is not only related to the patient´s condition, but also to the surgery and anesthesia[1]. There is a great difference among countries in relation to health and safety care in surgery and anesthesia. We compared literature data on intraoperative and anesthesia-related CA rates according to country´s Human Development Index (HDI) in two time periods. In addition, we analyzed the intraoperative and anesthesia-related CA rates according to country´s HDI and over time.
Methods: According to IRB, there was no need for ethical approval. A systematic review was performed using electronic databases to identify studies in which patients presented intraoperative and/or anesthesia-related CA rates. Proportional meta-analysis was performed to compare the intraoperative and anesthesia-related CA rates by HDI status (low-HDI *versus* high-HDI) and by time period (pre-1990s *versus* 1990-2018). In addition, we evaluated data on intraoperative and anesthesia-related CA rates according to HDI and over time by meta-regression.
Results: 78 studies from 24 countries assessing 18 million anesthetic administrations were included. Proportional meta-analysis showed, per 10,000 anesthetics, that perioperative CA rates declined in high-HDI countries (from 9.7 before the 1990s to 5.4 in the 1990-2018; P<0.0001) and increased in low-HDI countries (from 16.7 before the 1990s to 21.8 in the 1990-2018; P<0.0001); the anesthesia-related CA rates declined in both high-HDI (from 3.1 before the 1990s to 1.1 in the 1990-2018; P<0.0001) and low-HDI (from 12.9 before the 1990s to 6.2 in the 1990-2018; P<0.0001) countries. Meta-regression showed that intraoperative and anesthesia-related CA rates decreased with increasing HDI (P=0.0001 and P=0.001, respectively), but not over time (P=0.62 and P=0.42, respectively).
Conclusions: There is a consistent reduction in both intraoperative and anesthesia-related CA rates in high-HDI countries, but an increase in perioperative CA rates and a significant decrease in the anesthesia-related CA rates in low-HDI countries comparing the two time periods. Intraoperative and anesthesia-related CA rates were 4- and 5.7-fold higher, respectively, with low- compared to high-HDI countries during 1990-2018.
Reference:
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Acknowledgements: Financial support: FAPESP, CNPq, CAPES

13AP03-7
Acute effect of lipid emulsion on glycocalyx integrity in surgical patients, a microscopic and biochemical pilot study

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Background and Goal of Study: Endothelial glycocalyx (EG) is a sugar-based vascular lining of the inner surface of endothelial cells. It has been proved to have an essential role in vascular homeostasis. Lipid emulsions as a part of parenteral nutrition (PN) are widely used in patients in the setting of critical care and perioperative medicine. Lipids due to their structure may potentially interact with EG. We hypothesized a possible effect of lipid administration on EG.
Materials and Methods: Patients in general ICU or in surgical ICU after major abdominal surgery or cardio surgery were assessed for eligibility for this pilot observational study in University Hospital Hradec Kralove. EG was measured indirectly by automated sublingual videomicroscopy calculating a parameter PBR which describes the amount of lateral deviation of red blood cells from the central column and directly by levels of syndecan 1 and 4 in plasma as a degradational product, the study was performed during the first day of adding lipids as a part of their PN. The patients were given the lipid part of PN for 6 hours in prescribed dose of 1g/kg. Measurements were performed before lipid administration (T0) and 30 minutes after (T6) the infusion of lipid emulsion was terminated. The statistical analysis was performed at the level of significance $p<0.05$.
Results and Discussion: Fifteen patients were studied, PBR increased after the lipid infusion with no statistical significance (T0 = 2.14 ± 0,22mm, T6 = 2,24 ± 0,29mm, p = 0,13). At T0 there was in group statistically significant variability ($p < 0.0001$). Syndecan 1 and 4 showed similar T0 group variability ($p < 0.0001$). At T6 both the syndecan 1 and 4 showed statistically significant decrease in their particular levels. Syndecan 1: T0 = 2580 ± 1013ng/ml, T6 = 2365 ± 1077ng/ml, p = 0,02; syndecan 4: T0 = 134 ± 28ng/ml, T6 = 123 ± 40ng/ml, p = 0,04.
Conclusion(s): In our study, we proved that six hours long lipid infusion had no detrimental effect on the EG integrity assessed by PBR value and by syndecan 1 and 4 plasmatic levels. Observed decrease of syndecans shortly after lipid infusion allows us to hypothesize even possibly protecting effect of lipids on EG.
Acknowledgements: Funding: Ministry of Health of the Czech Republic, grant no. 15-31881A, all rights reserved. Trial registration: ClinicalTrials.gov, Identifier: NCT02783443.

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13AP03-8
Anesthetic consideration in patient with intraoperative quetiapine-related refractory hypotension: a case report

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Background: Quetiapine is a well-tolerated second generation atypical antipsychotic, which is an antagonist at serotonin, dopamine, histamine, and adrenergic receptors with moderate to high affinity [1]. We present a case of intraoperative quetiapine-related refractory hypotension.
Case Report: A 76-year-old, male patient who was scheduled for a colostomy take down. He had a history of emergency operation with sigmoid volvulus 3 months ago, which was required multi-doses of phenylephrine and continuous norepinephrine infusion for controlling hypotension. We recognized his schizophrenia medication during preanesthetic evaluation for second operation, but there were no history of cardiovascular disease. He took night dose of quetiapine 125 mg and lorazepam 2 mg before surgery. After 30 min of induction, blood pressure decreased to 62/30 mmHg, which was initially controlled with boluses of phenylephrine 100 μg and fluid loading. However, blood pressure decreased to 64/38 mmHg 20 min after initial treatment. Even though repeated treatment with phenylephrine and ephedrine, systolic arterial pressure was not increased up to 80 mmHg. So, we infused vasopressin 0.1 IU kg^{-1} h^{-1} after 2 IU bolus dose injection, and systolic hypotension (< 80 mmHg) was controlled with phenylephrine. A total of ephedrine 20 mg, phenylephrine 1100 μg, and vasopressin 11IU were used during the operation. Hemodynamic during recovery of anesthesia was stable and he was transferred to intensive care unit.
Discussion: Preoperative quetiapine as well as another atypical antipsychotic medication could result in refractory hypotension in patients receiving general anesthesia [2]. Vasopressin seems to have contributed to sustaining a blood pressure, even though its effect was not as well as expected [2]. However, phenylephrine and ephedrine are not effective as much as enough in restoring blood pressure because quetiapine antagonized the adrenergic receptors.
References:
1. Peuskens J: The management of schizophrenia: focus on extended-release quetiapine fumarate. Neuropsychiatr Dis Treat 2011, 7:549-564.
2. Poole KA, Weber N, Aziz M: Case report: quetiapine and refractory hypotension during general anesthesia in the operating room. Anesth Analg 2013, 117(3):641-643.

Learning points: So, Caution may be necessary when planning anesthesia for patients taking quetiapine, and consideration should be given to preparing adequate medicine, included vasopressin, phenylephrine, and ephedrine.

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13AP04-1
Effect of intraoperative hypotension on postoperative renal function in arthroscopic shoulder surgery – a retrospective study

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Background and Goal of Study: There are reports that hypotension during surgery reduces renal function after surgery. Arthroscopic shoulder surgery tends to decrease blood pressure due to position, and even the Bezold-Jarisch reflex. The authors hypothesized that patients with arthroscopic shoulder surgery, which had decreased blood pressure, had decreased renal function after surgery and planned a retrospective study.
Materials and Methods: We reviewed the medical records of patients who underwent arthroscopic shoulder surgery (n = 640) from July 2013 to March 2015 after approval of IRB review. Interactions of vital signs are recorded at intervals of 5 minutes on our anesthesia recording paper. The number of times the mean arterial pressure (MAP) was recorded below 50 mmHg was recorded. Patients who fell below 50 mmHg at one time were assigned to the hypotension group (n = 150), and those who did not have the normal group (n = 490). The preoperative, postoperative, 1 day, and 3 day postoperative examinations were recorded. In addition to the mean comparison, the ratio of postoperative Creatinine(Cr) before Cr (Crpo/pre) was investigated. Comparisons between the two groups were performed using an independent sample T-test. In addition, Spearman rho nonparametric correlation analysis was performed to determine which factors influenced postoperative renal function.
Results and Discussion: Unlike the expectation, almost all patients had decreased Cr after surgery compared to before surgery.(Fig.1.) There was no difference between Cr and GFR in the T-test between the two groups. There was no difference between the two groups in the ratio of Cr after surgery to preoperative Cr. In Spearman rho correlation analysis, the more the number of recorded MAPs was less than 50 mmHg, the higher Crpo/pre immediately after surgery($r=0.081$, $p=0.048$).
Conclusions: Almost patients had decreased Cr after arthroscopic shoulder surgery with the sitting position. Exposure to long-term hypotension in the sitting position is likely to reduce renal function
References:
Hallqvist L, Granath F, Huldt E, Bell M. Intraoperative hypotension is associated with acute kidney injury in noncardiac surgery: An observational study. Eur J Anaesthesiol 2018; 35: 273-9.

13AP04-2
Effect of intraoperative trans-oesophageal doppler versus flotrac guided fluid therapy on renal allograft outcome for living donor renal transplantation surgery

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Background and Goal of Study: ESRD patients undergoing renal transplantation are highly sensitive to hypo and hypervolemia. CVP guided fluid therapy is not actually predict fluid responsiveness. The objective of this study was to compare the effects of intra-operative transesophageal (TED -using flow corrected time , FTc)- versus FloTrac (using SVV, Stroke volume variation)- guided fluid therapy on renal allograft outcome in ESRD patients undergoing renal transplantation.
Materials and Methods: 60 patients of ESRD undergoing live related renal transplantation were allocated in to two groups. In Group 1(30 patients), TED, while in Group 2- FloTrac was used for guiding fluid therapy perioperatively. General anaesthesia was administered as per institutional protocol. Group 1, FTc was measured and a threshold of 350 ms was used, while in group 2, SVV was measured and a threshold of SVV more than 10% was used to administer boluses of balanced salt solution. In both the groups the total intra-operative fluid given and the post-operative serum creatinine at days 1, 3, 7, 10, 30, 60 and 90 were compared. Histopathological evidence of rejection was sought in patients where graft rejection was suspected.
Results and Discussion: No statistically significant difference was found in the total amount of intra-operative fluid administered (p=0.089) in both the groups, although significantly lesser number of fluid boluses was required in the Flow Trac group (p<0.001). There was no significant difference in the trend of post-operative serum creatinine (p>0.05) and histopathological evidence of graft rejection (p>0.05) between both the groups.
Conclusions: Both Trans-oesophageal Doppler (TED) and FloTrac can be used effectively to guide fluid therapy in end stage renal disease patients undergoing living donor renal transplantation, with no difference in the outcome of renal allograft function or of post-operative complications. We recommend the use of either of these two methods as reliable indicators of fluid status in these patients in place of CVP.
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13AP04-3
Do changes in Perfusion Index (deltaPI) reflect changes in Stroke Volume (deltaSV) during preload-modifying maneuvers?

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Background and Goal of Study: Changes in stroke volume (deltaSV) induced by a lung recruitment maneuver (LRM) have been shown to accurately predict fluid responsiveness during protective mechanical ventilation (1). Cardiac output monitors are used in a limited number of patients. In contrast, all patients are monitored with a pulse oximeter, that may enable the continuous monitoring of a peripheral perfusion index (PI). We postulated that changes in PI (deltaPI) may reflect changes in deltaSV during fast modifications of cardiac preload.
Materials and Methods: We studied 47 patients undergoing surgery and ventilated with a tidal volume of 6-8 ml/kg. All patients were monitored with a pulse contour technique enabling the continuous monitoring of SV and with a pulse oximeter enabling the continuous monitoring of PI (Radical 7, Masimo). LRMs are part of our protective mechanical ventilation strategy and were performed by increasing airway pressure up to 30 cmH20 for 30 secs. Fluid loads (250 ml of saline 0.9% in 10 minutes) were performed in patients who experienced a deltaSV >30% during LRMs and were therefore presumed as fluid responders (1). DeltaSV and deltaPI were recorded and compared both during LRMs and fluid loads.
Results and Discussion: LRMs induced a 26% decrease in SV and a 27% decrease in PI (p<0.05). We observed a fair relationship between deltaPI and deltaSV (r2= 0.34). A deltaPI ≥26% predicted a deltaSV >30% with a sensitivity of 83% and a specificity of 78% (AUC 0.84, 95%CI=0.71-0.93). 24 patients experienced a deltaSV >30% and subsequently received fluid. Fluid loads induced a 16% increase in SV and a 17% increase in PI. All but one patient were fluid responders (deltaSV >10%). The relationship between deltaPI and deltaSV was significant but weak (r2= 0.19).
Conclusions: DeltaPI may be used as a surrogate for DeltaSV during an LRM but not during a fluid load. These findings may be explained by the fact that a 10min fluid load is likely associated with more changes in vasomotor tone and sympathetic activity (both factors known to affect PI) than a 30sec LRM. The quantification of LRM-induced deltaPI has the advantage to be non-invasive, affordable and practical. It has potential to provide clinicians regular updates regarding the fluid responsiveness status of their patients.
Reference:
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13AP04-4
Influence of the Restrictive Fluid Management on the recovery of Gastrointestinal Motility after Whipples Procedure

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Background: In Pancreatic surgery perioperative fluid restriction can enhance recovery of gastrointestinal function.
Materials and Methods: To evaluate the efficacy of two perioperative treatment regimens, a prospective and retrospective study of the results of Whipples Procedures in 78 patients with both benign and malignant pathology of the bilio-pancreato-duodenal zone for the period from 2003-2017 was conducted. Since 2015 in our clinic, ERAS has been used successfully in patients undergoing Whipples procedure. For the purpose of comparative analysis of this study, the patients were selected from two groups: Group I (n=39, 2015-2017), which were treated in accordance with, and after the implementation of the ERAS; and Group II (n=39), where patients were retrospectively selected from the cohort treated in 2003 – 2014 in accordance with “traditional methods”. The volume of intraoperative infusion therapy, the period of recovery of the gastrointestinal motility and the rate of delayed gastric emptying were studied.
Results and Discussion: Volume of Intraoperative infusion therapy with crystalloids was significantly lower in I group (2100 ml 95% CI: [1988; 2300] vs 3300 ml 95% CI: [3100; 3500]; p <0.001). Patients in Group I returned to normal diet faster than patients in Group II (1.00 95% CI: [1.00; 1.00] vs 6.00 95% CI: [6.00; 7.00] p < 0.001). Further statistical analysis, using ROC curve, revealed a causative relationship between the volume of intraoperative infusion therapy (4 ml/kg/hr vs 6ml/kg/hr) with timing of removal of the nasogastric tube (NGT) and the restoration of enteral nutrition in the postoperative period.
Conclusions: Restrictive fluid therapy significantly reduces the period of recovery of the gastrointestinal motility, as well as increases the rate of delayed gastric emptying in patients after Whipples procedure.

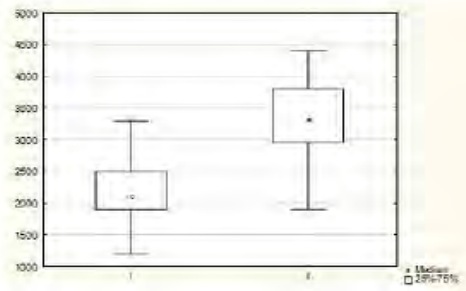

Figure. 1 Volume of intraoperative infusion therapy in comparative groups.

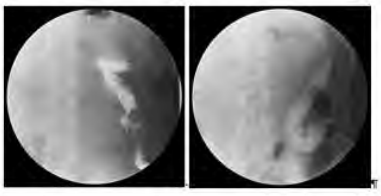
Figure 2. X-ray examination of the passage of the gastrointestinal tract in the patient on the first day.

13AP04-5
Alternative angiotensin metabolites detected in patients with high plasma renin activity during major abdominal surgery

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Background and Goal of Study: The renin-angiotensin-system (RAS) is a major regulator of fluid homeostasis and vascular tone. It contributes to blood pressure regulation during surgery via its major effector Angiotensin (Ang) II, which increases in response to induction of anesthesia. Alternative RAS enzymes like angiotensin converting enzyme 2 give rise to an alternative RAS pathway involving Ang 1-7, which counteracts Ang II via its receptor MAS, mediating potentially protective effects e.g. in acute lung injury. This pilot study aimed to quantify Ang 1-7 and its metabolite Ang 1-5 as alternative RAS markers in the perioperative period, and to find out if changes in RAS activation are associated with intraoperative noradrenaline dose or fluid balance.
Materials and Methods: We studied 9 patients undergoing elective major abdominal surgery who were not taking any RAS modifying drugs. Blood samples were drawn after induction of anesthesia, 1h after skin incision, at end of surgery, and on the 1st and 3rd postoperative day. Equilibrium angiotensin peptides were quantified in heparin plasma using mass spectrometry (LC-MS/MS, Attoquant Diagnostics, Vienna, Austria). Plasma renin activity (PRA) was measured by quantification of Ang I generation by LC-MS/MS. Noradrenaline dose, fluid balance and use of epidural anesthesia were documented. Exploratory data analysis was performed with nonparametric tests.
Results and Discussion: After induction we observed a low-renin (n=4) and a high-renin (n=5) group. The novel renin marker PRA-S (eqAng I+Ang II) showed good correlation with classical PRA (r=0.92, P<0.0001). Surgery caused a rapid, transient increase of RAS metabolites driven by increased renin secretion. Although increases in PRA during surgery were detected in the low- and the high-PRA groups, Ang 1-7 and Ang 1-5 were only detectable in the high-PRA group. Ang I and II were markedly elevated until end of surgery in the high- versus the low-PRA group (P<0.05). Ang II did not correlate with intraoperative noradrenaline dose, fluid balance or use of epidural anesthesia (n=4). Epidurals led to higher intraoperative noradrenaline doses (P=0.032).
Conclusions: Ang I and II plasma levels markedly increase during major abdominal surgery. Activation of the alternative RAS occurs mainly in patients with high PRA. The factors contributing to differential perioperative RAS activation warrant further clarification.

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13AP04-6
Responsiveness to fluid administration to avoid propofol hypotension during anesthesia induction

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Background and Goal of Study: Hypotension during induction with propofol is very common and well reported in pediatric patients (1). In this study, we hypothesized that the administration of 15 ml/kg of saline solution 0.9%, 15 min. before induction with propofol, would reduce the incidence of significant decreases in arterial blood pressure.
Materials and Methods: A systematic multicentric review of our recorded data was analysed. In this study, 88 children, ASA I-II, aged 1-14 years were scheduled for elective surgery under general anesthesia. The study comparing a cohort of children undergoing propofol anesthesia induction (3 mg/kg) receiving 15 ml/kg of saline solution 0.9% (Group 2, n=44) with a cohort not acquiring saline solution (Group 1, n=44). Study data included patient characteristics (gender, age, and weight), hemodynamic parameters measured at baseline and at 5 minute intervals for the procedure duration. Total and percent maximum decrease in systolic blood pressure (SBP) and mean arterial pressure (MAP) relative to baseline were calculated. Data were explored with Chi square analyses, t-tests, and linear correlations.
Results and discussion: Differences in SBP and MAP were not significant comparing the groups 1 and group 2 (46% versus 42% and 86% versus 83%, respectively). Logistic regression models adjusting for covariates that were significantly different between groups also found no significant group differences in SBP (1.18, 95% CI 0.67—2.08) or MAP (1.12, 95% CI 0.51—2.45) (Table 1)

Intubation Difficulty Scale

Parameter	Score
Number of Attempts >1	N_1
Number of Operators >1	N_2
Number of Alternative Techniques	N_3
Cormack Grade - 1	N_4
Lifting Force Required	
Normal	N_5=0
Increased	N_5=1
Laryngeal Pressure	
Not applied	N_6=0
Applied	N_6=1
Vocal Cord Mobility	
Abduction	N_7=0
Adduction	N_7=1
TOTAL: IDS = SUM OF SCORES	N_1-N_7

IDS Score	Degree of Difficulty
0	Easy
0 < IDS ≤5	Slight Difficulty
5 < IDS	Moderate to Major Difficulty
IDS = ∞	Impossible intubation

Rules for Calculating IDS Score:

N_1	Every additional attempt adds 1 pt.
N_2	Each additional operator adds 1 pt.
N_3	Each alternative technique adds 1 point: Repositioning of the patient, change of materials (blade, ET tube, addition of a stylette), change in approache (nasotracheal/orotracheal) or use of another technique (fibroscopy, intubation through a laryngeal mask).
N_4	Apply Cormack grade for 1st oral attempt. For successful blind intubation N_4 = 0.
N_5	Sellick's maneuver adds no points.
Impossible intubation: IDS takes the value attained before abandonment of intubation attempts.	

Cormack Grade[1]

[1] Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anaesthesia 1984;39:1105-1111.

Conclusion: The infusion of saline solution 15 mg/kg before induction with propofol did not show a statistically significant difference in SBP and MAP changes.
References:
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13AP04-7
Kidney function evaluation using NGAL and KIM-1 in surgical patients receiving intraoperative fluid replacement with hidroxyethilstarch: a randomized clinical trial

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Background and Goal of Study: Intraoperative fluid replacement may determine postoperative renal function. The safety of colloids (6% Hydroxyethylestarch 130/0.4 - HES) has been questioned in renal impaired and septic patients. However, effects on surgical patients with normal renal function need further studies. We proposed a prospective, randomized, clinical trial to evaluate the effects of HES infusion on renal function, through the specific biomarkers of renal function (NGAL and KIM-1), in patients submitted to hysterectomy. We aimed estimate the acute kidney injury (AKI) incidence based KDIGO criteria.
Materials and Methods: Sixty ASA I and II patients undergoing to elective open abdominal hysterectomy under general anesthesia were considered. Previous renal dysfunction, obesity, and subjects presenting with decompensate hypertension or diabetes were excluded. Patients were randomized into 2 groups: LR (lactated Ringer's) or HES. A baseline LR infusion (2 ml/kg/h) was used in both groups. Intraoperative fluid losses were restored with bolus of RL 300ml or HES 150ml according to the group when mean arterial pressure (MBP) was < 61 mmHg. Hemoglobin, proteinuria, urinary and plasma creatinine, urinary NGAL and KIM-1 levels were evaluated at 3 time points: before the surgery, 24 hours postoperatively and 40 days after surgery. Patients' urinary output was measured during surgery and during the recovery of anesthesia. The hemodynamic data were evaluated at the same time frame.
Results and Discussion: There were no differences in patient's comorbidities, intraoperative bleeding, postoperative pain or complications. Differences regarding the time of awakening and recovery from anesthesia, or length of hospital stay were not observed. Laboratory analysis of the biomarkers of renal function did not show significant difference within the groups. NGAL(A: 55,266 vs 51,126 p: 0,526; B: 73,848 vs 75,736 p:0,871; C: 42,083 vs 38,105 p: 0,482). KIM-1(A 0 p:0,76; B 0,0715 vs 0,143 p:0,67; C 0 p:0,591). AKI incidence based KDIGO criteria (urinary output) was 16,6% vs 10% p:0,706.
Conclusions: The present study shows that HES is as effective as LR to restore perioperative volume loss and the specific renal function biomarkers analysis at three different time points did not demonstrate significant renal dysfunction.

13AP04-8
A prospective single-blinded randomized controlled clinical trial of perioperative goal-directed fluid therapy versus standard fluid therapy of 283 patients undergoing open radical cystectomy on a standardized postoperative enhanced recovery pathway

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Background and Goal of Study: Postoperative ileus (POI) is a common complication of intra-abdominal surgeries, including radical cystectomy (RC) with reported POI rates as high as 32%. Targeted individualized perioperative fluid management has been shown to improve postoperative outcomes and POI for abdominal surgeries, compared to standard fluid therapy (SFT). We investigated whether goal-directed fluid therapy (GDFT) during open RC impacted POI incidence and other perioperative/postoperative complications by 30 days post-surgery.
Materials and Methods: This prospective single-blinded trial randomized patients undergoing open RC at a US cancer center to GDFT or SFT. Participants were ≥21 years old, had body mass index ≤45, and did not have active atrial fibrillation. The fluid algorithm combines preoperative and postoperative stroke volume optimization and intraoperative stroke volume variation minimalization, using the EV1000 clinical monitoring platform via a Flotrac sensor. All patients were treated on a standardized postoperative enhanced recovery pathway.
Results and Discussion: Between June 2014 and April 2018, 283 randomized RC patients received their assigned intervention, 142 GDFT and 141 SFT. There was no statistically significant difference in incidence of POI between GDFT and SFT arms (25% vs 21%, p=0.5). The overall incidence of complications was 92% with significantly higher incidence in the GDFT arm (p 0.028), but when looking at high-risk complications (16%) there was no difference between the two arms, with the exception of acute kidney injury (AKI), which was more frequent in the GDFT arm (56% vs 40% in SFT arm; p=0.006); all patients experiencing AKI were recovered by the time of hospital discharge as reflected by serum creatinine and glomerular filtration rate.
Conclusions: In patients undergoing open RC, there is no significant benefit in rate reduction of POI or other high grade perioperative/postoperative complications with individualized GDFT using the Flotrac sensor versus standard fluid management.
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Gómez-Izquierdo JC, Trainito A, Mirzakandov D, et al.Goal-directed fluid therapy does not reduce primary postoperative ileus after elective laparoscopic colorectal surgery: a randomized controlled trial Anesthesiology. 2017;127(1):36

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13AP04-9
The influence of pulse oximetry probe location on prediction of fluid responsiveness by Pulse Wave Transit Time (PWTT)

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Introduction: Hemodynamic stability based on normovolaemia is mandatory for patient outcome (1). Pulse wave transit time (PWTT) is a flow-based non-invasive monitoring parameter, consisting of pre-ejection period (PEP) and vessel transit time (VTT). It can be assessed in real time by using standard monitoring including ECG and pulse oximetry. Both the respiratory variation (Δ) of PEP (ΔPEP) and PWTT (ΔPWTT) are promising non-invasive parameters to prediction of fluid responsiveness (2,3). Pulse oximetry measurement at the ear lobe might be preferable to the fingertip during terms of low perfusion or vasoconstriction. However, the effect of different sites of pulse oximetry measurement on PWTT/ΔPWTT has not been studied yet. Thus, we compare the ability of ΔPWTT to predict fluid responsiveness with a pulse oximetry probe at the fingertip and the ear lobe.
Methods: Following IRB-approval and written informed consent 40 patients scheduled for major urological surgery were enrolled. PWTT was monitored continuously (LifeScope® Modell J BSM-9101 Nihon Kohden, Tokyo, Japan). The duration of PWTT lasted from the R-wave in ECG to the detection of a pulse oximeter wave either at the fingertip or the earlobe. Stroke volume was monitored by Esophageal Doppler Monitoring (CardioQ-ODM®, Deltex Medical Ltd, Chichester, UK). All measurements were corrected by Bazett's formula. 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 different ΔPWTT measurements derived from fingertip or earlobe pulse oximetry (ΔPWTT-finger vs. ΔPWTT-ear). A Wilcoxon test was used to to assess differences between fluid responders and non-responders. Difference between ROC curves was tested using the method by DeLong, DeLong, and Clarke-Pearson.
Results: 87 fluid boluses were given. 66 complete datasets were used for ROC analysis. AUC was 0,6307 for ΔPWTT-finger and 0,7164 for ΔPWTT-ear, respectively.
Conclusion: ΔPWTT-ear is superior to ΔPWTT-finger for prediction of fluid responsiveness.
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13AP05-1
Low- versus high dose of intraoperative opioids: a systematic review, meta-analysis and trial sequential analysis.

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Opioid-induced hyperalgesia is described as a state of nociceptive sensitization secondary to opioids administration. With the dual contemporary objectives of increasing postoperative patients comfort and accelerating clinical pathways, it is of uttermost importance to better understand and circumscribe the clinical implications of this phenomenon after intraoperative administration of opioids, especially in the light of postoperative oral opioids consumption epidemic. The objective of this meta-analysis was to investigate whether high doses of intraoperative opioids induces hyperalgesia when compared with low doses. We followed the PRISMA statement guidelines and rated the quality of evidence with the GRADE system. Only trials investigating pain outcomes and comparing two different dosages of the same opioid administered intraoperatively were included. Meta-analyses were performed mostly employing a random effects model. The primary outcome was pain score (analogue scale, 0-10) at 24 postoperative hours. Secondary outcomes included pain score and intravenous morphine consumption equivalents (mg) at 2 postoperative hours. Twenty-five controlled trials, including 1496 patients, were identified. Pain score at rest at 24 postoperative hours was increased in the high dose group (mean difference [95%CI]: 0.2 [0.4, 0.1]; I2=81%; p=0.01). Similarly, at 2 postoperative hours, pain score (mean difference [95%CI]: 0.4 [0.5, 0.2]; I2=79%; p<0.001) and intravenous morphine consumption equivalents (mean difference [95%CI]: 0.9 [1.7, 0.1]; I2=83%; p=0.03) were significantly increased in the high dose group. In conclusion, there is evidence that high dose of intraoperative opioids results in hyperalgesia in the postoperative period, when compared with low-dose.

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13AP05-2
Analgesic impact of intra-operative opioids versus opioid free anesthesia : a systematic review and meta-analysis

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Opioids are administered perioperatively for postoperative analgesia and intraoperatively to control the sympathetic response to surgical stimuli, frequently as a surrogate for presumed pain. However, opioid use during surgery is a matter of dispute in contemporary practice and carries associated risk of side effects such as postoperative nausea and vomiting (PONV). This meta-analysis investigated whether opioid-inclusive, compared with opioid-free anaesthesia, would reduce postoperative pain, without increasing the rate of PONV. We followed the PRISMA statement guidelines for meta-analysis reporting. Only trials investigating pain outcomes and comparing any type of intraoperative opioid administration with placebo injection or absence of intraoperative opioids, were included. Meta-analyses were performed mostly employing a random-effects model. The primary outcome was pain score at rest (analogue scale, 0-10) at 2 postoperative hours. Secondary outcomes included the rate of PONV within the first 24 postoperative hours and length of stay in the postanaesthetic care unit. Twenty-three controlled trials, including 1304 patients, were identified. Pain scores at rest at 2 postoperative hours were equivalent in the opioid-inclusive and opioid-free groups (mean difference [95%CI]: -0.2 [-0.5, 0.2]; I2=83%; p=0.38). The rate of PONV was reduced in the opioid-free group (risk ratio [95%CI]: 0.77 [0.61, 0.97]; I2=16%; p=0.03), while length of stay in the postanaesthetic care unit was similar between groups (mean difference [95%]: 0.6 min [-8, 9]; I2=60%; p=0.90). In conclusion, there is evidence that opioid-inclusive anaesthesia does not reduce postoperative pain, but is associated with more PONV, when compared with opioid-free anaesthesia.

13AP05-3
Gynecological surgery and nociception monitoring qNox and NOL Tm for control surgery stress. A clinical case.

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Background: There are different nociception monitors (1), although at present there is no scientific evidence of which is more sensitive and specific. For the detection of surgical stress there are different strategies: Detection of high frequency waves in the electroencephalogram (qNox, CVI, RE / ES) and derivatives of the autonomic nervous system response (ANI, SPI, NOL TM).
Case Report: Patient 50 years old operated on for abdominal hysterectomy and right ooforectomy by laparoscopy with general anesthesia. Personal antecedents of allergy to aspirin, no Hodkin Lynphom without recurrence 10 years ago, dyspepsia syndrome, anaemia and surgery of myomectomies. We prepared a standard monitoring, Tof cuff for neuromuscular monitoring, hypnosis monitoring with BIS and qCon / qNox in contralateral side, and nociception monitoring with qNox and NOL TM. Anesthesiologist was blind for these monitors and antinociception balance depended on Heart rate and arterial pressure. Induction without incidence with propofol, remifentanil and rocuronium, maintance with general anesthesia with propofol TCI Schnider Model Ce 2.5-3 micrg ml and remifentanil TCI Minto model Ce 2-3,5 ng ml. ERAS protocol and multimodal analgesia (metamizol 2 g, paracetamol 1 g, dexamethasone 4 mg, intravenous lidocaine 1 mg / kg / h, and fentanyl 0.3 microg kg at the end of surgery were administered). The anesthesiologist was blind for these nociception monitors and antinociception balance depended on heart rate and arterial pressure. Both monitors showed high values in different periods of surgery. After surgery and wake up the patient was transferred to postoperative unit. She did not need morphine to control pain and visual analytical score (VAS) was <3. The patient was transferred to the room and during the admission she did not need rescues of morphine. The pain was controlled with analgesia scheduled and discharged on day 3 of the postoperative period.
Discussion: The specificity and sensitivity of nociception monitors is higher than heart rate and arterial pressure, coinciding higher values with episodes of surgical stress. NOL TM multiparametric system seems more sensitive in the marked ranges than qNox, although both systems could point to the most intense surgical events.
References:
(1)Abad-Gurumeta A. et al.Rev Esp Anestesiol Reanim. 2017;64:406-414
Learning points: We need more studies that can show evidence of nociception monitoring in clinical practice.

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13AP05-4
Comparison of postoperative analgesia using intravenous patient-controlled analgesia device between traditional and optimizing basal infusion mode after laparoscopic cholecystectomy

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Background and Goal of Study: A new PCA device, which has the traditional infusion mode as well as optimizing basal infusion mode (OBIM), The OBIM is function that can increase or decrease the basal infusion rate depending on the total amount of bolus doses infused by bolus button within pre-fixed time interval. The purposes of this study is to reveal whether the new PCA device with OBIM will provide better postoperative analgesic effect, to give the evidence that this mode can be used for postoperative analgesia. Therefore, we compared the postoperative analgesic effect of traditional basal infusion or optimized basal infusion mode.
Materials and Methods: All participants were randomly allocated into one of either traditional mode group (group TM) or optimizing basal infusion mode (group OBIM). Both groups infused medicine with 2 ml h-1 of basal infusion rate (BIR), 2 ml of bolus volume, and 10 min of lock-out time. The BIR of group OBIM was automatically controlled to be increased with 0.4 ml h-1 interval if the bolus button is operated within 90 min, or it was decreased with 0.2 ml h^{-1} interval If not within 90 min. We recorded the numeric rate pain scale (NRS) at arrival and departure in the recovery room, and at postoperative 6 hours, 24 hours, and 48 hours in the ward. We recorded the bolus demand and bolus infusion counts at postoperative 6 hours, 24 hours, and 48 hours. We recorded the infused flow rate and infusion volume depending on time sequence. They were analyzed with Mann-Whitney U test, chi-square test, or Fisher's exact test. P values < 0.05 were considered with significant.
Results and Discussion: No statistically significant differences in the NRS score was observed between groups. Total infusion volume at postoperative 48 h was lower in group OBIM (75.7 ± 5.8 ml) than group TM (96.0 ± 0.5 ml) (P = 0.02). Infused flow rate of group OBIM was higher until postoperative 11.5 h, and it was lower after postoperative 17.5 h than that of group TM (P < 0.05). No statistically significant differences in the bolus demand and bolus infusion counts were observed between groups.
Conclusions: Optimizing basal infusion mode is effective to control postoperative pain as much as traditional mode, and it is more effective than traditional mode to reduce consumption of medicine mixed in PCA device for postoperative analgesia after laparoscopic surgery.

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13AP05-6
Whole transcriptome profiling in the nucleus of the solitary tract for antiemetic drug discovery in a rat model of postoperative nausea and vomiting

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Background and Goal of Study: The molecular mechanisms of postoperative nausea and vomiting (PONV) in the brain have not been elucidated. Eating kaolin clay as a type of pica has been examined in recent studies as an alternative behaviour to emesis. The aim of this study was to determine changes in genome-wide gene expression (whole transcriptome) in the nucleus of the solitary tract (NTS), which is considered to be the vomiting center in the human brain, in a rat pica model as surrogate behaviour of PONV for antiemetic drug discovery.
Methods: Forty-nine female Wistar rats were assigned to five groups and treated as follows: lower abdominal surgery followed by administration of 3 mg/kg of morphine (Surg group), no treatment (Naïve group), sham operation (Sham group), morphine administration alone (M group), and normal saline administration alone (NS group). Amounts of kaolin intake during a period of 12 hrs after treatment were recorded. Total RNA and total protein were extracted from the dissected NTS and whole transcriptome sequencing (RNA-seq) was performed for the two groups with the greatest difference in kaolin intake. Pathway analysis was performed to identify candidate molecules and PONV-associated signaling pathways. Gene and protein expression levels of the candidate molecules were compared and verified among the five groups by using RT-qPCR and Western blot. Finally, a behavioural pharmacological study was performed in 25 rats to verify the effect of a candidate antiemetic.
Results and Discussion: The median amounts of kaolin intake were 2.9 g (Surgery), 0.4 g (Naïve), 1.1 g (Sham), 3.5 g (M), and 0.4 g (NS) ($p < 0.001$). There was a significant difference in intake between the M and NS groups ($p < 0.01$). RNA-seq followed by pathway analysis showed that the gene expression levels of tyrosine hydroxylase and dopamine beta-hydroxylase in the catecholamine biosynthesis pathway were significantly decreased in the M group. RT-qPCR and Western blot also showed that these two gene and protein expression levels in the Surg group were lower than those in the Naïve and Sham groups. We postulated that release of noradrenaline, one of the catecholamine pathway end products, increased at the synaptic terminal of the NTS neuron after pica behaviour. Administration of dexmedetomidine (DEX, 25 μg/kg i.p.) after surgery reduced the amount of kaolin intake from 2.8 g (control) to 0.9 g ($p < 0.05$).
Conclusion: Dex has potential as a candidate antiemetic drug for PONV.

13AP05-7
Anti-PONV effect of lidocaine in pediatric surgical patients: A systematic review and meta-analysis.

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Background and Goal of Study: Lidocaine is a common adjuvant for pediatric general anesthesia. It is often used to prevent laryngospasm, propofol-induced pain in surgical pediatric patients. There is some evidence suggesting that the use of an intravenous lidocaine in adult patients undergoing general anesthesia could reduce the incidence of postoperative nausea and vomiting (PONV). However, it remains unclear whether the anti-PONV effect of lidocaine in pediatric patients. The purpose of this meta-analysis was to investigate anti-PONV effect of lidocaine infusion in surgical pediatric patients.
Materials and Methods: A search was conducted of published literature in MEDLINE, EMBASE, Web of Science, and Cochrane Central Register of Control Trials databases. Randomized control trials that evaluated the incidence of PONV after the intravenous lidocaine infusion compared with control were included. The primary outcome was the incidence of PON/POV/PONV within 24 hours after general anesthesia. The protocol of this systematic review and meta-analysis was registered in PROSPERO [www.crd.york.ac.uk/PROSPERO] with a unique identification number (CRD42018099029).
Results and Discussion: Five trials (819 patients) were included with 418 patients receiving intravenous lidocaine infusion. All the studies compared intravenous lidocaine with placebo. The overall incidence of PONV was lower in the lidocaine group compared with the placebo group (RR, 0.77; 95% CI, 0.58-1.02; I2 = 22%; p=0.06). No increase in adverse events was reported.
Conclusions: There was no statistically significant difference suggesting that intravenous lidocaine infusion may be a useful adjuvant to preventing PONV when all trials were included. However, there was limited evidence suggesting anti-PONV effect of intravenous lidocaine in low risk of bias study. Further randomized clinical trials with a low risk of bias are necessary to reach a conclusion.

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13AP05-8
A retrospective study of PONV risk factor and the effect of antiemetics for laparoscopic gynecological surgery in Japan : Hydroxyzine is a promising antiemetic.

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Background and Goal of Study: PONV disturbs early recovery after surgery. We retrospectively analyzed PONV risk factors and the effect of antiemetics for laparoscopic gynecological surgery. An old drug, hydroxyzine has not come under the spotlight, but may have a big potential for PONV.
Materials and Methods: IRB approval was obtained. We collected data from 3820 patients undergoing laparoscopic gynecological surgery in our institute from 2015-2018. Anesthetic management was basically with propofol and opioid (fentanyl and/or remifentanil), dexamethasone (DEX) as an antiemetic and fentanyl-based IVPCA. Types and doses of other antiemetics and adjuvant analgesics were discretionary to attending anesthetists. 5-HT_3 antagonists are off-label and expensive, usually not available in operation room in Japan. Patient factors (age, BMI, motion sickness, smoke status, previous PONV), perioperative factors (entry time, operation time, volatile anesthetics, fentanyl and remifentanil dose, tramadol, IVPCA composition) and antiemetics (hydroxyzine, DEX, droperidol, metoclopramide, domperidone, diphenhydramine and chlorpheniramine) were analyzed with logistic regression for PONV incidence (within 48 hours) as a primary outcome. P<0.05 was considered statistically significant.
Results and Discussion: Refer to Table1 below. Hydroxyzine odds ratio was 0.37 [0.28-0.49], and DEX was 0.72 [0.57-0.91]. Histamine antagonists are not a main player of PONV guidelines. Hydroxyzine, however, may have a stronger antiemetic effect than DEX, to be a standard antiemetic for PONV. In the Apfel score, motion sickness and previous PONV are categorized together as one risk factor, but each risk would be so different that they should not be discussed on the same plate. Previous no PONV must be another strong PONV reduction factor. Apart from Previous studies, aged patients had higher PONV incidence, which may be related to IVPCA. PONV tended to occur on the next morning in the timing of first sitting/standing up/ambulation, which may be associated with the fact that later entry time patients tended to continue IVPCA in that timing.
Conclusions: Hydroxyzine is a promising antiemetic for PONV.

Table 1		Total (%)	PONV+	PONV%	OR (95%CI)	p
Total		3820	1415	37.0		
Hydroxyzine	−	3458	1333	38.5		
	+	362 (9.5%)	82	22.7	0.37 (0.28-0.49)	<0.01
Dexamethasone	−	461	185	40.1		
	+	3359 (87.9%)	1230	36.6	0.72 (0.57-0.91)	<0.01
Droperidol	−	667	259	38.8		
	+	3153 (82.5%)	1156	36.7	0.80 (0.65-0.97)	0.03
Metoclopramide	−	3321	1233	37.1		
	+	499 (13.1%)	182	36.5	0.93 (0.75-1.15)	0.50
Domperidone	−	3752	1391	37.1		
	+	68 (1.7%)	24	35.3	1.00 (0.57-1.76)	1.00
Diphenhydramine*	−	3712	1379	37.1		
(*+diprophylline)	+	108 (2.8%)	36	33.3	0.72 (0.47-1.11)	0.14
Chlorpheniramine	−	3768	1398	37.1		
	+	52 (1.4%)	17	32.7	0.87 (0.46-1.63)	0.67
Patient factor		Total/Median [25%-75%]	PONV+	PONV%	OR (95%CI)	p
Age		41 [36-47]			1.02 (1.01-1.03)	< 0.01
≦30		449	148	33.0		
30-40		1270	453	35.7		
40-50		1589	592	37.3		
50-60		339	136	40.1		
60<		173	86	49.7		
BMI		21.2 [19.5-23.8]			0.93 (0.91-0.95)	< 0.01
18.5≦		493	207	42.0		
18.5-25		2679	1021	38.1		
25<		648	187	28.9		
Smoke status	−	3536	1351	38.2		< 0.01
	+	284 (7.4%)	64	22.5	0.48 (0.36-0.65)	
Motion sickness	−	2674	913	34.1		
	+	1146 (30.0%)	502	43.8	1.48 (1.27-1.73)	< 0.01
Previous PONV	NA	2877	1085	37.7		
	−	674 (17.6%)	181	26.9	0.55 (0.45-0.67)	< 0.01
	+	269 (7.0%)	149	55.4	2.09 (1.60-2.73)	< 0.01
Perioperative factor		Total/median (%)/[25%-75%]	PONV+	PONV(%)	OR (95%CI)	p
Entry time	9°	1264 (33.1%)	398	31.5	-	-
	9° ~15°	1933 (50.6%)	749	38.7	1.42 (1.21-1.66)	<0.01
	15° ~	623 (16.3%)	268	43.0	1.80 (1.45-2.22)	<0.01
Operation time	(min)	97 [66-137]			1.00 (1.00-1.00)	0.21
	≦60	819 (21.4%)	310	37.9		
	60-120	1715 (44.9%)	619	36.1		
	120 <	1286 (33.7%)	486	37.8		
volatile anes. and/or N_2O	No	3220 (84.2%)	1209	37.5	-	-
	≦30min	414 (10.8%)	143	34.5	1.00 (0.79-1.26)	1.00
	>30min)	186 (4.9%)	63	33.9	1.10 (0.78-1.54)	0.35
Fentanyl Dose	(μg/kg/min)	2.18 [1.45-3.19]			1.12 (1.05-1.19)	<0.01
Remifentanil dose	(ng/kg/min)	14.0 [11.3-60.7]			1.02 (1.00-1.03)	0.04
Tramadol	−	3279	1193	36.4		
	+	541 (14.2%)	222	41.0	1.40 (1.14-1.71)	<0.01
PCA	Composition (Fentanyl)	Max duration	Total	PONV+	PONV%	OR (95%CI)	p
None	-	-	21	5	23.8	-	-
PCEA	Depends		22	9	40.9	2.80 (0.65-12.2)	0.17
1	18μg/h : 4μg/bolus	18h	293	71	24.2	1.11 (0.34-3.66)	0.86
2	20μg/h : 20μg/bolus	40h	1559	684	43.9	2.70 (0.85-8.65)	0.94
3	20μg/h : 10μg/bolus	40h	217	82	37.8	2.49 (0.76-8.18)	0.13
4	20μg/h : 20μg/bolus	30h	1708	564	33.0	1.70 (0.53-5.42)	0.37

13AP05-9
Does intra-operative anti-emetic therapy in gastric bypass patients influence the need for post-op rescue anti-emetics?

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Background: Post-operative nausea and vomiting (PONV) is a common, distressing event following bariatric surgical procedures[1]. Previous studies have explored the associations between anaesthetic technique and PONV in bariatric surgical patients using Likert scales, however these are inconsistent. In this study we used administration of rescue therapy as a marker of significant PONV. In 2017 we implemented a standardised bariatric post-op protocol on our electronic prescribing system (EPMA). This eliminates variations due to individual prescribing and enables us to assess administration practices where the only variable is intra-operative technique.
Methods: Electronic prescribing data was downloaded into an excel spreadsheet and integrated with an existing database of bariatric patients using a lookup facility. The hypothesis was evaluated using a Chi-square test. As a secondary endpoint we explored the association between remifentanil based intra-operative techniques and PONV.
Results: Between June 2016 to March 2018 we collected data on 212 patients undergoing primary laparoscopic Roux-en-Y gastric bypass. 78% of the group were female with a median age of 44 (IQR 37-51, range 17-74) and median BMI 49. Intra-operative anti-emetic regimens are shown in Table 1. Intra-operative triple therapy was given to 82 (38.6%) of patients. Over half (53.3%) of all patients received post-op rescue therapy. There was no difference between the remifentanil and the non-remifentanil groups (55% vs 52% p=0.66, ns). Rescue therapy was required in 44/82 (53.6%) patients receiving intra-operative triple therapy versus 79/130 (60.7%) of patients who receiving two or fewer intra-operative anti-emetics (p=0.31, ns).
Conclusions: In this preliminary study were unable to demonstrate a significant reduction in antiemetic rescue doses after triple anti-emetic therapy, although there was a trend towards benefit. We found no association between intra-operative remifentanil usage and PONV. Any benefit of triple therapy may be exaggerated in this study, given that patients receiving intra-operative triple therapy with cyclizine and ondansetron are likely to have further doses of these rescue anti-emetics withheld until a period of time has elapsed, tending to improve the marker of nausea. Further data to follow.
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13AP05-10
Chemotherapy-induced nausea and vomiting (CINV) predicts postoperative nausea and vomiting (PONV) and vice-versa. Partial results of an observational study.

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Background and Goal of Study: Previous PONV in oncology patients has recently been associated with chemotherapy-induced nausea and vomiting (CINV). The aim of this study is to investigate whether inter-individual differences related to PONV are associated with ethnic, demographic, surgical or anesthetic factors and previous chemotherapy-induced nausea and vomiting
Materials and Methods: During the preanesthetic visit, 300 oncological patients classified as moderate or high-risk for PONV by the Apfel Score will be invited to participate in the study. We will register: type of anestesia and surgery, doses of opioids in the Operating Room(OR) and in the first 24 postoperative hours, antiemetics administered, race, family history of PONV and previous history of chemotherapy-induced nausea and vomiting (CINV). Blood sample will be collected by peripheral vein puncture in tubes containing EDTA and will later be genotyped for Single Nucleotide Polymorphisms (SNPs) from candidate genes. Fisher exact test was used to compare the groups, and $p<0.05$ was considered significant.
Results and Discussion: A total of 285 patients were evaluated so far and 113 underwent chemotherapy previous to surgery. The overall incidence of nausea and vomiting in the first postoperative 24 hours was 44.68% and 23.80%, respectively. From these, 113 patients were submitted to Chemotherapy previously to surgery and 69 (61.06%) reported CINV. From these, 34(49.27%) also nauseated in the postoperative period and 20 (28.98%) also vomited in the first 24 postoperative hours. There is a significant difference between groups ($p<0.05$). The subgroup of patients classified as Apfel 4 presented higher incidence of CINV (85.71%) than the overall incidence of CINV.
Conclusions: A history of chemotherapy-induced nausea vomiting is a strong predictor for PONV and should be used as an added risk factor for PONV in the preoperative period of oncological surgery.
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13AP06-1
Preoperative intravenous iron therapy is not associated with significant reduction in perioperative blood transfusion in patients undergoing major surgery: a propensity-matched case-control study

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Introduction: Preoperative anaemia is associated with increased rate of blood transfusion and adverse postoperative outcomes such as mortality and morbidity. Preoperative anaemia is traditionally treated with oral iron or allogenic blood transfusion. Oral iron may take weeks for iron repletion and increased haemoglobin levels, and is commonly associated with gastrointestinal side effects. Intravenous (IV) iron can replenish iron stores rapidly and raise haemoglobin faster. The aim of this study is to compare the incidence of blood transfusion between anaemic patients undergoing major surgery who received preoperative IV iron versus standard oral iron supplementation.
Methodology: Since 2017, patients presenting to the Singapore General Hospital Preoperative Assessment Centre and diagnosed with iron-deficiency anaemia, with at least 1 week to elective major surgery, would be offered IV iron therapy. This is a case-control study comparing 96 patients who received IV iron preoperatively with 96 patients who received oral iron therapy (selected by propensity score matching from historic cohort). All surgeries requiring general anaesthesia or regional anaesthesia were included, except for transplant and cardiac surgery. Historic controls were drawn from 4047 patients who underwent surgery in 2016 before introduction of IV iron therapy, while cases underwent surgery from 2017 to 2018. Propensity score was calculated using ASA status, age, gender, history of ischemic heart disease (IHD) and congestive heart failure (CHF), antiplatelet or anticoagulant use, surgical bleeding risk and preoperative haemoglobin level.
Results: After propensity matching, there was no statistically significant difference in distribution of preoperative variables such as ASA status, age, gender, history of IHD/CHF, antiplatelet, anticoagulant and surgical bleeding risk between the two cohorts. There was no significant difference in proportion of cases requiring transfusion (38.5% in control group versus 39.6% in IV iron group), nor was there a difference in total units of transfusion in either cohort (81 in control group versus 83 in IV iron group). Average time from IV iron therapy to surgery was 10.6 days.
Conclusion: There was no difference in blood transfusion rates between anaemic patients undergoing major surgery who received preoperative IV iron versus standard oral iron supplementation. The impact of IV iron therapy could be limited by the short duration from therapy to surgery.

13AP06-2
Preoperative anaemia and postoperative outcomes in patients undergoing colon surgery

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Background and Goal of Study: Preoperative anaemia is common among surgical patients and is recognized as an important and modifiable risk factor for surgery. The aim of this study was to evaluate the prevalence of preoperative anaemia and its association with blood transfusion and postoperative outcomes in patients undergoing colon surgery.
Materials and Methods: Retrospective cohort study of patients aged between 18 and 90 years old submitted to elective colon surgery from October 2017 to October 2018. Anaemia was defined as hemoglobin < 12 g/dL in women and < 13 g/dL in men, according to the World Health Organization. We considered severe anaemia as hemoglobin < 8g/dL, moderate 8 - 10,9 g/dL and mild ≥ 11,0 g/dL. Files were sourced for data on demographics, ASA, physical status, local and systemic postoperative complications, perioperative transfusion, intensive care admission, length of hospital stay, readmission rates and mortality.
Results and Discussion: During the studied period, a total of 146 patients were enrolled. The mean age was 67.56 ± 14.74 years, 59% were ASA II, and 35,6% ASA III. The prevalence of preoperative anaemia was higher than referred in the literature - 41,1% (65% females; 35% males). Preoperative anaemia was significantly associated with intraoperative and postoperative transfusions (p<.001) and longer length of hospital stay (p=.025). No statistical significance was found regarding postoperative complications, rehospitalization and death. Regarding anaemia subcategories, patients with moderate anaemia had more intraoperative transfusions (26,7%) compared to patients with no or mild anaemia (1,2%, 13,8%), and significantly more postoperative transfusions (51,6%) than the other two groups (8,1%, 13,8%, respectively). No complications directly related to transfusion were found. Preoperative iron therapy was not associated with less transfusion requirements, which most likely reflects lack of timely diagnosis and treatment of anaemia.
Conclusions: Preoperative anaemia was a common condition among patients undergoing elective colon surgery and it was significantly associated with an increase in perioperative transfusions and length of hospital stay. We did not find significant differences in morbidity and mortality, most probably because of the sample size. A prospective or retrospective study with a greater sample size will probably allow more relevant conclusions.

13AP06-3
Relationship between preoperative anemia and comorbidity burden among elderly patients undergoing major abdominal surgery, and its impact on postoperative complications: a prospective observational study

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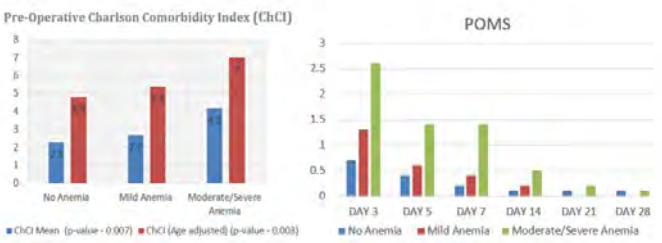
Background: Preoperative anemia is common among the elderly. This may be due to their general health status rather than primary morbidity. We aim to investigate the association between preoperative anemia and comorbidities, and its impact on postoperative complications, length of hospital stay (LOS) and health-related quality of life (HRQoL).
Methods: This is a prospective observational study. WHO definition of anemia was used. Preoperative comorbidities and complications were assessed with the Charlson Comorbidity Index (ChCI) and Post-Operative Morbidity Survey (POMS) / Comprehensive Complication Index (CCI) respectively. HRQoL outcomes were assessed with EQ-5D. Inclusion criteria are patients ≥65 years and planned major open abdominal surgery (>2 hours, or anticipated blood loss > 500 mL). POMS were collected on days 3, 5, 7-8, 14-15, 21-22, and 28-30. CCI was calculated up to either 30-days from surgery. EQ-5D scores were compared between baseline and post-operative 1 and 3 months. Anemia were divided into nil, mild and moderate-severe. The average ChCI, CCI and aggregate POMS score were compared using repeated measures analysis of covariance (ANCOVA).
Results: 121 patients completed follow up. 70 had no anemia, 31 mild anemia and 20 moderate/severe anemia. Patients with moderate/severe anemia had significantly higher ChCI. (P-value = 0.007)(Figure 1). The incidence of any POMS defined complications increased with increasing severity of anemia, across all postoperative time frames (Figure 1). Moderate/severe anemic patients had highest CCI scores (34.5) (P value = <0.001) and stayed longest on average (20 days) compared to non-anemic patients and mildly anemic patients. (P value = <0.001) The EQ-5D scores did not differ significantly between the 3 groups at all time frames.
Conclusion: Moderate/severe anemic elderly patients undergoing surgeries have more comorbidities preoperatively. As a result, they have complications in more organ-domains as demonstrated by their higher POMS score and more severe complications as demonstrated by their higher CCI score and longer LOS. Correction of preoperative anemia alone may not reduce these perioperative risks.
Figure 1.



13AP06-4
Preoperative, Single-Dose Intravenous Iron Formulation to Reduce Postsurgical Complications in Patients Undergoing Major Abdominal Surgery: A Pilot Randomized Control Trial (PIRCAS Trial – Pilot)

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Background: Preoperative anemia is associated with poor postoperative outcomes. However, it is often ignored, treated with oral iron, or corrected by allogenic blood transfusion (ABT). Oral iron has poor bioavailability and gastrointestinal effects, while ABT independently have negative effects on postoperative outcomes. An alternative is the use of intravenous iron, such as Ferric Carboxymaltose (FCM) infusion. Although FCM may cause iron stores repletion, its impact on postoperative outcomes is still unknown. We aim to evaluate the association between two methods of preoperative iron replacement and postoperative outcomes.
Methodology: This is an open-label pilot Randomized Controlled Trial (RCT) conducted in outpatient preoperative setting. Participants were randomly allocated via an online system to receive FCM infusion (intervention) or oral ferrous fumarate (standard care) in a 1:1 ratio (stratified by age, baseline haemoglobin, surgical site and surgical approach), 1 to 4 weeks prior to surgery. The Comprehensive Complication Index (CCI) was used to assess 30-day postoperative complications. The study was approved by Institutional Review Board – Ref: 2017/2005 and registered in the US Clinical Trials database – NCT03295851.
Results: A total of 30 participants were randomized (15 per arm). Four participants (2 from each arm) were withdrawn from the study as their surgeries were postponed. Participants from both arms have similar baseline characteristics. All data obtained were included in this preliminary intention-to-treat analysis. Results revealed that FCM group had a lower average 30-day composite postoperative CCI score when compared to the oral iron group (15.3 Vs 26.4 units; p=0.31). In terms of red blood transfusion, oral iron group had better mean incidence as compared to FCM group (0.9 Vs 1.2, p=0.66). However, none of the findings were statistically significant.
Conclusion: Our pilot study found that FCM may be associated with reduced postoperative complications. However, it did not reduce incidences of ABT. Our study is limited by small sample size which may introduce Type II error. A full scale RCT will be done to confirm these findings.

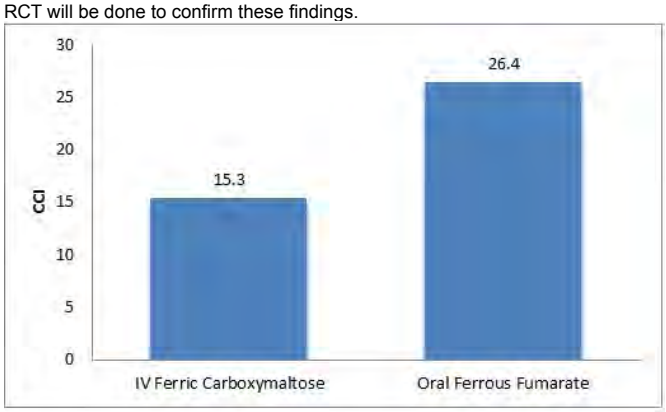

Figure 1, Comparison of Mean CCI Score between two groups

13AP06-5
Outcomes in preoperatively anaemic patients undergoing septic vs aseptic revision hip surgery

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Background and Goal of Study: Septic revision hip surgery is associated with more complications and higher rates of allogenic blood transfusion (ABT) than aseptic revision. Anaemic patients undergoing revision joint arthroplasty have been shown to suffer from impaired outcomes.[2] In this study, we aimed to differentiate the impact of septic revision in anaemic patients from other patient related factors.
Materials and Methods: Single center, retrospective, cohort study at a tertiary German university hospital. After clearance from the federal data protection officer and IRB approval (EA1/343/16), data of all patients undergoing revision hip surgery between 2006 and 2017 were consolidated in a database. Postoperative complications (e.g. cardiovascular, pulmonary, renal, etc.) were drawn from ICD-10 codes. Revision surgery was classified according to ICD 10 codes as either due to septic (T84.5-7) or aseptic (T84.14 or T84.3-4) revision. Patients were categorized as positive or negative for preoperative anaemia according to WHO criteria. Non-parametric testing was performed, considering a p-value below 0.05 statistically significant. We performed propensity score matching adjusting for age, sex, ASA-score, operation time and comorbidities.
Results and Discussion: A total of 1144 patients was included. 793 patients underwent aseptic and 351 underwent septic revision. Propensity score matching was performed for the group of 375 anaemic patients and was successful with the exception of length of operation. After adjusting for confounders 338 anaemic patients remained. Septic revision surgery was associated with higher rates of total complications (46.2% vs 33.1%, p=0.020) as well as sepsis (7.1% vs 0.6%, p=0.005), wound infection/dehiscence (7.7% vs 2.4%, p= 0.046), acute kidney failure (12.4% vs 4.8%, p=0.020) and transfusion of ABT (92.3% vs 70.4%, p<0.001). In addition, it was associated with longer LOS (17.1 vs 12.1 days, p<0.001) and higher rates of ICU care >24 hours (27.8% vs 13.0%, p=0.001).
Conclusion: Septic revision hip surgery in anaemic patients was associated with impaired outcomes. Special consideration (e.g. preoperative anaemia treatment) should be given to reduce perioperative risk of these high-risk patients undergoing a high-risk procedure
References:
1 Lu M. et al. Preoperative Anemia Independently Predicts 30-Day Complications After Aseptic and Septic Revision Total Joint Arthroplasty. J Arthroplasty. 2017;32(9S):S197-S201

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13AP06-6
Transfusion of red blood cells, fresh frozen plasma, or platelets is independently associated with mortality and infection after cardiac surgery in a dose-dependent manner

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Background and Goal of Study: Transfusion of red blood cells (RBCs) during cardiac surgery is known to increase the risk of post-operative mortality and adverse events. However, it is not known whether transfusion of other types of blood products increases the risk of adverse events after cardiac surgery.
Materials and Methods: Patients who underwent valve surgery and/or coronary artery bypass grafting from January 1, 2011 to June 30, 2017 and September 1, 2013 to June 30, 2017 at two heart centers were included in this retrospective study. After stratifying patients based on propensity score matching, we compared rates of mortality and infection between patients who received transfusions of RBCs, fresh frozen plasma (FFP) or platelets with those who did not receive such transfusions. Multivariate logistic regression was used to assess the relationship between transfusion and outcomes.
Results and Discussion: Of 8,238 patients in this study, 109 (1.3%) died, 812 (9.9%) experienced infection, and 4,937 (59.9%) received at least one type of blood product. Receiving transfusion of any blood type was associated with higher rates of mortality (2.0% vs. 0.18%, p<0.01) and infection (13.3% vs. 4.8%). All three blood products on their own independently increased risk of mortality per unit transfused (RBC, OR 1.18, 95%CI 1.14 to 1.22; FFP, OR 1.24, 95%CI 1.18 to 1.30; platelets, OR 1.12, 95%CI 1.07 to 1.18). Transfusion of any of the three blood products increased, in a dose-dependent manner, the incidence of mortality (OR 1.88, 95%CI 1.70 to 2.08 per 3 units of blood components) and infection (OR 1.50, 95%CI 1.43 to 1.57 per 3 units).
Conclusions: Transfusion of RBCs, FFP or platelets is an independent risk factor of mortality and infection, and combined transfusion of any of the three blood products is associated with adverse outcomes after cardiac surgery in a dose-dependent manner.

13AP06-7
Efficacy of Intravenous Iron Therapy in Maintaining Haematocrit levels on Patients Undergoing Bimaxillary Orthognathic Surgery

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Background and Goal of Study: Bimaxillary orthognathic surgery is widely performed to correct dentofacial anomaly such as prognathism and retrognathism. However, the complicated vascularity of the surgical site and limited visual field can lead to excessive bleeding. There were many methods of patient blood management to reduce the blood transfusion. Among them, the perioperative iron supplement increased the haemoglobin level and prevented anaemia after surgery. Therefore, this study is aimed to evaluate the effect of intravenous iron isomaltoside on maintaining haemoglobin concentration in patients undergoing bimaxillary orthognathic surgery.
Materials and Methods: Forty-nine patients, aged 19 to 40 years, scheduled for bimaxillary orthognathic surgery were randomly assigned into the iron (n=25) and the control (n=24) groups. Patients of the iron group were given intravenous iron isomaltoside 1000mg after anaesthetic induction. In contrast, patients of the control group received an equivalent volume of normal saline as a placebo. The primary outcome was haematocrit and secondary outcomes were the levels of serum iron, ferritin, transferrin saturation, total iron binding capacity, and reticulocyte. They were assessed after anaesthetic induction and at 1 day, 2 weeks, and 4 weeks postoperatively.
Results and Discussion: The mean preoperative haematocrit was similar between the two groups (iron group vs. control group: 36.5% vs. 34.9%, p=0.153). The intraoperative bleeding was also comparable between the two groups (iron group vs. control group: 520ml vs. 620ml, p=0.184). However, the haematocrit of the iron group was higher than the control group at 4 weeks postoperatively (43.2% vs. 39.5%, P=0.022). The level of serum iron and ferritin were higher in the iron group until the 2 weeks and 4 weeks after operation, respectively. The count of reticulocyte was also higher in the iron group at 2 weeks postoperatively (99.2 vs. 83.2, P=0.051). The administration of intravenous iron did not statistically reduce the intraoperative haemorrhage or increase the haematopoiesis.
Conclusions: Iron isomaltoside had efficacy in maintaining haematocrit in bimaxillary orthognathic surgery. Therefore, the perioperative administration of intravenous iron isomaltoside is the useful strategy to reduce blood transfusion due to intraoperative bleeding.

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13AP06-8
Acute perioperative hypothermia: prevention, diagnosis and treatment - National perspective.

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Background and Goal of Study: In the perioperative period, we may face hypothermic patients. In this scenario, it is extremely important to evaluate the knowledge of anesthesiologists about the prevention, diagnosis and treatment of unintentional hypothermia. We developed a national survey to find some of these information regarding temperature care in Brazil.
Materials and Methods: The study was approved by the Ethics Committee. After informed consent, the data were collected through an online questionnaire and sent to the members of the Brazilian Society of Anesthesiology (SBA) mailing list: a total of 10749 anesthesiologists and anesthesia residents. The questionnaire was composed of twenty four questions of multiple choice, which addressed demographic issues, hospital structure, knowledge about diagnosis, monitoring, conducts and complications in the scenario of accidental hypothermia.
Results and Discussion: We had 1131 answers, 62,55% male, 56,01% of the respondentes had less than 40 years. Among the answers 33,67% identified themselves as anesthesia residents. Regarding the hospital where the anesthesiologist act 60,79% are in the private sector and 91,87% have warming devices available. However only 14,72% use warming devices in all patients. The most used device is forced warm air blanket, followed by intravenous fluid warming devices and water heated mattress. The most used monitor is the esophageal (60,51%), followed by nasopharingeal (53,14%) and cutaneous (30,06%). The warming devices are used mainly before anestesia induction (51,38%), after anesthesia induction (45,48%) and only 1,47% uses it only when hypothermia is present. Unfortunately we still have 54,81% of physicians that affirm they don't monitor the temperature of their patients in the PACU. When we asked if they believe that hypothermia can lead to complication 99,11% consider that it is true.
Conclusions: There were a low number of answers, what can reflect the lack of interest regarding the topic among Brazilian anesthesiologists. Although the respondents consider that hypothermia is linked to complications. We think that with simple measures as talking about hypothermia can lead to changes in practice, reduce postoperative hypothermia in elective patients and truly there is space to eradicate this issue from the clinical practice in Brazil, as it seems that resources to fight it are available.

13AP06-9
Effect of preoperative warming on postoperative outcomes in laparoscopic surgery

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Background and Goal of Study: Close control of perioperative temperature prevents the appearance of postoperative complications, such as postoperative shivering or patient's discomfort. Preoperative warming has demonstrated to prevent hypothermia and its associated complications. We aimed to assess the effect of different prewarming times in the prevention of hypothermia, its effect on optimizing patients' recovery in the Post-anaesthesia Care Unit (PACU) and on preventing postoperative complications.
Materials and Methods: Once the approval of Ethics Committee was obtained, we carried out a prospective controlled study. Seventy-five patients who had undergone laparoscopic surgery were included. Prewarming was performed: 25 patients were not prewarmed (control), 25 patients were prewarmed for 15min (p15) and 25 patients were prewarmed for 30min (p30). The following data were collected: age, weight, height, ASA physical status, basal temperature, surgery, duration of anaesthesia, operating room temperature, body temperature throughout the perioperative period, PACU length of stay (LOS), postoperative shivering, postoperative Visual Analogue Scale (VAS), postoperative complications and hospital LOS. Results among groups were analysed using SPSS 24.
Results and Discussion: Patients underwent prostatectomy (57%), nephrectomy (36%) or pyeloplasty (7%). No significant differences were found among groups regarding patients' characteristics, surgery, duration of anaesthesia or operating room temperature. Intraoperative temperatures were significantly higher in p15 and p30 than in the control group. At the end of the surgery, temperature in the control group was 35.81ºC, in p15, 36.32ºC (p=0.02) and in p30, 36.65ºC (p=0.0001). No significant differences were found regarding temperature between p15 and p30. Postoperative shivering was found in 40% of the patients in control, in 0% in p15 and in 4% in p30 (p=0001). VAS at PACU arrival was 2.9±2.2 in the control group, 1.9±1.4 in p15 (p=0.04) and 1.7±1.4 in p30 (p=0.02). Regarding VAS, no significant differences were found between p15 and p30 (p=0.6). No statistical significant differences were found among groups regarding PACU LOS (p=0.4), hospital LOS (p=0.1) or postoperative complications (p=0.7).
Conclusion: Prewarming for 15 or 30 min prevents hypothermia at the end of laparoscopic surgery and reduced postoperative shivering and pain. It did not affect PACU LOS, hospital LOS, or postoperative complications.

13AP06-10
The effect of irrigation fluids on the development of perioperative hypothermia in patients undergoing transurethral urologic surgery

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Background and Goal of Study: Irrigation fluids may be an important cause of perioperative hypothermia and the Portuguese Society of Anesthesiology(SPA) recommends warning them at 38-40º. Our goal was to evaluate the impact of unheated irrigation solutions on the development of hypothermia in patients undergoing transurethral urologic surgery.
Materials and Methods: Prospective observational study with a sample of adult patients undergoing transurethral prostatic or vesical resection(TURP/ V) or percutaneous nephrolithotomy(NPC). Room temperature was maintained constant(21º), fluid therapy was controlled and patients were kept warm with forced-air blanket. Temperatures at the beginning and end of the surgery and at discharge from the post-anesthesia care unit(PACU) were recorded.
Results and Discussion: Sample(N=41) of mostly males(84.2%) with a mean age of 67.7y. ASA physical status: II(60.5%), III(39.5%). Mean BMI 27.1(σ=3.8). 21.6% diabetic patients and 5.4% with hypothyroidism. Most common procedure was TURP(76.3%) and the mean duration was 77.8±32.3. Most common anesthesia was SA(76.3%). Mean irrigation volume: 10.5±7.5L. Temperature measurements: baseline 36.5±0.5º; end of surgery 35.6±0.6º; PACU discharge 35.8±0.5º. Using a mixed linear model to correlate the variation in temperature with previously determined risk factors for hypothermia (age, ASA status, diabetes or hypothyroidism, BMI) and other interest factors (anesthesia, duration, irrigation volume) we found no relation between any mentioned factors. Despite this, our data suggests an impact of age, diabetes, hypotiroidism and volume of irrigation solutions in the decrease of body temperature (Figure 1).

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	Sig.
[ASA=2]	,340	,173	,058
No diabetes	-,332	,204	,114
No hypothyroidism	-,271	,350	,444
Spinal anesthesia	-,037	,214	,863
Age	-,011	,007	,153
Duration	,004	,004	,330
Irrigation volume	-1,766E-5	1,563E-5	,266
BMI	,036	,021	,103

a. Dependent Variable: Temperatura inicial.

Conclusions: Hypothermia is a common event(55.3% in our sample) despite managing several important causing factors (fluid therapy, room temperature, forced-air blanket). Considering the complications associated with perioperative hypothermia it seems crucial to pre-warm and monitor patients' body temperature throughout the procedure and consider heating irrigation solutions as the only other controllable hypothermia trigger.

13AP07-1
The efficacy and safety of HSK3486 for sedation and anaesthesia in patients undergoing diagnostic colonoscopy: a randomized, double-blind, parallel group, active-controlled, multi-center study.

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Background and Goal of Study: HSK3486 is a new chemical entity (NCE), being developed and formulated in injectable emulsion by Haisco Pharmaceutical Group Co., Ltd. in China as a sedative and anaesthetic. It's a short-acting, but more potent GABAA receptor agonist than propofol. This Phase IIb study aimed to evaluate the efficacy and safety of HSK3486 for sedation and anaesthesia in patients undergoing diagnostic colonoscopy.
Materials and Methods: Eligible patients were randomized (1:1:1) into 3 groups to receive 0.4, 0.5mg/kg of HSK3486 and 2.0mg/kg of propofol as procedure sedative for diagnostic colonoscopy. The primary endpoint was the success of colonoscopy procedure, measured by completion of colonoscopy, no requirement for an alternative sedative or anaesthesia drug and no requirement for more than 5 doses of study drug within any 15 minutes period. Other secondary endpoints included time to start procedure, time to patient full alert, time to discharge, patient/physician satisfaction and safety.
Results and Discussion: A total of 94 patients were finally enrolled (from December 2017 to August 2018).Patients enrolled into HSK3486 0.4, 0.5mg/kg and propofol 2.0mg/kg group were 31, 32, 31, respectively. All 3 groups completed the procedure successfully and achieved 100% success rate. Time to start procedure and time to patient full alert in HSK3486 0.5 mg/kg group is the same as propofol group. Fewer patients required top-up dose in HSK3486 0.5mg/kg group than those in the HSK3486 0.4mg/kg and propofol group. Adverse events (AEs) were mild to moderate in all patients. In this study, the incidence of adverse drug reaction (ADR) was seen in the 3 groups: 48.4%, 34.4% and 61.3%, and 1 severe apnea case occurred in the propofol group. No serious adverse event (SAE) or AE led to withdrawal. Compared to propofol group, the combined data from two HSK3486 groups demonstrated less injection pain (9.5% vs. 45.2%), less respiration depression (11.1% vs. 16.1%), similar hypotension (15.9% vs. 19.4%), but more bradycardia (4.8% vs. 0%). Moreover, fewer patients required airway management (3.2% vs.9.7%) in HSK3486 groups than those in propofol group were noted in this study.
Conclusions: HSK3486 has been demonstrated to provide effective sedation/anaesthesia and better safety than propofol for patients undergoing diagnostic colonoscopy.

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13AP07-2
Complete bed rest versus early ambulation after spinal anesthesia: a single center case-cohort study and a nationwide survey of post-procedural care standard in Taiwan

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Background and Goal of Study: Postdural puncture headache (PDPH) is one of the major complications after spinal anesthesia (SA) with the reported incidence of 0.1-36%. Bed rest after SA is a common clinical practice to prevent the development of PDPH, but its role in prevention of PDPH is not clinically substantial. This study aimed to survey the post-procedural care standard for SA among the teaching hospitals in Taiwan and compare the occurrence of PDPH after changing the postoperative care policy for SA in our institute.
Materials and Methods: We surveyed the current post-procedural care policy for SA in the teaching hospitals in Taiwan. In April 2018, the nursing care standard after SA was altered from complete bed rest (up to 6 h) to early ambulation (move freely on the bed) in our hospital. Post-procedural complications were recorded in 138 consecutive patients who received SA before or after changing our postoperative care policy (n=69 in each group).
Results and Discussion: A total of 102 hospitals (including 23 medical centers and 79 metropolitan hospitals) responded to the survey. Complete bed rest after SA is currently the standard postoperative care practice in 68.6% of these hospitals, and there was no difference between medical centers and metropolitan hospitals (56% vs 72%, respectively; P=0.145, X^2=2.11). Most hospitals (41.4%) request complete bed rest for 8 h after the procedure. In our cohort study, 3 cases in the bed rest group and 1 case in the early ambulation group developed PDPH after SA (4.3 vs 1.4%; P=0.31). More patients in the bed rest group complained low back pain (7.2 vs 2.9%; P=0.24) and higher VAS pain score at lower back (4.2±1.7 vs 3.0±0.9; P<0.05). In addition, the overall satisfaction of anesthesia was also higher in the ambulation group.
Conclusions: Preventive bed rest remains as a common clinical practice of post-procedural care after SA in Taiwan. Compared with early ambulation, our case-cohort shows that bed rest has no effect on prevention of PDPH after SA. In fact, prolonged bed rest increases incidence and pain intensity of low back strain, and reduces patients' contentment with anesthesia service. Although free ambulation after SA improves the comfort recovery, it might increase the risk of falls due to residual motor blockade. Therefore, we suggest that early ambulation after SA should be exercised under careful surveillance in the ward.

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13AP07-3
Ultrasound-guided epidural anesthesia in a patient with lung aplasia and skeleton deformation undergoing abdominal hysterectomy: a case report

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Background: Pulmonary aplasia combined with other congenital abnormalities of skeleton and internal organs in humans is a rare pathology. In such patients, the choice of anesthetic technique before surgery may be complicated and limited [1]. Here we report the successful completion of abdominal hysterectomy under ultrasound-guided epidural anesthesia in an adult patient with specified pathology.
Case Report: A 42-year-old female patient with body mass of 35 kg (BMI 13.7 kg/m2) was admitted to the clinic complaining about frequent utering bleeding episodes . After examination, she was diagnosed with uterine fibroids and was prescribed surgical treatment (abdominal hysterectomy). Right pulmonary aplasia, hyperinflated left lung, dextroposition of the heart, kyphoscoliosis, scoliosis (Fig.1), and decline in pulmonary tests (Fev1-0.8L, FVC-1.4L) were revealed as concomitant pathology. Because of non-typical situation, ultrasound-guided epidural anesthesia was chosen as anesthesia method. Ultrasound was used to identify the epidural space and safe direction for its puncture. Using landmarks, epidural space puncture and subsequent catheterization was performed without difficulty. Ropivacaine hydrochloride 7.5 mg/ml 10 ml was used as an anesthetic. The surgery and post-surgery periods were unremarkable.
Discussion: In patients with pulmonary aplasia combined with congenital abnormalities of skeleton and internal organs, the choice of anesthetic technique before surgery may be complicated. Difficult airway, aspiration, and pulmonary complications may lead to severe hypoxemia during general anesthesia. Pathological deformation of the patient's spine can lead to difficulties in puncture and catheterization of the epidural space. The ultrasound study allowed us to identify individual features of the epidural space location and determine safe direction for its puncture.
Conclusions: Ultrasound-guided epidural anesthesia may be successfully used in patients with skeleton and internal organs malformations.
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Learning points: Using ultrasound facilitates individual approaches for anesthetic management of high-risk patients.

13AP07-4
The perioperative and anaesthetic risk factors of surgical site infection in the patients undergoing pancreaticoduodenectomy

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Background and Goal of Study: Surgical site infection (SSI) is one of major problems in perioperative care, and morbidity of SSI is high in digestive surgery. The incidence proportion of SSI in pancreaticoduodenectomy (PD), a long-time and high invasive digestive surgery, has been reported as 10 - 20%. The aim of this study is to investigate the perioperative and anaesthetic risk factors of SSI in PD.
Materials and Methods: This is a retrospective cohort study in setting of single university hospital. We obtained the institutional review board in our hospital. We reviewed the charts of the consecutive 330 patients who underwent PD from January 2009 to March 2018. Multivariate logistic regression analysis was performed to investigate the association between SSI and perioperative and anaesthetic factors. P value < 0.05 was defined statistically significant.
Results and Discussion: The mean age was 68.3 years (standard deviation (SD); 10.1). The mean time of operation was 11.2 hours (SD; 2.5). SSI occurred in 54 patients (16%). Female (odds ratio (OR); 2.73, 95% confidence interval (CI); 1.38 – 5.40), body mass index (OR; 1.13, 95%CI; 1.02 – 1.25), preoperative serum albumin (g/dl) (OR; 0.51, 95%CI; 0.29 – 0.91), cerebrovascular disease (CVD) (OR; 3.79, 95%CI; 1.36 – 10.59), ischaemic heart disease (IHD) (OR; 8.60, 95%CI; 1.68 – 44.01), and use of sevoflurane vs. desflurane or propofol (OR; 2.05, 95%CI; 1.02 – 4.09) were detected as the significant risk factors of SSI in PD (Table).
Conclusions: We found that CVD, IHD and use of sevoflurane were possible new risk factors of SSI in PD. Further research is needed to confirm the association between these risk factors and SSI in future.

Table. Results of multivariate logistic regression analysis

Variables	Adjusted Odds Ratio	95% confidence interval	P value
Female	2.73	1.38 - 5.40	0.004
Body mass index	1.13	1.02 - 1.25	0.023
Preoperative serum albmin (g/dl)	0.51	0.29 - 0.91	0.023
Cereblovascular disease	3.79	1.36 - 10.59	0.011
Ischemic heart disease	8.60	1.68 - 44.01	0.010
Use of sevoflurane (vs. desflurane or propofol)	2.05	1.02 - 4.09	0.043

13AP07-5
Smoking cessation enhances platelet aggregation via the release of HSP27 from human platelets stimulated by collagen

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Background and Goal of Study: Smoking is recognized to increase the risk of postoperative morbidity and mortality. Thus, smoking cessation is recommended for patients undergoing surgery. It is known that platelet hyper-aggregability is observed in smokers than in non-smokers. Heat shock proteins (HSPs) are induced by various biological stresses. HSP27 is one of HSPs, and extracellular HSP27 reportedly acts as a proinflammatory agents. It has been reported that plasma levels of HSP27 is higher in smokers than in non-smokers. We have previously reported that HSP27 is released from human platelets, accompanied with platelets activation stimulated by collagen. In the last annual meeting of Euroanaesthesia, we reported that smoking cessation causes temporary platelet hyper-aggregability induced by collagen. However, the influence of smoking cessation on HSP27 release and platelets activation is not investigated. In the present study, we investigated the effect of smoking cessation on the release of HSP27 from human platelets stimulated by collagen.
Materials and Methods: We enrolled 21 patients who visit smoking cessation outpatient services between January, 2012 and November, 2014. Blood samples were donated 4 times as follows: before smoking cessation, and 4, 8 and 12 weeks after smoking cessation. Platelets were stimulated by collagen, and released HSP27 were analyzed by enzyme-linked immunosorbent assay for HSP27. The data were analyzed by Friedman test followed by Wilcoxon rank sum test.
Results and Discussion: The levels of released HSP27 from collagen-stimulated human platelets at 4-8 weeks after smoking cessation were significantly higher than those before smoking cessation, and returned to similar levels before cessation at 12 weeks. The enhancement of HSP27 release is closely related to the platelet hyper-aggregability which is observed temporarily after smoking cessation. Our results suggest the possibility of increasing complications by platelet hyper-aggregation in the short term after smoking cessation.
Conclusions: Smoking cessation enhances the release of HSP27 from human platelets stimulated by collagen. We should be careful to the possibility of complications due to temporary up-regulated platelets in the short term after smoking cessation for the surgery.

13AP07-6
Perception of the role of anesthesiologists in the perioperative setting: a survey in a cohort of Belgian patients

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Background and Goal of Study: Public perception about the qualifications and responsibilities of anesthesiologists in and out of the operating room (OR) seems to be inaccurate in large parts of the world. Their knowledge may differ for various reasons such as educational level, age and former exposure to the health system. Therefore, our goal was to assess the knowledge about the role of anesthesiologists in a Belgian population and to test the impact of several demographic variables and former exposure to the health system on this knowledge.
Materials and Methods: After obtaining informed consent, a survey was taken preoperatively from adult patients undergoing elective surgery in the Jessa Hospital, Hasselt, Belgium. The survey included questions addressing demographic data, number of previous anesthetic procedures, the knowledge of the education/training and the responsibilities of the anesthesiologist in and outside the OR. Descriptive statistics were used to report baseline characteristics and responses. Depending on the variable tested, the Pearson correlation or the Spearman rank's correlation test was applied. A p-value < 0.05 was considered statistically significant.
Results and Discussion: In total, 361 patients were enrolled from January to November 2018. Only 43 patients (11.9%) correctly answered the number of years of training required to become an anesthesiologist. Patient´s perceptions of the various responsibilities of an anesthesiologist in the OR are shown in table 1. Age (rs = -0,141, p<0,01) was negatively correlated whereas educational level (rs =0,264, p<0,01) was positively correlated with the patient´s perception of the role of anesthesiologists. Gender, previous surgery and chronic medical condition were not correlated.
Conclusions: This survey confirms that also Belgian patients are lacking sufficient understanding of the role of anesthesiologists. Older age and lower educational level are associated with lower knowledge. Collaboration between local press and the Belgian society of anesthesiology may improve the view of the profession by the public.

	Surgeon	Anaesthesiologist	Nurse	Don´t know
Who puts you to sleep before surgery?	3 (0.8)	305 (84.5)	21 (5.8)	32 (8.9)
Who is responsible for waking you up after surgery?	7 (1.9)	222 (61.5)	89 (24.7)	43 (11.9)
Who is responsible for monitoring your vital signs during surgery?	12 (3.3)	184 (51.0)	132 (36.6)	33 (9.1)
Who monitors blood loss during surgery?	114 (31.6)	61 (16.9)	107 (29.6)	79 (21.9)
Who transfuses blood during surgery when necessary?	80 (22.2)	75 (20.8)	153 (42.4)	53 (14.7)
Who administers medication and fluids during surgery when necessary?	28 (7.8)	159 (44.0)	130 (36.0)	44 (12.2)
Who supervises patient care in the PACU?	14 (3,9)	84 (23.3)	238 (65.9)	25 (6.9)

Table 1: Data are presented as absolute numbers and (%)

13AP07-7
Patient's perception of anaesthesia and the role of anaesthesiologist: a Brazilian survey

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Background and Goal of study: Anaesthesia is still a major concern for patients, although, since 2006, Brazilian's medical regulation board recommends a preanaesthetic assessment before surgery, preferably as an outpatient basis, which could decrease such concerns and increase knowledge about the role of an anaesthesiologist. The aim is to evaluate the patient's knowledge, concerns, and fears related to the anaesthesiologist and anaesthesia.
Material and Methods: Prospective and cross-sectional study with a 50 items survey applied to patients in a preanaesthetic clinic of a major hospital in Belo Horizonte, Brazil.
Results: We included 441 patients. Of those interviewed, 81.7% had undergone surgery before under anaesthesia, with the majority under general anaesthesia (47.7%). The majority (63.4%) did not know which anaesthetic technique was planned for the surgery evaluated on the ongoing preanaesthetic assessment. When asked which anaesthetic technique the patient would choose, 37.5% opted for general anaesthesia and 34.5% did not know, with most of those patients (86.1%) accepting the anaesthesiologist's recommendation, even otherwise different. Regarding the patient's knowledge of an anaesthesiologist's attributions, most answered that he/she is responsible for making the patient sleep deeply (83.6%) and for monitoring the vital signs during surgery (37.4%). On the other hand, most answered that the nurse is responsible for waking up the patient (33.5%) and the surgeon (46.8%) is responsible for determining the fasting time. The majority (56%) considered anaesthesia a safe procedure, and 78.7% considered false that anaesthesia often results in brain damage. Regarding anaesthesia-related fears, such as being unconscious during surgery, speaking personal secrets, waking up during surgery, decreasing mental capacity after surgery, postoperative nausea, and exposal (being naked) during surgery, the majority replied they were not concerned. On the other hand, most answered they were very worried about the anaesthesiologist's experience and qualification to take care of them during surgery and in an emergency situation, as well as staying in the ICU for a long time, being paralyzed after anaesthesia, and not waking up after surgery.
Conclusion: Patients should be informed about anaesthesia safety and anaesthesiologist's attributions. Also, the patient should be involved early in the preanaesthetic assessment to demystify those unnecessary fears and concerns.

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13AP07-8
Validation of the Richards-Campbell Sleep Questionnaire in postoperative patients.

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Background and Goal of Study: Along with pain, sleep disturbances cause the greatest discomfort in patients during the first few days after surgery. The incidence of insomnia in postoperative patients may reach 50%. Because of high costs and complexity of implementation the polysomnography remains inaccessible for a routine sleep assessment. Instead, scoring scales are cheap, and can be easily included into routine nursing care. The English version of RCSQ is characterized by high sensitivity, specificity, reliability and correlation with polysomnography in intensive care patients. The aim of the present study was a validation of the RCSQ in population of postoperative patients.
Materials and Methods: Translation of the English version of RCSQ into Ukrainian was done by two independent translators, followed by a series of back translations to ensure accuracy. The study included 31 patients after general surgery. The age was 26-68 (50,7 ±5,4) years. The Ukrainian version of RCSQ was applied to all patients. The mean of the 5 RCSQ items comprised a total score. A 10-h polysomnography during night was also performed.
Cronbach's alpha was used for reliability analysis. Sensitivity and specificity of the translated version of RCSQ were calculated. Pearson's coefficient was used to assess correlation between RCSQ and total sleep duration, sleep onset latency, REM duration by polysomnography.
Results and Discussion: Insomnia was present in 11 subjects (36,4% male and 63,6% female) . The rest 20 subjects (45,0% male and 55,0% female) did not have insomnia . Ukrainian version of RCSQ showed high reliability (Cronbach's alpha 0,91). The sensitivity for diagnosis of postoperative insomnia was 87,14% and specificity 84,32%. The RCSQ correlation coefficient with total sleep duration for polysomnography was 0,68; with sleep onset latency – 0,82; with a REM duration – 0,73.
Conclusions: The obtained results indicate the validity of the RCSQ in sleep quality assessment and insomnia diagnosis in postoperative patients.

13AP07-9
The Brief Measure of Emotional Preoperative stress (B-MEPS) as a new predictive tool for Postoperative Pain: A Prospective Observational Cohort Study

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Background and Goal of Study: Surgery can be considered a powerful external stressor causing the organism a cascade of physiological and psychological reactions as a protective, coordinated, and adaptive response to sensory inputs from the environment and internal inputs from the body. Recently, we've used the item response theory to developed an instrument to assess the preoperative individual psychological vulnerability based on emotional stress, the Brief Measure of Emotional Preoperative Stress (B-MEPS). We hypothesized that high preoperative stress, evaluated by B-MEPs result, is associated with higher postoperative pain levels and poor rehabilitation in patients submitted to intermediate or major surgery.
Materials and Methods: prospective, observational, cohort study of adult patients undergoing major surgery from March 2017 to March 2018. Preoperative assessment before the surgery included: demographic questionnaire; the BMEPs and Central Sensitivity Inventory; experimental pain tests and serum biomarkers collection. Postoperative evaluation until 48h of rest and movement-evoked pain, consumption of morphine and Quality-of-Recovery's scale.
Results and Discussion: 150 patients were included in the cohort. Using the latent class model, we found 23 (15%) patients had high emotional preoperative stress. Variables significantly related to preoperative stress were: previous psychiatric diagnosis and Central Sensitization Inventory result. Mean evoked-movement pain in the first 12 to 48h was 95-105% higher than at rest pain. A mixed model for repeated measures showed a sustainable effect of B-MEPS as movement pain predictor, independently of demographic data, comorbid conditions, preoperative pain test, type of anesthesia, and surgical duration. Previous chronic pain, cancer surgery, and pre-operative pressure pain tolerance were also independent predictors of postoperative movement pain. Moderate to severe postoperative evoked-movement pain was the only significant predictor of poor rehabilitation in 48 hours after surgery.
Conclusions: Results confirm that a brief screening method of the preoperative emotional state could detect individuals prone to experience severe postoperative pain. To translate this finding into possible beneficial changes in the perioperative assistance, the next step is to plan specific interventions considering the level of emotional preoperative stress assessed by the B-MEPS tool.

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13AP07-10
Rates and causes of last-minute surgery cancellations: A Lebanese University Hospital experience.

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Background and Goal of Study: Surgery cancellation reduces operating room efficiency and increases costs. Last-minute surgery cancellation (LMSC) is the commonly used measure in the operating room (OR) of major hospitals to assess performance [1]. The aim of this observational, retrospective study is to identify the rate and reasons of LMSC of elective surgery in our hospital.
Materials and Methods: Operating room records of elective surgery were retrospectively reviewed over 2 months. Data collected from OR listings were: Surgeries scheduled, performed and cancelled, timing and causes of cancellation (avoidable and non-avoidable). The "LMSC" is defined as the procedures cancelled over 24 hours before surgery.
Results and Discussion: In the study period, 1711 patients > 18 years-old were scheduled for elective surgery which 163 (9.5 %) were cancelled. The majority of LMSC were potentially avoidable (75.47%) by timely identification of medical problems: 42.95% were identified preoperatively (incomplete complementary exams 6.75%, change in surgery indication 1.23%, patient refusal 4.91%, non-compliance to stop chronic medications 6.75%, lack of hospital bed reservation 6.75%, lack of third-party payment approval 14.11%, by the specialist consultant doctor 2.45%); intraoperatively (lack of OR time 10.43%, lack of bed at hospital 3.68%, by the surgeon 6.13%, replacement by an urgent case 1.84%, lack of surgery material 7.98%, absence of fasting 1.23%); postoperatively (lack of bed in the intensive care 1.23%). The non-avoidable causes of LMSC (24.53%) were: worsening a chronic illness 2.45%, acute changes in baseline medical disease 9.2%, the patient did not attend 11.04%, death of the patient 0.61% and unknown cause 1.23%.
Conclusions: Determining the major avoidable contributors to LMSC is an essential step to decrease it. The number of LMSC can be decreased by improving communication between patient, doctors and nurses. More studies should be carried out at regular intervals to find the causes of LMSC in order to improve the functioning of the OR.
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13AP08-1
The relationship between the general anaesthetic and the 5-year survival rate after cancer surgery: a retrospective study

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Background and Goal of Study: There are studies that total intravenous anaesthesia (T group) is advantageous for prognosis of cancer patients compared to inhalation gas. This study analyzed the relationship between anesthetics and 5 years survival rate in patients who underwent cancer surgery.
Materials and Methods: The medical records of operated patients with gastric cancer, lung cancer, colorectal cancer, breast cancer, and hepatocellular carcinoma were examined in a hospital from 2006 to 2009. The 5 - year survival rate was compared between T group and inhalation gas anaesthesia group(GA group). Patient factors include age, sex, body mass index, hypertension, diabetes mellitus, metastasis at the time of surgery, and the length of hospital stay. The duration of postoperative mortality was assessed using Kaplan-Meier survival curves after propensity matching.
Results and Discussion: A total of 2207 patients were enrolled finally. The 5-year survival rate of the T group was 66.3% (599/903), which was higher than that of the GA group (65.8%, 858/1304), but not statistically significant. There was no difference in survival rates between the two groups when compared with propensity matching (Fig. 1). Male patients, longer duration of hospitalization, diabetic patients, and patients with metastasis showed a lower survival rate after 5 years in the hazard ratios plot (Fig. 2). Although the retrospective design is a major limitation of this study, it seems that the prognosis does not change according to the anaesthetic used for general anaesthesia in cancer surgery.
Conclusions: The choice of anaesthetic does not play a impactive role in the patient's prognosis, it would not be necessary to apply a particular anaesthetic agent uniformly in cancer patients.
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Wigmore TJ, Mohammed K, Jhanji S. Long-term Survival for Patients Undergoing Volatile versus IV Anesthesia for Cancer Surgery: A Retrospective Analysis. Anesthesiology 2016; 124: 69-79.

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13AP08-2
Intra-peritoneal administrated ropivacaine in the perioperative period reduces the interval to initiation of chemotherapy after extensive surgery for advanced ovarian cancer.

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Background and Goal of Study: Ovarian cancer is often diagnosed late and therefore mortality is high. Surgical debulking to remove the solid tumor and metastases followed by adjuvant chemotherapy is the standard regimen for advanced ovarian cancer. Several studies have shown that local anesthetics (LA) have anti-inflammatory effects and *in vitro* studies have shown that LA can reduce cancer cell multiplication. Our hypothesis was that administration of intra-peritoneal LA (IPLA) would lead to improved postoperative recovery, earlier start of chemotherapy and possibly longer disease-free survival.
Materials and Methods: This was a prospective, randomized, double blind, multicenter, placebo-controlled study (ClinicalTrial.gov reg no: NCT02256228) in patients undergoing cytoreductive surgery for ovarian cancer. Patients were randomized to receive either intraperitoneal ropivacaine (Group IPLA) or saline (Group P) perioperatively. Except for study drug, patients were treated similarly, including pain management via epidural analgesia. At the end of surgery, a multi-port catheter was inserted intra-peritoneally, lateral to the surgical incision and ropivacaine 2mg/ml or 0.9% saline10 ml injected as a bolus injection every other hour for 72 h via a pump
Results and Discussion: Forty patients, twenty in each group, were recruited. No complications from LA administration were recorded. Inflammatory and stress markers were similar between the groups. Time to initiation of chemotherapy was significantly shorter in group IPLA (Median 21, IQR 20-19 vs. 29 days, IQR 21-40, p = 0.021). No differences in standardized endpoint, global quality of recovery (QoR) or life (QoL) were found between the groups. No statistical differences were seen in pain intensity of morphine consumption between the groups. Time to home readiness and complications (including medical and surgical), was similar in both groups.
Conclusions: Administrating ropivacaine during surgery and continuously post-operatively for 72 hours after cytoreductive surgery for ovarian cancer is safe and reduces the time interval to initiation of chemotherapy. More studies are needed to confirm these findings and even study other outcomes such as disease-free survival

13AP08-3
Increased Mu opioid receptor 1 expression in Colorectal Cancer

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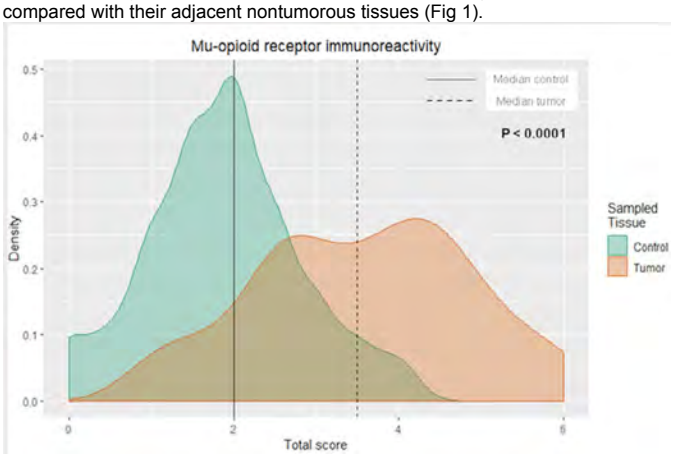
Background and Goal of Study: There is a growing interest on the potential effect of perioperative anesthetic management on cancer growth and spread. Preclinical studies suggest that opioids could promote direct tumor growth, angiogenesis, metastasis and immunosuppression of cellular and humoral responses, mainly mediated by Mu opioid receptor 1 (MOR-1) activation. Thus, the expression of the MOR-1 is an indicator of poor prognosis in some cancer types[1], but its relevance in colon cancer is unknown. The objective of this study is to evaluate MOR-1 expression differences between colorectal cancer samples and adjacent non-tumorous tissues (control).
Materials and Methods: Preliminary study in colorectal cancer samples. Immunohistochemical staining was used to detect MOR-1 expression in primary colorectal cancerous surgical samples and adjacent non-tumorous tissues. Evaluation of MOR1 immunoreactivity was carried out two times by a pathologist who was blinded to tissue identity. The median value distribution from the repeated analysis was assessed in both tissue lines.
Results and Discussion: One hundred seventy-four sample tissues were evaluated as a preliminary assessment. MOR-1 expression was higher in cancerous tumor compared with their adjacent nontumorous tissues (Fig 1).



Conclusion: Our study shows that Mu 1 opioid receptor expression is higher in colorectal cancer than in their adjacent non-tumorous tissues. Further studies are needed to evaluate if MOR-1 over-expression could be associated with poor clinical outcomes and whether they can be targeted for therapy.
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13AP08-4
Effects of various oxygen concentrations on breast cancer cells viability and metabolism

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Background and Goal of Study: Perioperative hyperoxia in oncological patients can be associated with an increased long-term mortality [1]. While oxygen toxicity is documented in several circumstances, its implication in cancer cell growth and progression is poorly understood. We aimed to evaluate the impact of various oxygen concentrations on cancer cell viability and metabolism using an in vitro model.
Materials and Methods: We investigated 3 different cell lines: human breast epithelial MCF10A, triple negative human breast cancer cells MDA-MD-231 and triple negative murine mammary cancer cells 4T1. 2000 cells per well were seeded into 96 well plates. After 24 hours cells were exposed to either 21%, 40%, 60% or 80% oxygen concentration for 8 hours. Cell viability was measured at 48 hours by MTT assay. The oxidative stress was evaluated by reactive oxygen species (ROS) production using 2′,7′-dichlorofluorescin diacetate at the end of oxygen exposure and 48 hours later. Wells from all 3 cell lines were fixed at the end of O2 exposure for further immunofluorescence investigations.
Results and Discussion: 48 hours after oxygen exposure, cell viability was increased only in 60% O2 exposed human normal and human cancer cells, but not in murine cancer cells. All 3 cell lines showed increased ROS production after 60% ($p<0.05$) and 80% ($p<0.001$) O2 exposure. At 48 hours ROS were still elevated in 80% O2 groups, mainly in murine cancer cells, while in 60% groups ROS decreased to control group levels.
Conclusions: Short term high oxygen concentration exposure of human and murine breast cancer cells alters differently cell viability and oxidative stress response.
References:
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13AP08-5
Repeated administration of lidocaine inhibits colon carcinoma growth in animal models

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Background and Goal of Study: Numerous studies have reported that systemic continuous infusion of local anesthetics have beneficial effects on pain control and postoperative recovery. Recent in vitro studies have shown that local anesthetics influence the cancer cells behavior, but there are only a few animal studies and no study on colorectal carcinoma in animals.
Materials and Methods: Human colorectal carcinoma HCT-116 cells stabilized on cellular polysaccharide based biomatrix where subcutaneously inoculated on NIH-Foxn1 immunodeficient male 12 weeks old rats and exposed on lidocaine continuous infusion during surgery for tumor implant under sevoflurane anesthesia and for another 12 weeks as intraperitoneal administration. Control group rats were injected with 0.9% natrium chloride. Transcutaneous tumor dimension was measured and tumor volume estimated at 6 and 12 weeks after implant.
Results and Discussion: All tumor volumes in lidocaine group (n=6) where reduced below 10% of the tumor volumes in control group (n=4) at 12 weeks ($P<0.001$). The volume of tumor in lidocaine group was reduced at 12 weeks compared with 6 weeks and in one of the cases the tumor was transcutaneous undetectable at 12 weeks. Histological data will also be presented.
Conclusions: In our preliminary study, prolonged administration of lidocaine reduced HCT-116 tumor size in animals. Further studies on larger groups are needed.
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13AP08-6
The influence of perioperative systemic steroid administration in diabetic patients receiving fast track primary Total Hip Arthroplasty versus patients requiring collum fracture surgery. Results of a retrospective study.

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Background and Goal of Study: As part of the fast track total Hip Arthroplasty (THA) in our hospital, patients receive dexamethasone 0,15 mg/kg/iv preoperatively. These patients stop oral diabetes medication from 48 hours until day of surgery. Patients with collum fracture receive a standard dose of 8 mg/iv dexamethasone preoperatively, but oral diabetes medication is not stopped. The aim of this study is to evaluate the influence of dexamethasone on serum glucose levels in patients with diabetes in the early postoperative phase and compare elective surgery with non-elective surgery.
Materials and Methods: In this retrospective cohort study, serum blood glucose levels per-operatively (5 hours before until 24 hours after surgery) were analysed. All patients underwent THA or collum fracture surgery in 2016 or 2017 and received dexamethasone intravenously. Data on demographics, surgery and outcomes were retrieved from their medical records.
Results: A total of 231 patients were analysed consisting of 89 THA and 142 collum fracture patients, mean age was 78.8 ± 10.6 years, 66,7% were female, mean ASA score was 2.2 ± 1.0. In the THA group, mean blood glucose before surgery was 7.8 ± 2.2 mmol/l compared to 10.1 ± 3.3 mmol/l in the collum fracture group ($p<.001$). 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 ($M = 16.1 \pm 4.3$). After 24 hours, blood glucose levels turned to baseline levels. No significant differences between the two groups were observed in this effect, although the effect seems more pronounced in the THA group. 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 45.5 % of the patients with no significant differences between the two groups.
Conclusion: Our study suggests that the use of dexamethasone increases blood glucose levels temporarily, which needs interventions in diabetes regime in about half of the patients. In light of the advantages this seems acceptable, however changes in glucose and diabetes medication policy are advised.

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13AP08-7
Peri-operative management of a child with a rare metabolic disorder.

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Background: Fatty acid metabolic disorders are rare. Carnitine palmitoyl transferase II deficiency (CPT II) is an autosomal recessive disorder of mitochondrial fatty acid oxidation and is characterised by recurrent episodes of rhabdomyolysis triggered by prolonged exercise, fasting or febrile illness.[1]
Case Report: Our patient, a 13 year old child with a known CPT II deficiency and a past history of recurrent episodes of myositis was posted for an open surgical reduction of a fractured ankle. Preoperative management included minimizing fasting time, providing carbohydrate maintenance, monitoring creatine kinase level and preventing rhabdomyolysis. As fatty acid metabolism is deranged and there is a risk of malignant hyperthermia, a spinal anaesthetic was considered ; however the child was not keen for this, while lipid load ruled out Propofol TIVA use. A general inhalational anaesthetic with thiopentone induction was performed with maintenance on supraglottic airway, sevoflurane and opioids. A Continuous infusion of glucose saline was maintained throughout the procedure with continuous temperature monitoring till postoperative period. A vapour free anaesthetic machine and Dantrolene were kept on standby. Temperature and etCO2 remained stable and procedure was completed uneventfully. Early feeding was instituted in the post-operative period and patient was then discharged subsequently with no complications.
Discussion: CPT II deficiency is characterised by the inability to derive energy from fatty acid oxidation. Once immediate glucose and glycogen stores are exhausted, muscle catabolism leads to rhabdomyolysis with muscle pains, hyperkalemia, metabolic acidosis and myoglobinuria. Therefore, the peri-operative management should include measures limiting fasting time to a minimum with glucose maintenance to prevent muscle breakdown. There is limited literature regarding association of malignant hyperthermia and CPT II deficiency.[2] In our case, we used inhalational anesthetics without any adverse effects. A literature search didn't reveal any case report with muscle biopsy proved MH associated with CPTII deficiency. While we believe that this association is unlikely, it would be prudent to take measures to prevent MH triggers where possible and be prepared to treat MH should it arise.
References:
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2.Hogan KJ1,Vladutiu GD.Anesth Analg.2009 Oct;109(4):1070-2.

13AP08-8
Anaesthetic management of severe perioperative hemorrhage during radical nephrectomy with vena caval thrombectomy: a case report.

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Background: Radical nephrectomy with inferior vena cava (IVC) thrombectomy is one of the pathologies that have major anesthetic and surgical implications, due to the risk of severe intraoperative hemorrhage.
Case Report: We report a 51 year old, ASA grade III, male patient with a presentation of stage IV (T4N1M0) renal cell carcinoma. The tumor thrombi had invaded the renal vein and 2cm of the infrahepatic segment of the IVC. He received combined general anesthesia with epidural analgesia. During thrombectomy and cavotomy, there was an unexpected complication while attempting to place a second clamp proximaly to the first one. The first clamp which was in the middle of the thrombus, accidently got loose and opened, causing acute and severe blood loss. We took resuscitation measures immediately and started transfusion with packed red blood cells (RBC) and fresh frozen plasma (FFP). We maintained the mean arterial pressure (MAP) above 70 mmHg with α1 agonist Phenyelphrine 500 mcg and Ephedrine 20 mg. He also received calcium gluconate 10% 10ml, metilpredisolon 80mg, hypertonic NaCL 10% and NaHCO3 8.4% 160ml. Due to fast local hemostasis the bleeding stopped, and right radical nephrectomy with IVC reconstruction by direct suture was done. The patient received four units of RBC and two units of FFP in total. Total blood loss was estimated to be 5 liters, but we managed to stabilize and extubate the patient at the end of surgery.
Discussion: Nephrectomies in association with IVC resection and reconstruction have an increased risk of blood loss and may need massive perioperative blood transfusions (1). The anesthesiologist should be aware of the risks of extensive hemorrhage and take all necessary measures to minimize the onset of coagulopathies and blood loss (1). Prevention of hypothermia, early resuscitation with warm crystalloids and blood products as well as invasive intra-arterial blood pressure measurement are essential for successful outcome (2).
References:
1. Juan P. Cata at all. Blood loss and massive transfusion in patients undergoing major oncological surgery: What do we know? ISRN Anesthesiology volume 2012, Article ID 918938.
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Learning points: Accidents can happen, regardless of a good preoperative preparation. Strategic planning of the anesthesia, communication among teams and back up of transfusion support are the key to a successful anesthetic management.

13AP08-9
The patients background not responding on 3 months after surgery in prospective observational study.

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Background and Goal of the Study: The aims of prospective cohort studies are to assess the occurrence of outcome event and associated factors. However, longer observation period is, the more dropout rate increases. High dropout rate would increase selection bias, which may result in difficulty to interpret the results. We have conducted a prospective cohort study to assess postoperative functional disability on 3 months after surgery. We aimed to investigate the incidence of dropout rate, and background of patients who did not respond after 3 months of surgery.
Materials and Methods: Individuals aged ≥55 years who were scheduled to undergo surgery in our hospital between April 2016 and March 2018 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 including nutritional status, postoperative complications and reoperation were also evaluated. The dropout rate was calculated based on the presence and absence of response after 3 months. Cox proportional hazards model was applied to determine associated factors with non-responders.
Results and Discussion: Of 3068 patients with preoperative data, 440 (14.3%) did not respond on 3 months after the surgery. As shown in Table 1, wearing of pacemaker, body mass index (25 , <30 and 30), preoperative malnutrition, high score of preoperative WHODAS2.0, reoperation and postoperative complications were independently associated with increased non-response on 3 months later, whereas older age and high level of serum albumin were associated with decreased non-response on 3 months later.
Conclusion: In our prospective cohort study, postoperative dropout rate on 3 months was 14%. Preoperative comorbidities including decreased functional ability and postoperative complications contributed to non-response. Our findings would support that the results of prospective cohort studies should be interpreted with consideration of the background of patients who could not follow up.

Table 1 Associated factors with the patients who did not respond on 3 months after surgery.

	Risk ratio	95% CI	P value
Age	0.98	0.97-0.99	0.039
Pacemaker	2.55	1.14-5.72	0.022
Serum albumin	0.77	0.61-0.98	0.034
Body Mass Index 25≦, <30	1.33	1.06-1.67	0.014
Body Mass Index 30≦	1.64	1.09-2.48	0.017
Malnutrition	1.64	1.1-2.43	0.013
Pre WHODAS2.0 score	1.008	1.003-1.014	0.003
Reoperation	1.88	1.25-2.83	0.002
Postoperative comlication	2.34	1.34-4.09	0.003

WHODAS; The World Health Organization Disability Assessment Schedule

13AP08-10
Active clinical services of technically efficient surgeons in a university hospital

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Background and Goal of Study: It is 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 provide active clinical services in a university hospital. This is an extension of our previous study (ref).
Materials and Methods: We collected data from all the surgical procedures performed at Teikyo University Hospital from April through September in 2013-2018. The dependent variable was defined as length of active clinical services calculated as the number of months when a surgeon operated as a senior surgeon.
Output-oriented CCR model of data envelopment analysis was employed to calculate surgeon's technical efficiency score. Inputs were defined as (1) the number of assistants, and (2) the time of surgical operation. The output was defined as the surgical fee for each surgery.
Six control variables were selected; experience, medical school, surgical volume, gender, and academic rank (full or associate professor). Multiple regression analysis using an ordinary least squares model was performed. A p-value < 0.05 was considered statistically significant.
Results and Discussion: We analyzed total 17,227 surgical cases in 36-month study period. Efficiency scores were calculated for all of them in each year, and the mean of the efficiency scores for each surgeon was calculated. Two hundred and twenty-two surgeons were analyzed in the multiple regression. Efficiency scores had significantly negative association with length of active clinical services (p = 0.006). Experience and surgical volume had significantly positive association with length of active clinical services (p = 0.001 and p = 0.000). The other coefficients of control variables were insignificant (Table).
Conclusions: Technically efficient surgeons provide shorter active clinical services in a university hospital.
References:
Nakata Y, et al. Physician Leadersh J 2018; 5:51-5
Acknowledgements: This work was supported by Japan Society for the Promotion of Science KAKENHI Grant Number 17K09247.

Table.
Results of multiple regression analysis using an ordinary least squares model. Data are presented as mean ± robust standard error. * indicates that the coefficient is significantly different from zero ($p < 0.05$).

	Dependent variable: Length of active clinical services (months)		
	Coefficients	95% Confidence Interval	p-value
Efficiency Score *	-7.336 ± 2.651	-12.56, -2.11	0.006
Experience *	0.321 ± 0.094	0.136, 0.506	0.001
Medical School	-0.136 ± 1.732	-3.552, 3.279	0.937
Surgical Volume *	0.329 ± 0.045	0.240, 0.417	0.000
Gender	0.527 ± 1.560	-2.547, 3.602	0.735
Rank (Professor)	-1.729 ± 2.482	-6.620, 3.163	0.487
Rank (Associate Professor)	4.216 ± 2.260	-0.238, 8.670	0.063

13AP09-1
A smart Foley catheter for the continuous and easy monitoring of tissue perfusion: an animal study

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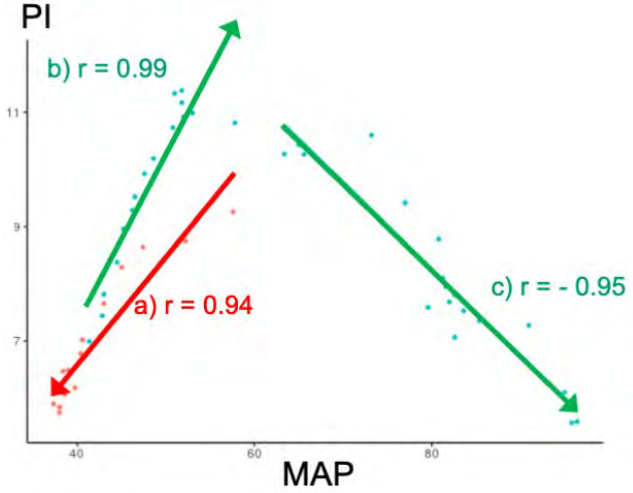
Background and Goal of Study: Restoring tissue perfusion is the main endpoint of hemodynamic management. As of today, tools designed to assess tissue perfusion are mainly for research. We tested a new Foley catheter (Ikorus UP, apdiagnostics.net.com) equipped with a photoplethysmographic sensor enabling the continuous monitoring of urethral perfusion index (uPI).
Materials and Methods: 5 pigs were anesthetized, mechanically ventilated and equipped with Ikorus UP. Mean arterial pressure (MAP) changes were induced first by increasing the inspired fraction of sevoflurane (MAP target 40 mmHg) and second by administering norepinephrine at increasing doses (MAP target 100 mmHg). The optimal MAP was defined as the MAP associated with the highest uPI.
Results and Discussion: Increasing depth of anesthesia induced a decrease in uPI that was significantly correlated with the decrease in MAP (individual r values ranging from 0.63 to 0.94). During vasopressor administration the relationship between MAP and PI was biphasic (example shown in figure 1) with an initial rise in PI that was closely correlated with MAP (r values ranging from 0.88 to 0.99) followed by a fall in PI that was inversely related to MAP (r values ranging from -0.72 to -0.95). The optimal MAP ranged from 52 to 70 mmHg.
Conclusions: Ikorus UP was able to detect changes in tissue perfusion induced by anesthesia and vasopressor administration. Vasopressors may have a paradoxical effect on tissue perfusion (aka dissociation or lack of coherence between macro and microcirculation) that was detected by Ikorus UP. The optimal MAP varied from one animal to the other. Because a Foley catheter is commonly used in high risk surgical and ICU patients, this new device has potential to make monitoring of tissue perfusion a reality and help clinicians to individualize vasopressor therapy.

Figure 1: Example of changes in mean arterial pressure (MAP) and urethral perfusion index (PI) in an illustrative pig. a) decrease in MAP and PI induced by anesthesia, b) rise in MAP and PI induced by norepinephrine, c) rise in MAP and decrease in PI induced by norepinephrine.



13AP09-2
Dexmedetomidine ameliorates isoflurane-induced cognitive dysfunction in mice subjected to chronic brain trauma by attenuating microglial activation

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Background: Traumatic brain injury(TBI) is a leading cause of cognitive dysfunction. Bone marrow-derived microglia(BMDM) that have infiltrated into the hippocampus contribute greatly to cognitive dysfunction after TBI. Furthermore, postoperative isoflurane-induced cognitive dysfunction is associated with inflammatory activation of hippocampal microglia. Dexmedetomidine(DEX) has been reported to attenuate isoflurane-induced neurocognitive impairment. We investigated the effects of DEX on isoflurane-induced cognitive dysfunction and inflammatory activation of hippocampal BMDM subjected to chronic TBI.
Materials and methods: The study protocol was approved by the Animal Ethics Committee of Sapporo Medical University. Adult male C57BL/6 mice received bone marrow transplantation from green fluorescent protein C57BL/6 transgenic mice. Those mice were assigned to 4 groups: Naïve-Isoflurane-Vehicle(Naïve-Iso), Sham-Isoflurane-Vehicle(Sham-Iso), TBI-Isoflurane-Vehicle(TBI-Iso-Veh), and TBI-Isoflurane-Dexmedetomidine (TBI-Iso-DEX) groups. We used a stereotaxic impactor to induce TBI. A burr hole was made 4 mm anteriorly-posteriorly to the bregmatic suture and 4 mm laterally to the sagittal suture over the right hemisphere. Using an impactor, a 3-mm tip was accelerated down to a depth of 1 mm at 3 m/second. Naïve mice did not undergo an operation. At 4 weeks after the operation, mice were pre-treated with DEX(50 μg/kg, i.p.) or a vehicle at 30 min prior to isoflurane exposure(1.5% for 30 min). Cognitive function was assessed using the Barnes Maze test at 2 weeks after isoflurane exposure. All of the mice participated in 3 sessions per day at an inter-session interval of 3 hours for 3 days. After completion of behavioral testing, we observed the number of hippocampal BMDM by immunohistochemical staining. Behavioral data were analyzed by two-way repeated measures ANOVA with post-hoc Turkey's multiple comparison.
Results: TBI-Iso-Veh mice failed to learn the task and took significantly longer to reach the escape hole. In contrast, TBI-Iso-DEX mice showed amelioration of impaired learning of the task and found the hole faster on the final day.TBI-Iso-DEX tissue had a significantly reduced number of hippocampal BMDM compared with that in TBI-Iso-Veh tissue.
Conclusion: We demonstrated that DEX ameliorates isoflurane-induced cognitive dysfunction caused by chronic TBI. The neuroprotective effect of DEX was associated with attenuation of microglial activation.

13AP09-3
The Effect of Desflurane on Retinal Angiogenesis in a Mouse Model of Oxygen-induced Retinopathy

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Background and Goal of Study: Retinopathy of prematurity (ROP) is an ocular disorder that occurs primarily in premature infants and is the most common cause of vision impairment. This study examined the effect of desflurane on angiogenesis in a mouse model of ROP.
Materials and Methods: The mice were randomly allocated to the control (C), ROP control (Rc), or ROP with exposure of desflurane (Rd) group. Seven-day-old mice were exposed to 75% oxygen chamber for 5 days beginning on P7 (P: postnatal day), and thereafter returned to room air. Age-matched mice exposed to room air were the C group. To observe angiogenesis of the retina, the mice were sacrificed P16. The Rd group was exposed to 8% desflurane for 2 h on P12, P13, and P14 with 40% oxygen. Whole-mount immunofluorescence staining for evaluation of the avascular area and western blot analysis for evaluation of hypoxia-inducible factor 1α (HIF-1α) and vascular endothelial growth factor A (VEGF-A) expression were performed. The data quantification was performed using the Image J software (National Institutes of Health, Bethesda, MD, USA).
Results and Discussion: The ratio of avascular area / total retinal area was not changed significantly in the Rd group, compared to the Rc group. The expression of HIF-1α and VEGF-A in the Rd group and Rc group was not different significantly (Figure 1 and 2).
Conclusions: Desflurane does not have a significant influence on retinal angiogenesis via HIF-1α and VEGF-A expression in the OIR mouse model. However, these findings are not directly applicable to premature infants, and it would be necessary to carry out further studies to determine the effect of desflurane on angiogenesis.

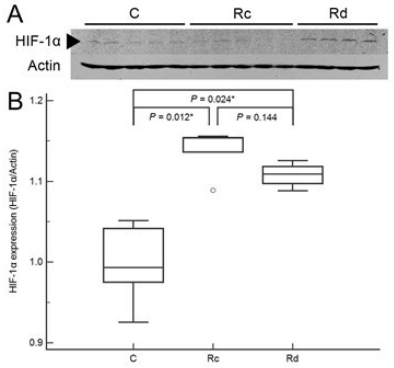

Figure 1. Western blotting analysis and quantification of the protein expression of HIF-1α. For quantification of the protein expression of HIF-1α, the ratio of HIF-1α / actin was analyzed. The values are expressed as median and interquartile range (horizontal lines represent respective group medians; boxes, 25th–75th percentile; whiskers, 10th–90th percentile; and closed circles, outliers). Mann–Whitney U test with Bonferroni correction was performed for post-hoc multiple comparisons. * : $P < 0.05$. C, normoxic control group; Rc, retinopathy of prematurity (ROP) without exposure to desflurane group; Rd, ROP with exposure to desflurane group; and HIF-1α, hypoxia inducible factor-1α.

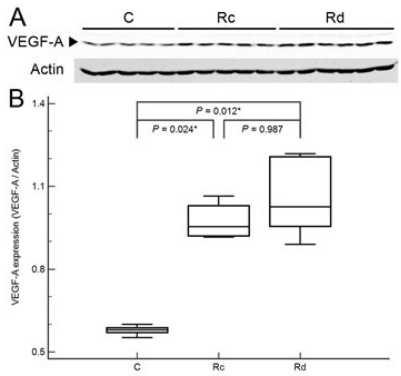

Figure 2. Western blotting analysis and quantification of the protein expression of VEGF-A. For quantification of the protein expression of VEGF-A, the ratio of VEGF-A / actin was analyzed. The values are expressed as median and interquartile range (horizontal lines represent respective group medians; boxes, 25th–75th percentile; and whiskers, 10th–90th percentile). Mann–Whitney U test with Bonferroni correction was performed for post-hoc multiple comparisons. * : $P < 0.05$. C, normoxic control group; Rc, retinopathy of prematurity (ROP) without exposure to desflurane group; Rd, ROP with exposure to desflurane group; and VEGF-A, vascular endothelial growth factor-A.

13AP09-4
Postoperative malignant hyperthermia that confirmed by calcium-induced calcium release rate (CICR) after breast cancer surgery in which prompt recognition and immediate dantrolene administration counteract fatal status.

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Background: Malignant hyperthermia (MH) of postoperative onset is a rare disease, but it develops very serious symptoms, so prompt and appropriate response is required. We report a case of a patient who developed sudden postoperative hyperthermia, which was definitively diagnosed as MH by the postoperative calcium-induced calcium release rate (CICR) measurement test.
Case Report: A 61-year old woman with a history of stroke hospitalized for surgery of breast cancer. There were no special problems such as life history, allergy, muscle disorder, and preoperative examination. General anesthesia was introduced by propofol, fentanyl, remifentanil and rocuronium. After intubation, anesthesia maintained by propofol and remifentanil with Bispectral Index monitoring, mastectomy and muscle flap reconstruction surgery was performed without major problems. We warmed up with warming device against hypothermia(35.7). After confirming her spontaneous breathing, we administered 200mg of sugamadex and extubated. Thereafter systemic shivering, masseter spasm appeared, and rapid increase of temperature(max38.9) and EtCO2(max 59mmHg) was noted. We have suspected MH and started cooling of the body surface and administered chilled potassium free fluid water and 1200mg of dantrolene. After body temperature dropped and shivering improved, patient entered the ICU. We continued body cooling within the target range of 36-37 in ICU. Consciousness disorder, hypotension, elevation of serum potassium, metabolic acidosis, and cola urine were not observed during ICU stay. Then, her general condition became better and left the hospital on the day 12th. Muscle biopsy after discharge were performed and suggested that it is definitive diagnosis of MH.
Discussion: Present case suggested it was almost certain case of MH in the retrospective evaluation using the MH scale(50points) by Raut et al(1). Prompt recognition and immediate treatment with IV dantrolene administration and body cooling could effectively reverse potentially fatal syndrome. It was a valuable case of postoperative MH that leads to confirmed diagnosis by CICR.
Learning point: Propmpt recognition and immediate treatment with dantrolene and cooling could reverse fatal syndrome of MH, which was confirmed diagnosis by CICR.
References:
1.Raut, Monish S et al. Rare postoperative delayed malignant hyperthermia after off-pump coronary bypass surgery and brief review of literature Annals of cardiac anaesthesia vol. 19,2 (2016): 357-62.

13AP09-5
Use of methylene blue in vasoplegic syndrome after non-cardiac surgery

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Background: Vasoplegic syndrome is an increasingly recognized disease in perioperative medicine and is characterized by severe hypotension, normal or elevated cardiac output, and decreased systemic vascular resistance. It occurs commonly after cardiopulmonary bypass but may also occur after other types of surgery.
Case Report: A 77-year-old woman was admitted to undergo posterior lumbar interbody fusion. During surgery, 50 µg of phenylephrine was administered because the patient's mean arterial BP decreased. About 2 min later, her mean arterial BP increased rapidly to 123 mmHg and her SVRI increased sharply. To control the rapid increase in BP, 500 µg nicardipine HCl was administered. Thereafter, her mean arterial BP decreased rapidly. Norepinephrine was administered, but the mean arterial BP remained at 60 mmHg. On arrival in the PACU, transthoracic echocardiography was performed and showed normal ventricular volume and left ventricular systolic function (ejection fraction 65%), no regional wall motion abnormality, and no pericardial effusion or hematoma. We excluded cardiogenic, anaphylactic, and hypovolemic causes of hypotension, and assumed that the patient had developed vasoplegic syndrome. Therefore, vasopressin was initiated at 2 U/h because norepinephrine alone had not recovered the BP. Given the lack of response to a vasopressor, we administered methylene blue at a dose of 0.5 mg/kg (35 mg). There was an immediate increase in BP from 74/54 mmHg to 112/66 mmHg. The patient was transferred to the intensive care unit.
Discussion: Vasoplegia has been reported most frequently after cardiac surgery with cardiopulmonary bypass, and has been reported in non-cardiac major surgery such as liver transplantation. However, there has been no report of a sudden onset due to intraoperative drug use like our patients. Vasoplegic syndrome that does not respond to potent vasoconstrictors is difficult to treat. Methylene blue can be used to treat vasoplegic syndrome that does not respond to catecholamine vasoconstrictors.
References:
McCartney SL, Duce L, Ghadimi K. Intraoperative vasoplegia: methylene blue to the rescue! Curr Opin Anaesthesiol 2018; 31: 43-9.
Learning points: Vasoplegic syndrome can be developed when using nicardipine to offset the effects of phenylephrine during surgery. The vasoplegic syndrome responds poorly to norepinephrine or vasopressin can be treated with methylene blue.

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13AP09-6
Prognostic value of lactate clearance in major liver surgery

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Background and Goal of Study: Major hepatectomy represents a high-risk surgery that is associated with increased mortality and morbidity unless advance perioperative management is applied. The aim of this study was to assess the impact of perioperative lactate clearance on patient outcome.
Materials and Methods: Fifty-five consecutive patients that underwent major hepatectomy were included. We measured intraoperative lactate levels at the beginning of surgery, before liver dissection, after dissection, end of surgery and during the first postoperative days. Extent of liver resection was also noted. Intraoperative blood loss and transfusion, vasopressor support, duration of Pringle manoeuvre, length of surgery and postoperative liver functional tests on postoperative day one and Postanaesthesia Care Unit (PACU) Length of Stay (LoS) were also noted. Lactate clearance was defined as de mathematical difference between end of surgery and 24 hours after surgery lactate levels.
Results and Discussion: The mean age in our study group was 57.3±13.0 years. The mean duration of surgery was 298±145 min and the median number of Pringle manoeuvres was 2 [0,5]. The median PACU LoS was 1 [1,5] days. The mean lactate levels at the end of the dissection phase was 4.7±2.1 mmol/L and at the end of surgery was 3.1±1.8 mmol/L. The extent of liver resection correlated with lactate levels at the end of surgery ($p=0.002$) and both 12 hours ($p<0.001$) and 24 hours ($p=0.04$) after the surgery. The duration of the Pringle manoeuvre also correlated with both end of surgery ($p=0.002$) and 24 hours after the surgery ($p<0.01$) lactate levels. A low lactate clearance correlated with the extension of liver resection ($p=0.01$), duration of the Pringle manoeuvre ($p=0.02$) and intraoperative blood loss ($p=0.01$) and was the only predictive factor for postoperative liver dysfunction ($p=0.02$).
Conclusions: Low intraoperative lactate clearance represents a good marker of postoperative outcome in patients undergoing major hepatectomy. Intraoperative blood loss, duration of the Pringle manoeuvre and extent of liver resection represent risk factors for both increased postoperative lactate levels and low lactate clearance.

13AP09-7
Proadrenomedullin (ProADM): biological marker of the risk of perioperative organic failure in major abdominal surgery. A multicenter study.

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The aim of this study was to determine the association between high serum levels of Proadremedullin (ProADM) , in adult patients scheduled for major non-cardiac surgery, and the appearance of perioperative organ failure.
Materials and Methods: Prospective observational study in 363 adult patients scheduled for major abdominal surgery in 4 university hospitals in Spain. ProADM serum levels were determined immediately before surgery. Demographic variables were collected, as well as a score of preoperative risk scales RCRI (Revised Cardiac Risk Index) and ASA. The incidence of postoperative organ failure and mortality in the first 30 postoperative days was recorded. Mean and standard deviation (SD) were calculated for the quantitative variables and frequencies were calculated for the qualitative variables. The association between qualitative variables was analyzed by Chi square test or Fisher's exact test and between quantitative variables by Student's t test. Finally, a multivariate analysis was performed, using Logistic Regression, to determine the preoperative variables related to perioperative organ failure and calculate their risk of occurrence through Odds Ratio (OR).
Results and Discussion: The incidence of postoperative organ failure was 16.8% (61 patients) and the 30-day mortality was 4% (14 patients). The mean value of ProADM was 1.02 nmol / L. A total of 67 patients (18.5%) had plasma ProADM values ≥ 1 nmol / L. . A statistically significant relationship was found between preoperative levels ≥ 1 nmol / L and a greater incidence of postoperative organ failure ($p=0,001$), as well as a longer hospital stay ($p=0,021$) and a greater risk of death in the first postoperative month ($p=0,006$). A statistically significant relationship was also found between the levels of proADM ≥ 1 nmol/L and high values in the ASA (≥ 3) and RCRI (≥ 2) scales. In the multivariate analysis, perioperative variables associated with organ failure were included in the study population, independently associated with a ProADM value> 1 nmol / L as a risk factor (OR = 3.2, 95% CI 1.7-6.2; $p<0.05$).
Conclusions: The serum level of ProADM is an independent risk factor for postoperative organ failure in adult patients scheduled for major non-cardiac abdominal surgery.
Acknowledgements: Thank you for your contribution to the study to Dr. Carlos Garcia Bernedo (Hospital del Mar. Barcelona) and Dr. Emilio Maseda (Hospital.U.La Paz, Madrid)

13AP09-8
Sphenopalatine Ganglion Block (SPGB) with ropivacaine and dexamethasone on Endonasal Endoscopic Surgery (EES) – case series

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Background: Anaesthetic challenges in EES include minimizing bleeding and controlling postoperative pain with a multimodal strategy. Regional anaesthesia with BGEP seems to be an effective technique in reducing postoperative pain. We describe 10 cases in which SPGB was performed with ropivacaine and dexamethasone for ESS.
Case Report: Demographic variables, ASA class, polyps grade, mean arterial pressure (MAP), heart rate (HR), duration of surgery, blood loss, Boezaart scale, intra/postoperative analgesic consume, numerical rating scale (NRS) on arrival/ discharge, length of hospital stay. SPGB was performed with noninvasive transnasal approach (with a swab) with ropivacaine at 7.5 mg/dL (4 ml) + dexamethasone (4 mg) 10-20 min before induction (2.5 ml/nostril). All patients underwent general anaesthesia with perfusion of remifentanil. Informed consent was obtained from all patients. 6 male patients, median age 44.5 years (26-66), median BMI 24.8 kg/m2. 4 patients ASA 1, 5 ASA 2, 1 ASA 3. Average duration of surgery of 120 minutes. Median PAM was 55 - 99 mmHg and HR was 57 - 83.5 bpm. Median blood loss was 100 ml (10-300) and median evaluation of the surgical field was 3 (2-4). In 9 cases the NRS was 0 on arrival at the recovery (1 case was 5). We obtained NRS 0 at discharge for all patients. Paracetamol was administered intraoperatively, NSAIDs in 6 and opioids in 2 patients. In 9 patients there was no need for analgesia in the recovery, and in the NRS patient of 5, NSAID + tramadol was required. At 24 hours postoperatively 5 patients did not require analgesia, 3 made 1 g paracetamol and 2 made 3 g. All patients were satisfied with the procedure. Median duration of hospitalization was 3 days (2-4). No adverse effects were reported.
Discussion: SPGB is used for treatment of some types of headache (ex: post puncture headache). The literature demonstrates advantages of this technique in ESS (transoral approach with lidocaine or bupivacaine/levobupivacaine). To our knowledge, SPGB with ropivacaine is not yet described in this context. Dexamethasone seems useful in improving the quality of nerve blocks. In this case series, good analgesia and postoperative comfort were observed. In most cases the surgeon reported mild bleeding (Boezaart 3).
Learning points: SPGB with ropivacaine + dex seems to be safe and effective as an integral part of a multimodal analgesia in ESS.
Reference:
Shamil, E. et al (2018). Clinical Otolaryngology, 43(5),1201-1208

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13AP09-9
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 analgesia and enhanced recovery in hysterctomy
Materials and Methods: In this study we included 58 ASA I – II class young women (20-60 years) scheduled 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 anesthesia 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.
Conclusions: Lidocaine intravenous infusion may be safe and useful for enhanced recovery in hysterectomy as it provides better analgesia and early mobilisation comparing with placebo.

13AP09-10
International multicentre cohort study for the external validation of CLASSIC – Classification of Intraoperative Complications

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Background: Prospectively validated systems for reporting intraoperative complications are lacking. This international prospective cohort study aimed to assess the external validity and practicability of CLASSIC, a newly developed and updated CLASSification of Intraoperative Complications (CLASSIC). The updated CLASSIC defines 5 severity grades depending on the need for treatment and severity of symptoms.
Methods: In 18 centres from 12 countries, patients undergoing any type of surgery were consecutively enrolled, excluding one-day surgeries (NCT03009929). The attending surgical and anaesthesia team graded all intraoperative complications according to CLASSIC. All postoperative complications were assessed daily until hospital discharge and graded using the Clavien-Dindo classification. The association between the most severe intra- and postoperative complication (primary endpoint) was investigated using Spearman's rho. The association between the most severe intraoperative complication and the postoperative length of stay (pLOS; secondary endpoint) was investigated in a multivariable median regression model with robust standard errors considering study centre clustering. This analysis was adjusted for age, ASA-class, wound classification, complexity and urgency of the procedure. In a survey including 10 fictitious case scenarios describing intraoperative complications, reliability of CLASSIC was assessed using the intra-class correlation coefficient (ICC).
Results: Out of 2640 patients screened, 2520 patients were enrolled, of which 610 (24%) experienced any intraoperative complication. 2508 postoperative complications were observed in 838 patients (33%). In-hospital mortality was 1% (n=25). The Spearman correlation between the most severe intra- and postoperative complication was 0.22 (p<0.001). In multivariable analysis, median pLOS increased with each CLASSIC grade (from 0.5 days (95% CI -0.03, 1.03) for Grade I vs 0, up to 4.5 days (95% CI 0.50, 8.50) for Grade IV vs 0). The survey (response rate 80%) showed an ICC of 0.75 (95% CI 0.59, 0.91). Practicability of CLASSIC was rated as 6 (IQR 5-7) out of 9.
Conclusions: CLASSIC provides a validated and standardised tool to quantify and qualify intraoperative complications in clinical practice and research with a high reliability and practicability. Intraoperative complications show an association with important postoperative outcomes, rendering CLASSIC a useful tool to enhance perioperative patient safety.

13AP10-1
Cognitive aids for the management of deteriorating surgical patients: a user experience

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Background and Goal of Study: Adherence to best practice management of intraoperative emergencies improves through the use of cognitive aids.[1] Aim of this study was to develop and validate cognitive aids for the management of deteriorating surgical patients (CAMDS) in order to improve adherence to best practice and hereby reduce the likelihood of failure to rescue. This abstract focuses on the user experience of the CAMDS.
Materials and Methods: Surgical teams were randomly assigned to manage 150 high fidelity simulation cases of deteriorating patients using the CAMDS or not. There were 10 patient scenarios; pneumonia, pneumothorax, bradycardia, cardiac arrest shockable and non-shockable rhythm, bleeding, myocardial infarction, anaphylaxis, sepsis and loss of consciousness. To assess perceived usability of the CAMDS, participants were asked about eight aspects (see table 1) of the CAMDS. These items were scored on a Likert scale (0= strongly disagree to 4= strongly agree), overall usability was scored 0 to 10 (0 =fully insufficient to 10 excellent). A Student´s t-test was used to detect a significant difference from neutral (score of 2).
Results and Discussion: The surgical teams consisted of 1 surgical doctor with a median work experience of 2 (IQR 1-5) years and 1 or 2 nurses with a median work experience of 3.5 (IQR 1,5-7) and 3 (IQR 2-6,3) years, respectively. All were novices in the use of cognitive aids. Overall usability of the CAMDS was scored at a median of 8.7 (IQR 8-9). A good user perceived usability of the CAMDS was found (table). A good user perceived usability will aid in implementing the CAMDS in daily practice in the surgical wards. The CAMDS have the potential to decrease failure to rescue in the surgical population.

Item	Median (interquartile range)	P value (confidence interval)
ease of use	3 (2.8 - 3.5)	< 0,001 (0.9-1.3)
logical order management steps	3.3 (3 - 3.7)	< 0,001 (1-1.5)
readability	3.3 (2.8-3.7)	< 0,001 (0.9-1.5)
provided overview	3.3 (3-3.5)	< 0,001 (-1.4)
interrupted treatment	1 (0.7-1.3)	< 0,001 (-1.2 - -0.8)
improved treatment	3.3 (3.1-3.7)	< 0,001 (1.2-1.6)
recommendation to use	3.6 (3.1-3.9)	< 0,001 (1.3-1.7)
suitability for daily use	3.7 (3.3-4)	< 0,001 (1.4-1.8)

Conclusions: This study showed a good perceived usability of newly developed cognitive aids for deteriorating surgical patients.
References:
[1] Arriaga AF et al. Crisis checklists for the operating room: development and pilot testing. N Eng J Med 2013;17;368:246-53

13AP10-2
Effect of sevoflurane and isoflurane on post-anesthesia cognitive dysfunction in normal and type II diabetic rats

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Background and Goal of Study: Both animals and human studies have documented cognitive and behavioral impairment after exposure to inhalational anesthetics, another studies also approved the drawback and predisposing effect of diabetes on cognition. The purpose of this experimental work is to demonstrate if the commonly used anesthetics isoflurane and sevoflurane can result in differential effect on post-operative cognition in normal and type II diabetic rats.
Materials and Methods: 60 male Wister rats aged 6 weeks were divided into 6 groups; group C (normal control), group CD (diabetic control) group S (sevoflurane anesthesia) group I (isoflurane anesthesia) group SD (diabetic sevoflurane anesthesia) group ID (diabetic isoflurane anesthesia). Animals were anesthetized by either 2.5% sevoflurane or 1.5 % isoflurane respectively for 2h. 1 week later animals were undergone cognitive tests on (Morris water maze, T maze and open field arena), thereafter animal were sacrificed and hippocampus homogenates were studied for caspase 3 activity by western blot assay. Induction of type II diabetes in CD, SD and ID groups was carried out by feeding on high fat diet for 8 weeks. During the fourth week Type II diabetes was induced in the experimental group by single IP injection of 30 mg/kg STZ.
Results and Discussion: Control diabetic rats showed no change in long-term/ reference memory, non-spatial working memory, exploratory activity or caspase 3 expression in hippocampus homogenate. The same previous results were demonstrated after sevoflurane anesthesia in normoglycemic rats. Anesthesia with isoflurane in normoglycemic rats resulted in significant decline in long-term/ reference memory, and non-spatial working memory while exploratory activity and caspase 3 expression in hippocampus homogenate showed no change as compared to normal control rats. Diabetes clearly revealed significant deterioration in post-anesthesia cognitive changes after anesthesia with sevoflurane or isoflurane in all the studied domains as compared to either normal control or diabetic control.
Conclusions: These results suggest that isoflurane anesthesia can result in post anesthesia cognitive impairment in normoglycemic and diabetic rats, while sevoflurane seems safe in this point in normoglycemic but not diabetic rats. The mechanism of this cognitive impairment may be partially explained by Caspase 3 induced apoptosis in rat hippocampus.

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13AP10-3
An association between S100β protein release prompted by cardiac surgical procedure and an early postoperative cognitive decline

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Background and Goal of Study: Cardiac surgery and the use of cardiopulmonary bypass (CPB) induce brain injury through the inflammatory and stress responses that predispose occurrence of postoperative cognitive decline (POCD). The S100β protein is expressed by astrocytes in the brain and does not reach the peripheral circulation of healthy individuals. Thus, S100β represents a marker of blood-brain barrier disruption and brain injury. The purpose of this prospective observational study was to investigate a possible link between postoperative S100β levels and an occurrence of early POCD after cardiac surgery.
Materials and Methods: The study involved 81 patients who were scheduled for an elective cardiac surgery both with and without CPB. Ethical approval for this study (No. 2181-147-01/06/J.B.-16-2) was provided by the Ethics Committee of the University Hospital of Split. Serum S100β levels were determined 6 and 30 h following the end of CPB or 3 h following the end of beating-heart surgery. A battery of 8 neuropsychological tests were used to assess the patients 2 days before the surgical procedure and on the 6th postoperative day. POCD in an individual is defined as a reliable change index equal to or less than -1.96 on at least 1 test.
Results and Discussion: On the 6th postoperative day, 21 of the 81 (25.9%) patients fulfilled the diagnostic criteria for POCD. At all-time points, the S100β levels were in the pathologically elevated range (> 0.12 μg l^{-1}). S100β levels after 6 and 30 h following the end of CPB were 0.27 ± 0.19 μg l^{-1} and 0.14 ± 0.07 μg l^{-1}, respectively, while 3 h following the end of beating-heart surgery was 0.28 ± 0.15 μg l^{-1}. Our results showed that the level of S100β has been decreased twofold in the period between 6 to 30 h after CPB. However, similar to two previous studies, this study did not reveal a significant relationship between elevated postoperative S100β levels and POCD. In contrast, a recent study did find such a correlation. This discrepancy amongst the various studies is most likely due to methodological differences in the timing of S100β sampling and the administration of the neuropsychological tests.
Conclusions: Although this study did not identify a relationship between postoperative S100β levels and an occurrence of early POCD after cardiac surgery, further research is warranted.

13AP10-4
Risk assessment for septicaemia and mortality among diabetic surgical patients - A nationwide population-based retrospective cohort study

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Background and Goal of Study: Diabetic surgical patients are susceptible to infection, sepsis, and even mortality among critical individuals. The comprehensive features of risk factors affecting the septicaemia and mortality for diabetic surgical patients are not completely understood. This study evaluated the association of risk factors, including severity of the diabetes, affecting the septicaemia and mortality rates among diabetic surgical patients.
Material and Methods: Using the reimbursement claims from Taiwan National Health Insurance Research Database from in 2008-2013, 48,264 diabetic surgical patients were identified among 23 million beneficiaries. Under the method of propensity score-matching in patients' age, sex, low income or not, pre-existing medical conditions such as mental disorders, hypertension, hyperlipidemia, heart failure, ischemic heart disease, liver cirrhosis, renal dialysis, COPD, anemia, types of surgery and anaesthesia, 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 48,264 surgical patients without diabetes were selected for comparison. Stratification analysis of risk for postoperative septicemia was further analyzed. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) associated with postoperative complications and mortality were evaluated under the multivariate logistic regressions model between patients with or without diabetes.
Results and Discussion: Compared with the controls, diabetic surgical patients had higher risks for septicaemia (OR 2.29, 95% CI 2.18-2.42), pneumonia (OR 1.79, 95% CI 1.68-1.90), stroke (OR 1.77, 95% CI 1.67-1.88), urinary tract infection (OR 1.63, 95% CI 1.55-1.72), and overall ICU mortality (OR 1.61, 95% CI 1.44-1.79). There are higher risks developing postoperative septicaemia in diabetic surgical patients if they had pre-existing inadequate control for diabetes, diabetes-related complications, mental disorder, hypertension, hyperlipidemia, ischemic heart disease, or liver cirrhosis.
Conclusions: This retrospective cohort showed that diabetic surgical patients had higher risk developing various adverse outcomes, esp. septicaemia, and overall mortality. Further prospective study is needed to modify the healthcare protocols for these specific population.

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13AP10-5
Obesity as Outcome Modifier in Hip and Knee Arthroscopies: A Retrospective Analysis

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Background: Osteoarthritis (OA) is the most prevalent disease of the joints in adults throughout the world. Obesity, secondary to age, is the most pertinent risk factor to the onset of OA. Arthroscopies are frequently used in these affected individuals to assess the need for further procedure or to provide symptomatic relief. We intended to compare the incidence of postoperative complications and opioid consumption between obese and non-obese young adults after hip and knee arthroscopies.
Methods: An international retrospective study was conducted at two medical centers: The Ohio State University Wexner Medical Center, Columbus OH, USA and Hospital Universitari Dr. Josep Trueta, Girona, Spain. After receiving institutional review board's approval, peri- operatively variables were collected from patients -18 to 40 years old- who underwent hip and knee arthroscopies between January 2017 and December 2017. According to patients' body mass index (BMI), study population was divided as obese (BMI >30 kg/m2) and non-obese (BMI ≤30 kg/m2).
Results: From the total of 589 patients, 195 patients (33%) were considered obese. The obese group had a mean age of 30.1±6.7 years and the non-obese of 26.4±6.8 years (p<0.0001). Postoperative complications for the obese group were: tachycardia (27%), hypertension (25%), bradycardia (9%), hypotension (9%), hyperventilation (2%), and oxygen desaturation (2%). Postoperative complications for the non-obese group were: bradycardia (22%), tachycardia (19%), hypertension (19%), hyperventilation (4%), oxygen desaturation (2%), and postoperative nausea and vomiting (1%). The median postoperative opioid consumption (calculated as morphine equivalent dose) for the obese and non-obese group was 7.5mg [IQR 4, 11.3] and 6.3mg [IQR 2, 11.3] respectively (p=0.0055).
Conclusion: Overall, postoperative complications were not different between obese and non-obese patients. Obesity did not impact negatively the perioperative outcome for hip or knee arthroscopies. These results correlate with previous published evidence (1,2). The study shows that obese patients are older and opioid consumption was found to be higher when compared to non-obese patients.
Acknowledgements: Authors would like to thank Daniel Stoicea for protocol design colaboration, Marilly Palettas, MPH, for statistical analysis, and Jaume Borrell-Vega, MD, Nadejda Cuznetova, MD, Luis Periel, and Andrew Costa for data collection.
1. JBJS.2018;100(11):965-73
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13AP10-6
Pre-Operative Cognitive Assessment using the Self-administered Gerocognitive Examination (SAGE).

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Background and Goal of Study: Several cognitive screening tests have been developed to assess cognitive status and identify patients with different degrees of cognitive impairment. Scharre et al. developed and validated the Self-administered Gerocognitive Examination (SAGE) to identify mild cognitive impairment (MCI) and early dementia in ambulatory patients. SAGE is a brief (12 questions), self-administered cognitive test that can be effortlessly used by any healthcare provider without requiring patient interaction or special equipment. The maximum SAGE score is 22; scores of 15 and 16 are suggestive of MCI and scores less than 14 are suggestive of dementia. We aimed to assess preoperative cognitive status of surgical patients at our institution based on SAGE scores.
Materials and Methods: Patients undergoing elective surgeries between September 2016 and November 2018 were included for data analysis. SAGE was performed pre-operatively based on general guidelines of test administration. The following demographics were collected: age, gender, race, ASA and level of education. Patients were distributed into 3 groups according to their SAGE score: dementia (0-14), MCI (15-16), and normal (17-22).
Results and Discussion: Out of the 320 patients who completed the SAGE preoperatively, 42 (12.85 %) were in the dementia group, 39 (12.23%) in the MCI group, and 239 (74.92%) in the normal group. There were no significant differences in age, gender or ASA between the three study groups (p=0.087, p=0.625, and p=0.692 respectively). Race and lower level of education were significantly associated with not being in the normal cognitive function group (p= <0.001 for both variables).
Conclusions: Cognitive function of patients undergoing elective surgeries can be easily self-assessed preoperatively with SAGE. Lower SAGE scores are suggestive of low cognitive reserve favoring post-operative delirium and slow cognitive recovery.
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13AP10-7
Choice of inhalational anesthetic does not implicate early postoperative cognitive functions: primary results from randomized double-blinded study

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Background and Goal of Study: Desflurane has been associated with faster emergence times, better vigilance and patient satisfaction. However, it is not clear whether desflurane has advantage over other inhalational anesthetics with regard to cognitive functioning. We are presenting primary results of randomized double-blinded study comparing desflurane and sevoflurane effect on postoperative cognitive changes.
Materials and Methods: Patients of at least 40-years-old undergoing elective thyroid surgery were included in the study. Participants were randomly allocated to either sevoflurane or desflurane group. Cognitive testing was performed a day before the surgery and repeated 24 hours postoperatively. Testing consisted of memory, attention and reasoning tasks. Maximum total score possible – 135 points. Postoperative cognitive dysfunction was diagnosed if postoperative score reduced by ≥20 %.
Results and Discussion: So far results of 47 patients are included in the analysis: 32 (68.1%) in sevoflurane group and 15 (31.9%) in desflurane group. Median decrease in overall postoperative score was -1.52% (IQR 15.5). 1 patient (2.1%) had been diagnosed with postoperative cognitive dysfunction. However, 6 patients (12.8%) had severely lower memory scores. Sevoflurane and desflurane groups were comparable based on demographics, duration of anesthesia, intraoperative fentanyl doses, postoperative pain and satisfaction scores, as well as preoperative baseline testing results.
Postoperatively no difference was found comparing total testing results between sevoflurane and desflurane groups (91.4 vs. 93.6, p = 0.67). Likewise, group scores did not differ on memory (26.0 vs. 26.8, p = 0.81), attention (31.7 vs. 32.5, p = 0.68) and reasoning (36.4 vs. 36.9, p = 0.84) tasks. No correlation was observed between age, body mass index, preoperative anxiety level or duration of anesthesia. Weak negative correlation was found between postoperative satisfaction and total postoperative score (r = -0.31; p = 0.04). Intraoperative temperature also negatively correlated with overall score (r = -0.34; p = 0.04).
Conclusions: no difference was found between two inhalational anesthetics in cognitive testing results. Contrary to age or duration of anesthesia, lower intraoperative temperature and worse postoperative satisfaction have negative implications on postoperative cognitive performance.

13AP10-8
Genetic risk factors of cerebrovascular events in perioperative period

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Background and Goal of Study: Cerebrovascular events are extremely frequent cause of death and disability around the world. Unfortunately further increase of cerebrovascular morbidity rate is predicted. At the date, risk factors control is the only efficient management to improve morbidity and mortality.
We studied whether gene polymorphism rs1537378 has influence on cerebrovascular atherosclerosis (CA) in Kazakh population.
Materials and Methods: We prospectively studied 100 adult patients after Local Ethic committee approval. 70 patients with cerebral atherosclerosis (CA-group) and 30 patients with no atherosclerosis (noCA-group). We studied demographic data, risk factors for atherosclerosis and ischemic stroke, cerebrovascular events, data of cerebral arteries imaging for atherosclerosis. In all patients we studied rs1537378 gene polymorphism.
Results and Discussion: 36 pts of CA-group previously had ischemic stroke, 22 pts had no signs of CA, other 12 pts had minimal neurological manifestation of CA (decreased memory, headache, dizziness), 51 pts have one or more risk factors for ischemic stroke (ischemic heart disease, arterial hypertension, diabetes mellitus, hyperlipidemia, obesity and smoking).
57 pts of CA-group underwent elective surgery: 24 carotid procedures, 16 aorta and branches procedures, 17 cardiac procedures. Non of pts nave cerebral events after surgery.

Characteristics	CA group	noCA group	p value
Total No	70	30	-
Gender (M/F)	51/19	21/9	0.849875
Age (y)	61.7±8.9	61.6±8.6	0.483066
BMI (kg/m2)	26.7±3.6	25.5±3.0	0.438638
Previous cerebral events (%)	51.4	10.0	0.013976
Risk factors for CA (%)	72.8	70	0.770
Pathological rs1537378 allele (%)	41.4	3.33	0.001
Neurological events during in-hospital stay	0	0	-

The relative risk of CA in pts with CT polymorphism in rs1537378-C gene is 12.429 (DI 95%). Odds ratio is 20.512.
Conclusion: Gene polymorphism rs1537378 may appear as a risk factor for cerebrovascular atherosclerosis and ischemic stroke in Kazakh population. Further investigations are needed.

13AP10-9
Studying Patient Anaesthetic ConcErns (SPACE): A pilot feasibility study

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Background: Patients' anxiety in the perioperative period has a high prevalence of between 33–90%.[1] Tools measuring perioperative anxiety rarely evaluate the concerns underlying them. Studies evaluating anaesthetic concerns are of limited size and lack generalisability. We therefore undertook a pilot survey to evaluate the concerns held by patients perioperatively and to validate the survey.
Methods: A survey was designed with patient, clinician and lay representatives, to assess perioperative outcome concerns. Prior to surgery, participants completed the survey reporting their understanding of the anaesthetic process, current anxiety levels and degree of concern relating to 16 potential intra- and post-operative events. Ten-item numerical rating scales were formatted based on events felt most significant. Individuals' demographics and details of the anaesthetic and surgery were gathered. Investigators surveyed elective surgical patients over 3 consecutive days in a tertiary London teaching hospital. The data was analysed using SPSS.
Results and Discussion: Eighty-two patients out of 101 eligible patients completed the survey, an 81% response rate. The median (interquartile range [range]) age was 52 (36.25–66 [19–84]), and 45 were male (55%). There were significant differences in overall pre-operative anxiety between men and women (p=0.001), median score 4 (2–7.5 [1–10]) vs. 7 (3.5–9 [1–10]), respectively. The score for understanding of the anaesthetic process was 8 (6–10 [1–10]). Outcome concerns of post-operative pain, 'not waking up' and an unsuccessful operation were most frequently reported (Fig.1). The questionnaire components are reliable and demonstrate good levels of internal consistency (α=0.948) using Cronbach's Alpha.
Conclusion: This pilot data suggests validity of the survey, produces hypothesis-generating information on perioperative outcome concerns. It demonstrates feasibility of conducting a larger study. Full validation of the survey and a multi-centre, prospective observational study is now planned.
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Question	Variable	Median	IQR (UB)	-	IQR (LB)	Range
	Overall perioperative self-reported anxiety score	5.0	2.0	-	7.0	1 - 10
	Anaesthetic-related anxiety score	5.0	2.0	-	8.0	1 - 10
	Surgical-related anxiety score	5.5	3.0	-	8.0	1 - 10
	Anaesthetic-related concerns					
1	Damage to my teeth during the anaesthetic	1.0	1.0	-	4.0	1 - 10
2	Pain after the operation	5.0	2.0	-	8.0	1 - 10
3	Nausea and vomiting after the operation	3.0	1.0	-	7.3	1 - 10
4	Having a sore throat	3.0	1.0	-	6.3	1 - 10
5	Being awake during surgery when I am not supposed to be	4.0	1.0	-	8.3	1 - 10
6	Not waking up after the operation	5.0	1.0	-	9.3	1 - 10
	Surgical related concerns			-		
7	Permanent scarring or deformity	3.0	1.0	-	6.8	1 - 10
8	The operation will be unsuccessful	5.0	2.0	-	8.0	1 - 10
9	The operation will make my existing condition worse	1.0	1.0	-	3.0	1 - 10
	Overall concerns regarding the entire operation			-		
10	My hospital stay will be longer than I expect	3.0	1.0	-	5.0	1 - 10
11	My responsibilities at home will be negatively affected	2.0	1.0	-	4.3	1 - 10
12	Getting back to work or normal activities will be delayed	3.0	1.0	-	5.0	1 - 10
13	A complication during or after the operation which delays recovery (e.g. a chest infection, wound infection, blood clot)	4.0	2.0	-	7.0	1 - 10
14	A complication during or after the operation which causes permanent disability (e.g. stroke, nerve injury, loss of limb)	3.0	1.0	-	8.0	1 - 10
15	Having to go to the intensive care unit (ICU)	3.0	1.0	-	7.0	1 - 10
16	Death during or after my operation	2.0	1.0	-	8.0	1 - 10

Figure 1 – A summary of survey data. Median reports the degree of concern or anxiety on a 10-item scale, where one is the least and ten is the most. IQR, interquartile range; ICU, intensive care unit

13AP10-10
Disturbances for patient`s well-being in the PACU after general or spinal anaesthesia.

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Background and Goal of Study: Simple interventions as ice pops or music can reduce stress levels and increase the wellbeing of patients after general or spinal anaesthesia (1,2). In preparation for an oncoming clinical trial about patient satisfaction and pain management we searched Pubmed and our own data to identify factors which disturb our patient`s wellbeing.
Materials and Methods: Retrospective analysis of anonymised CERTKOM-questionnaires about the wellbeing of our patients in the PACU after operations in general or spinal anesthesia from 2010 to 2013. Descriptive analysis of the obtained data.
Results and Discussion: We investigated 476 questionnaires from different surgical specialties. Most frequent postsurgical after-effects for patient`s well-being were thirst with 40% and surgery-induced pain with 17%. In subgroup analyses we explored the after-effects in the two surgical specialties with the lowest reported well-being. Although only a small percentage of patients had each symptom from the questionnaires (thirst, pain, nausea, etc.), the after-effects were equally distributed among the patients. They summed up to the approximately same relevant number of patients with none or only some feeling of well-being as observed in the whole-group analysis.
Conclusions: Even in hospitals certified as excellent in pain management (3) exists still a high percentage of patients claiming postoperative discomfort due to after-effects. We see the necessity for an increased focus on this topic and the need for an investigation regarding patient's perception.
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13AP11-1
Postoperative continuous respiratory volume monitoring for early detection of pulmonary complications after abdominal surgery

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Background and Goal of Study: Postoperative pulmonary complications (PPCs) are a major cause of morbidity and mortality after abdominal surgery [1]. PPCs may be preceded by subtle changes in respiratory minute volume before respiratory rate is affected. We hypothesized that postoperative respiratory volume monitoring in the surgical ward may be used to detect early changes in respiration associated with the development of PPCs.
Materials and Methods: We included consecutive adult patients undergoing elective abdominal surgery with an expected postoperative hospital stay greater than 48 hours. Respiratory rate, tidal volume and minute volume were continuously measured in the postoperative period at the surgical ward using a non-invasive impedance respiratory volume monitor (ExSpiron 1Xi, Respiratory Motion Inc., USA). PPCs were defined as respiratory failure, pulmonary infection requiring antibiotics treatment, atelectasis, pneumothorax and bronchospasm during hospital stay. We used mixed modelling to assess differences in continuous respiratory measurements between patients with or without PPC. Standard deviation of minute volume was used as an indirect parameter for minute volume variability over time.
Results and Discussion: Of the 30 included patients, 7 developed a PPC (23%). Patients that developed a PPC did not show longer periods of high (> 20/min) or low (< 12/min) respiratory rate than those without PPC; median 20.3% (IQR 8.5% – 36.2%) vs 28.7% (19.3% – 36.8%), respectively. Average tidal volume values were lower in patients that developed a PPC (mean difference 20.9%, 95% CI: -8.3% – 50.1%, p=0.153), however this did not reach statistical significance due to the high variability in tidal and minute volumes. Patients that developed a PPC had a lower variability over time in minute volume in the first 24 hours (mean SD 0.285 vs 0.400 respectively, p=0.017).
Conclusions: Postoperative respiratory volume monitoring detects early abnormalities in minute volume variability and may therefore identify those patients at risk for postoperative pulmonary complications, even when respiratory rate remains unaffected.
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Acknowledgements: We thank dr. P.M. van de Ven for his help with mixed modelling.

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13AP11-2
Respiratory morbidity in post-operative patients following emergency colorectal surgery in the Royal Alexandra Hospital

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Background and Goal of Study: Patients undergoing emergency laparotomy are at high risk of morbidity and mortality. The 4th report on the National Emergency Laparotomy Audit (NELA) found a 30-day mortality rate of 9.5% (1). The Postoperative Morbidity Survey (POMS) is a validated scoring system for identifying postoperative morbidity after major abdominal surgery retrospectively (2). The Emergency Laparotomy and Laparoscopic Scottish Audit (ELLSA) began in November 2017. A standard operating procedure for chest physiotherapy referral in the immediate post-operative period has been introduced for this patient cohort. We aimed to find any change in respiratory morbidity following standardisation of care compared to baseline.
Materials and Methods: From August to July 2015-2016 (Cycle 1) and November to August 2017-2018 (Cycle 2), Respiratory POMS scores were retrospectively calculated at postoperative Days 3 and 5 and used as a marker of respiratory morbidity. Score 0 indicates no new oxygen therapy or respiratory support, a score of 1 does. All other data was obtained from our NELA and ELLSA database. The chi-square test was used to compare the POMS scores at Day 3 and 5 between the two cohorts. A p-value <0.05 was considered statistically significant.
Results and Discussion:
Cycle 1: Day 3 POMS 1: 35/53 (66%)
Day 5 POMS 1: 23/51 (45%)
Cycle 2: Day 3 POMS 1: 41/70 (59%)
Day 5 POMS 1: 19/70 (27%)
2 patients in Cycle 1 died on day 4/5.
The difference between patients with POMS 1 on Day 5 between the two cohorts was statistically significant with a p-value <0.05.
Conclusions: The reduction in patients with respiratory morbidity at Day 5 may be due to differences between the two cohorts of patients but increased physiotherapy input and emphasis on mobilisation may be relevant. We plan to integrate the Respiratory POMS score into the local care pathway alongside raising awareness of the incidence of morbidity experienced by these patients.
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13AP11-3
Analysis of the anatomical localization of foreign bodies and anesthetic management in the pediatric airway

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Background and Goal of Study: Our study aims to analyze the exact localization of foreign bodies (FB) in the airways and evaluate the prevalence in the right bronchus compared to the left and compare data with the existing literature.
Materials and methods: A systematic multicentric review of our recorded data was analysed, 98 patients less than 12 years of age with FB aspiration were evaluated. The following parameters were observed: age, gender, definitive history of aspiration, signs and symptoms, findings of chest x-ray. Preoperative symptomatic treatment received by patient, details of anaesthesia and monitoring were recorded. Type of FB, location of FB, need for tracheostomy, complications and their management were also noted.
Results and discussion: Out of the 98 patients assessed, 68% of the patients were below 3 years of age and 32% were above 3 years of age. Rigid bronchoscopy was done under general anaesthesia and 86 cases were positive for foreign body. The most frequently aspirated object was groundnut with cough being the most common symptom. In our study we found an almost equal incidence of foreign body in right (34.30%) and left bronchus (36.35%), contrary to several other studies, followed by tracheal foreign body in 16.34%. Spontaneous ventilation was carried out in 13 patients with tracheal foreign body while controlled ventilation was carried out in the remaining cases (Table 1, 2). The most common complication was desaturation (39.56%), followed by intubation at the end of surgery for respiratory distress (16.40%) and laryngospasm (8.44%).

Location	No of cases	Percentage
Trachea	16	16.34
Right bronchus	34	34.30
Left bronchus	36	36.35
No Foreign body	12	12.3

Table 1. Location of foreign body.
In pediatric age there is an equal incidence of foreign bodies between the right bronchus and the left bronchus due to the angle of bifurcation

X ray findings	No of cases	Percentage
Collapse	26	25.48
Obstructive emphysema	33	32.34
Consolidation	19	18.62
Normal	12	11.76
No chest X-ray	8	7.84
Total	55	100

Table 2. X-ray findings

Conclusion: In pediatric age we found an equal incidence of foreign bodies between the right bronchus and the left bronchus due to the angle of bifurcation which, especially in children under 8 years of age, does not show significant differences (1). Use of controlled ventilation with muscle relaxants provided adequate depth of anaesthesia but use of spontaneous ventilation is preferred if patients are unstable with proximal foreign body.
References :
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13AP11-4
Upper airway compromise caused by sigmoid perforation after laparoscopic hysterectomy: a tricky diagnosis

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Background: Ectopic air localizations after pneumoperitoneum have been reported in various laparoscopic surgical techniques [1].
Case Report: A 45 year old woman, ASA 1, 57 kg, 169 cm, presented for elective laparoscopic hysterectomy. The patient was hemodynamically stable throughout the operation. Mobilization was not possible on the first postoperative day due to pain, which responded to analgesics. On the second postoperative day, after mobilization, the patient became dyspnoic. She readily developed dysphonia, neck and face edema that were initially treated as anaphylactic reaction. No improvement was seen and the patient was transferred to the ICU unit. Crepitus could be felt in the neck, thorax and lower limb area. Chest x-ray was not diagnostic. The patient rapidly developed cardiovascular and respiratory impairment and was transferred to the operation theatre under inotropic support for emergency laparotomy. Intubation was achieved with a small endotracheal tube. Mechanical ventilation was copious; suspected tension pneumothorax was treated with immediate decompression of the pleural space. Faecal odour was noticed on thoracocentesis and surgical exploration revealed sigmoid perforation which had taken place during the laparoscopic hysterectomy. The ruptured sigmoid was closed and a diagnosis of septic shock with subcutaneous emphysema caused by colon perforation was retained. The patient was transferred to the ICU unit, where she developed high fever and mediastinitis. She was extubated on the second postoperative day and dismissed from hospital ten days later. The patient suffered recurrent mild pneumonias over the next period and was completely symptom-free from the respiratory tract, two months after surgery.
Discussion: It has been stated that postlaparoscopic pneumoperitoneum resolves within three days in 81% of the patients;CO_2 has a high solubility and thus complications like capnothorax, subcutaneous emphysema, pneumothorax and pneumomediastinum due to laparoscopy are expected to occur within the 24 hours after laparoscopic surgery.
References:
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Learning points: The key for ideal management of such cases is prompt differential diagnosis between complications of pneumoperitoneum and acute abdomen due to gut perforation.

13AP11-5
Intraoperative PEEP Optimization. Effects on Postoperative Pulmonary Complications and Inflammatory Response: Preliminary Results of a Randomized Controlled Trial

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Background and Goal of Study: Ventilator induced lung injury, leading to postoperative pulmonary complications (PPC) is a common risk of mechanical ventilation during major abdominal surgery. There is convincing evidence to recommend the use of lung protective mechanical ventilation (LPV) applying low tidal volumes, optimal positive end-expiratory pressure (PEEP) and regular alveolar recruitment manoeuvres during general anaesthesia even in patients with healthy lungs. However, the effects of using an individualized PEEP on the inflammatory response and its correlation with PPC has not entirely been evaluated. The goal of our prospective, randomized controlled trial was to evaluate these effects during open radical cystectomy.
Materials and Methods: Participants were randomized into Study (SG) and Control groups (CG). LPV with a PEEP of 6 cmH2O was applied in the CG, and a static pulmonary compliance (Cstat) directed, titrated optimal PEEP value was used in the SG. Primary endpoints were PPC and serum procalcitonin (PCT) kinetics, representing the inflammatory response. Secondary endpoints were organ dysfunction, in-hospital stay, and 28-days mortality. Intraoperative oxygenation, respiratory mechanical values, PCT kinetics and postoperative paO2/FiO2 results of 20 patients are presented in this preliminary analysis. Unpaired t-test were used for normally distributed data and the Mann-Whitney U-test for skewed data. 2-way RM ANOVA was used to compare the groups serum PCT levels. Data are reported as mean or median ± margin of error.
Results and Discussion: Higher Cstat (51.1 ± 8.9 vs. 44.4 ± 6.0 mL/cmH2O, p=0.093) and PaO2/FiO2 values were measured intraoperatively and right after surgery in SG, but the results were non-significant (Fig. 1). There were no significant differences in PCT kinetics between groups.

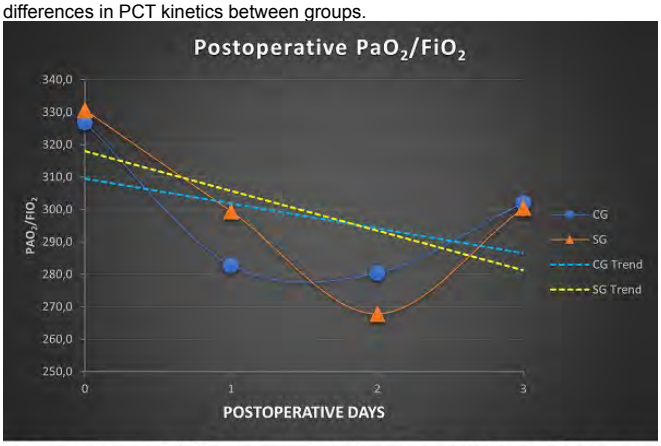

Figure 1. Mean postoperative PaO_2/FiO_2 values of groups. Despite PPC earlier developed in CG and higher PaO_2/FiO_2 ratio was measured in SG right after surgery and on POD1, on POD2 PaO_2/FiO_2 ratio decreased more significantly in SG than in CG.
PPC=postoperative pulmonary complications, CG=Control Group, SG=Study Group, POD=postoperative day

Conclusions: Preliminary analysis of our data does not give a clear answer to our hypothesis. There was a tendency of better intraoperative and early postoperative results, but we could not prove clear benefits of individualized LPV neither on oxygenation nor on inflammatory response.

13AP11-7
Kcne4 deletion sex-dependently inhibits the RISK pathway response and exacerbates hepatic ischemia-reperfusion injury in aging male mice

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Background and Goal of Study: Liver ischemia-reperfusion (IR) injury is an important cause of hepatocellular damage occurring during or after surgical procedures such as liver transplantation or hepatic resection. The underlying mechanisms of reperfusion induced hepatic damage is incompletely understood. Ion channels, including a cardiovascular-expressed potassium channel ancillary subunit, KCNE4, can influence susceptibility to reperfusion-induced arrhythmogenesis. However, it is unclear whether KCNE4 deletion affect acute post-ischemia/reperfusion induced hepatic damage.
Materials and Methods: Kcne4+/+ and Kcne4-/- C57BL/6 mice of both gender were anesthetized. After laparotomy, the portal vein, hepatic arterial and venous trunk were identified. Mice were subjected to 30 min of hepatic ischemia followed by 3h of reperfusion. GSK-3β inhibitor SB216763 was intravenously applied after the hepatic ischemia, 5minutes prior to commence of reperfusion. Male Kcne4+/+ and Kcne4-/-mice were castrated to establish a testosterone deficiency model. Mice were sacrificed 3 hours after reperfusion. Blood samples were taken and fresh liver samples were collected for histology and westernblotting analysis.
Results and Discussion: Here, we discovered that germline Kcne4 deletion exacerbates hepatic IR injury damage in 13-month-old male mice, despite a lack of Kcne4 expression in male mouse liver. Activation of anti-apoptotic signalling cascades such as the reperfusion injury salvage kinase (RISK) and survivor activating factor enhancement (SAFE) pathways is protective in a variety of tissues in the context of ischemia reperfusion (IR) injury. we found that Kcne4 deletion prevents the hepatic ERK1/2 phosphorylation response to IR injury. Conversely, in 13-month-old female mice,Kcne4 deletion increased both baseline and post-IR GSK-3β inhibitory phosphorylation, and pharmacological GSK-3β inhibition was hepatoprotective. Finally, castration of male mice restored normal hepatic RISK/SAFE pathway responses in Kcne4-/- mice, eliminated Kcne4 deletion-dependent serum ALT elevation, and genotype-independently augmented the hepatic post-IRGSK-3β phosphorylation response.
Conclusions: The findings support a role for KCNE4 as a systemic modulator of IR injury response in male mice, and uncover hormonally influenced, sex-specific, KCNE4-dependent and independent RISK/SAFE pathway induction.

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13AP11-8
Cervical cerebrospinal fluid fistula after spinal surgery: non-agressive treatment. Case report.

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Background: After spinal surgery a common adverse effect is the cerebrospinal fluid's fistula (CFF). Since there is currently no evidence in favour of the conservative treatment, surgery tends to be promoted to repair the CFF[1]. We report the results of a case study where the conservative treatment using acetazolamida and drainage was carried out with amazing results.
Case Report: A 64-year-old male with a history of hypertension and fatty liver was programmed for spinal surgery. The surgery was developed under general anesthesia and it lasted 7 hours without anesthetic incidents. During the operation an accidental dura's break was registred and it was immediately repaired by the surgeon. At cervical level, a leak at cerebrospinal fluid (CF) was detected immediately after the surgery. We decided to apply the conservative treatment after considering all the possible options. This way, our patient received acetazolamida for 3 weeks. Antibiotics and compressive dressing were used as a prophylaxis of meningitis as well. It required drainage in 12 different occasions. The fluid was studied by microbiology laboratory but observed negative results. The evolution was favourable and finally after 7-8 weeks, the CFF was completely closed.
Discussion: The CFF is a widely known complication after spinal surgery. This causes discomfort on the patients while extending the hospitalization period. Several alternative therapeutical strategies to a new surgery, that tends to be promoted as the gold standard, have been developed, however there are no significant differences between them[1].On the other hand, surgery has its owns besides effects as bleeding or infection. Therefore, in order to avoid these and because a second surgery coud be very hard in this patient, we decided to apply conservative treatment with acetazolamida. It is a carbonic anhydrase inhibitor which decreases the CF synthesis and allows dura to be repaired[2]. In conclusion, conservative treatment could be considered as a good alternative to surgery since it may lead to spontaneous fistula's closure without the need of surgery[3].
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Learning points: We can´t forget about the CFF as common adverse effect after spinal surgery. It would be necessary doing further studies about treatment with acetazolamida, in order to compare it to the gold standard.

Patient Safety

14AP01-1
Perioperative and Anesthetic Adverse Events in Thailand (PAAd Thai) Incident Report Study: Anesthetic Adverse Events in Correlation with Communication Mishaps

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Background and Goal of Study: The Royal College of Anesthesiologists of Thailand (RCAT) has performed a trial entitled "The Perioperative Anesthetic Adverse Events Study in Thailand (PAAd Thai)'. This multi-center, prospective, observational study was held in 22 major hospitals all over the country. This trial was part of the PAAd Thai which explicitly intended to emphasize anesthetic adverse events related to communication mishaps.
Materials and Methods: The PAAd Thai working team generated a standardized incident record form. Any incidents marked by reporters by means of either communication problem as a contributing factor, to improve communication as a factor to minimize the incident or improvement of communication as a suggested corrective strategy were collected for analysis.
Results and Discussion: Among 2,206 incident reports, there were 234 cases (10.6%) with communication mishaps. The most frequent ineffective communication happened in ASA class III patients. The communication error-related adverse events occurred mainly intraoperatively in cases with cardiac arrest (27.8%), desaturation (23.5%), severe arrhythmia (21.8%), death (17.5%), and re-intubation (15.8%). Unplanned intensive care unit admission accounted for 18.4% of the cases while 17.5% died. On the seventh postoperative day, 144 patients fully recovered. Communication problems took place mostly within the anesthesia team (46%) followed by with surgeons (31%). About one-tenth happened with more than one type of colleague.
Conclusions: From the PAAd Thai Study, communication mishaps were found in approximately 10% of the cases with anesthesia-related adverse events. Effective communication is mandatory for safe anesthesia and surgery. Strategies to improve communication among various health care professionals are highly recommended.

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14AP01-2
Mortality in tertiary paediatric critical care centre 2008-2012 versus 2013-2017: retrospective cohort trial

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Background and Goal of Study: Mortality in paediatric critical care can be considered one of the factors of treatment efficiency. The relative decline of mortality can be related to the progress of intensive care. The trends in paediatric critical care mortality are not well described in Czech Republic.
Materials and Methods: After Ethics committee approval authors retrospectively evaluated data of paediatric critical care patients who died in Department of paediatric anaesthesiology and intensive care, University hospital Brno. The primary aim was to evaluated the PICU mortality in two periods: 2008-2012 versus. 2013-2017. The secondary outcome were demographics of the cohort and the diagnosis that led to death. Pearson chi-square and Kolmogorov–Smirnov test were used to describe the mortality difference between groups.
Results and Discussion: The overall mortality in study period was 11.44% (186/1625). The mean age of the patients (6.99 vs. 6.37 years, p=0.414) and the mean PICU length of stay (7,58 vs. 3.65 days, p=0.099) were not statistically different between the groups, also there was no detected difference according to the admission diagnosis between the groups: Post-resuscitation care/CPR in progress (38.9% vs. 52.1%, p=0.078), trauma (15.9% vs. 23.3%, p=0.20), sepsis (21.2% vs. 27.4%, p=0.33), respiratory failure (54.9% vs. 60.3%, p=0.46). Mortality in period 2008-2012 was 14.63% (113/772) versus 8.74% (73/835, p=0.00022) in period 2013-2017.
Conclusions: Mortality was significantly reduced in period 2013-2017 when compared to 2008-2012. The difference was independent of admission diagnosis.
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14AP01-3
Medication safety in gynecology and obstetrics in a tertiary university hospital. Do anaesthesiologists follow the recommendations?

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Background and Goal of Study: Despite the recommendations of the Spanish System of Notification in Safety in Anesthesia (SENSAR), the Anesthesia Patient Foundation (APSF) and the European Board of Anaesthesiology (EBA UEMS), medication errors still occur in 1/133 anaesthesia[1,2]. The aim of this survey is to identify whether the anesthesiologists of a Spanish tertiary hospital know about the safety policies in the administration of drugs.
Materials and Methods: Two questionnaires with closed and open answers have been elaborated. The first one consisted of a 14-questions checklist that was used to audit the 7 gynecology and obstetrics operating rooms (OR) for two weeks. We assessed the application of the labeling system and drugs storage. The second 16-questions questionnaire was sent by email to all staff and resident anaesthesiologists working in the Maternal hospital and assessed the knowledge of the anesthesiologists on the safety measures applied in their department.
Results and Discussion: A total of 34 OR were observed, in which the rate of medication labelling was 79.4%. Propofol (30%) was the least labeled. In case of emergency, in 41.2% no one was responsible for loading the medication and 29.7% did not know how to act. In all the dependencies, ephedrine was the only drug available in pre-loaded syringes. Regarding the routes of administration: the epidural route was identified in 75% and intra-arterial in 62.5%. However, the intravenous route was identified in only 12.5%. 41 participants were censed: 13 (31.7%) R1-R2, 8(19.5%) R3-R4; 7 (17.1%) staffs with <5 years of experience; 10 (24.4%) staffs between 5-20 years of experience and 3 (7.3%) staffs > 20 years of experience. 32.4% had never heard of European recommendations. In obstetrics ORs, drugs were separated in specific areas. This was not the case in the 4 gynecology operating rooms. 35.3% of anaesthesiologists did not report errors in administration and 26.5% did not know that they can be notified.
Conclusions: The elaboration of protocols and their diffusion are necessary to increase the safety culture, especially among trainee-doctors. The implementation of an anonymous and non-punitive reporting systems of incidents is the way to improvement. The use of pre-filled syringes, as well as the designation of a person responsible for the drug administration would minimize the risk of accidental administration.
References:
1. EBA UEMS, 2011. 2. SENSAR and ISMP, 2011

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14AP01-4
Are manually preloaded sirynges safe? A microbiological audit in the maternity of a tertiary spanish hospital.

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Background and Goal of Study: The latest recommendations of the EBA concerning medication safety include the use of preloaded syringes[1,2]. In the obstetric units, the risk of emergent surgery imposes the immediate availability of pre-loaded drugs to spare the time of preparation and decrease the risk of medication administration errors. In absence of available industrial preparations, many anaesthesiologists prepare and store drugs manually in prevision of emergent situations, which raises the problem of the risk of bacteriological contamination[3]. This audit was performed to assess this risk in the maternal unit of a tertiary university hospital.
Materials and Methods: All the syringes preloaded in the delivery suite and the 2 operating rooms of our maternal unit were collected at the end of a weekend shift (the longest time that preloaded syringes were stored), the date of preparation was read and we analysed bacterial contamination: local anaesthetic mixtures (lidocaine and ropivacaine plus fentanyl), propofol, phenylephrine and atropine. After the identification and processing at the microbiology department, samples were cultivated in sheep blood agar plates and enrichment broth and were incubated under aerobic conditions at 37ºC for 48h and 5 days respectively.
Results and Discussion: A total of 18 syringes were collected, 12 to 72 hours after preparation: five 20 mL ropivacaine mixture syringes, two 10 mL lidocaine 2% syringes, two 20 mL propofol syringes, three 2 mL atropine syringes, three 10 mL phenylephrine syringes, and three 100 mL phenylephrine bottles. Only one atropine sample which had been prepared 2 days before was positive for S. epidermidis after enrichment due to possible contamination during processing.
Conclusions: The use of manually preloaded medication in the obstetric environment to increase medication safety, did not show more than 5.56% of contamination on this limited sample of syringes. This interesting result indicates a relative bacteriological safety of manually preloaded syringes until 48 hours after preparation, even though chemical degradation of the drug is not controlled under these conditions of preservation. These results should be confirmed in further studies.
References: 1. EBA UEMS, 2011, 2. Eur J Anaesthesiol 2017; 3. 34:4-7. Haas, R,et al. Am J Infect Control 2017.

14AP01-5
Second Degree Mobitz I Atrioventricular Block Associated with Lidocaine Infusion - A Case Report

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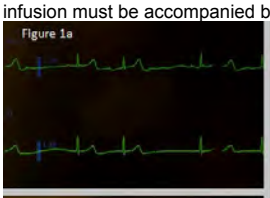
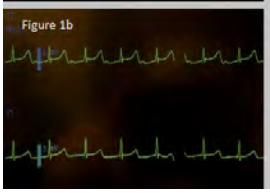
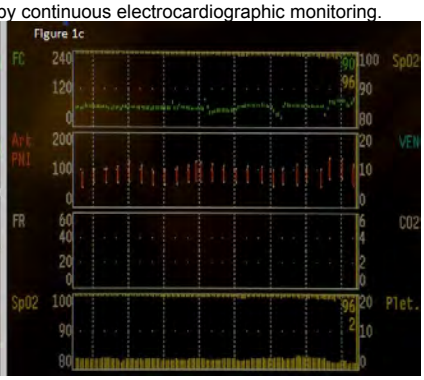
Background: Systemic lidocaine is a relevant component of enhanced recovery after surgery (ERAS) protocol, particularly when epidural analgesia is omitted[1].
Case report: A 66 year-old woman (weight 57 kg, height 1.54 m) was scheduled for a left partial scapulectomy due to a chondrosarcoma. She had been treated with a radical right mastectomy and axillary dissection 21 years before for a breast cancer and had received adjuvant chemotherapy and radiotherapy after surgery. Preoperative electrocardiogram demonstrated left anterior hemiblock, a PR interval of 0.12 s, and a heart rate of 75 bpm. Total intravenous anaesthesia (TIVA) was planned with a target-controlled infusion of propofol, lidocaine 2 mg/kg bolus and an infusion of 2 mg/kg/hr, dexmedetomidine 0,5 mcg/kg in 5 minutes followed by an 0,5 mg/kg/hr infusion, fentanyl 200 mcg and S(+)-ketamine 20 mg in bolus. A central venous catheter was inserted under ultrasound guidance. The patient was positioned in left lateral decubitus and the operation was started. After 95 minutes and a total lidocaine dosage of 276 mg, some of the atrial electrical stimulus did not conduct to the ventriculus, in a Wenckebach phenomenon pattern (figure 1a). Lidocaine and dexmedetomidine infusions were immediately stopped and 1 mg of atropine was administered. The rhythm changed to a first-degree atrioventricular block (figure 1b) and the patient remained stable during the procedure (figure 1c). An ECG was performed in the recovery room and showed a progressive reduction of the PR interval. The patient was discharged home on the first post-operative day with no additional perioperative events.
Discussion: Contributors to the heart block may include lidocaine, dexmedetomidine, opioids and previous anthracycline chemotherapy.
References:
1. Dunn LK, Durieux ME. Perioperative Use of Intravenous Lidocaine. Anesthesiology 2017; 126(4):729-737.
Learning points: Although promising results as an analgesic, opioid-sparing, ileus-preventing and anti-inflammatory agent, lidocaine requires safety concerns and infusion must be accompanied by continuous electrocardiographic monitoring.







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14AP01-6
Deep residual neuromuscular blockade after sugammadex administration

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Background: Sugammadex rapidly reverses rocuronium-induced neuromuscular blockade. We report a case in which an unexpectedly large amount of sugammadex was needed for antagonizing rocuronium.
Case report: A 74-year-old woman underwent emergency bowel resection due to the incarceration of a femoral hernia under general anaesthesia. She had no history of liver and renal dysfunction, laboratory data showed elevated serum creatinine (1.50 mg/dl) and urea nitrogen (48.5 mg/dl) levels, probably due to dehydration. Anaesthesia was induced with propofol, rocuronium, and fentanyl, and maintained with desflurane and remifentanil. For intubation, 40 mg rocuronium and three repeated doses of 10 mg were administered during the 2 h 28-min surgery. A transversus abdominis plane block was performed after the conclusion of the surgery, and sugammadex 200 mg was administered 59 min after the final dose of rocuronium. Although the patient did not respond to verbal commands, the trachea was extubated after confirming adequate spontaneous breathing because her blood pressure continued to rise. After extubation, the patient still did not respond to a call and her blood pressure exceeded 210 mmHg. A neuromuscular monitor was applied, suspecting residual paralysis, and it revealed that the patient was still under deep neuromuscular blockade (TOF count: 0, PTC: 8). An additional dose of sugammadex (200 mg) was administered, and the patient opened her eyes 3 min later with a TOF ratio of 107%. She was then discharged from the operating room uneventfully.
Discussion: The patient was under deep neuromuscular block even after 4 mg/kg sugammadex administration, indicating that a large amount of rocuronium remained at the time of initial reversal. It has been shown that reversal with sugammadex in the absence of monitoring does not preclude residual neuromuscular blockade[1]. However, to our knowledge, no “deep blockade” after sugammadex administration has been reported. Renal dysfunction caused by dehydration in addition to advanced age might contribute to reduced rocuronium clearance resulting in prolonged action. Although a majority of anaesthesiologists do not routinely use neuromuscular monitors[2], this case clearly shows the need for using the monitor as a daily practice.
References:
1) Kotake Y, et al. Anesth Analg 2013;
2) Philips S, et al. Anaesth Intensive Care 2013
Learning points: The use of a neuromuscular monitor is essential even in cases where sugammadex is used.

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14AP01-7
Malignant Hyperthermia - a case with good outcome

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Background: Malignant Hyperthermia (MH) is one of the most serious events associated with anesthesia. This autosomal dominant disease is rare (1 in 100000) and affects patients exposed to halogens and succinylcholine[1]. Expression varies and may take more than one exposition to occur. Mortality ranges from 1.4% to 9.5%.
Case report: 63 years old male with ocular trauma admitted in the operating room for vitrectomy. Medical history of hypertension, dyslipidemia, alcohol abuse and COPD Gold IIIC. Anesthetic history of general anesthesia without complications. Pulmonary wheezing and rumbles at auscultation. General anesthesia with propofol, fentanyl and rocuronium for induction and sevoflurane for maintenance. After 90 minutes, EtCO2 started to rise with an obstructive capnography and worsening of pulmonary wheezing at auscultation. Bronchospasm was assumed and treated. Despite treatment and ventilation adjust, EtCO2 continued to rise until 116 mmHg. Muscular rigidity became evident and temperature increased to 40.5ºC. The hypothesis of MH was raised. Treatment was implemented: sevoflurane discontinued, high flow ventilation (FiO2 100%), dantrolene bolus (2,5mg/kg), active cooling, fluids and 1mg/kg furosemide. Arterial line and central venous catheter were placed, core temperature and urine output were monitored. Temperature and EtCO2 started to drop. A total dose of 5mg/kg of dantrolene was administered along 45 minutes. Patient stabilized with 37.2ºC, pCO2 68 mmHg and was taken to ICU. An infusion of dantrolene (0,25 mg/kg/h) for 24h was initiated. In the ICU muscular enzymes started to drop (CK 1105»176 and mioglobin 644»57). Hepatic function normalized and renal function was preserved. Patient was extubated on 3th day, discharged from ICU on 4th day and from the hospital 17 days after the procedure. DNA and caffeine halothane contracture tests confirmed the diagnosis.
Discussion: This case highlights the importance of fast diagnosis and correct management of rare complications like MH. Hospitals should have a MH cart, checked and updated regularly.
Learning points: MH is rare but early identification and treatment promote a good recovery.
References:
1.Riazi, Sheila, et al. “Updated Guide for the Management of Malignant Hyperthermia.” Canadian Journal of Anesthesia/Journal Canadien Danesthésie, vol. 65, no. 6, 2018, pp. 709–721

14AP01-8
Patient safety incidents related to postoperative residual curarization: analysis of the Spanish Incidents Reporting System data base from 2009 to 2017

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Background and Goal of Study: Residual neuromuscular blockade (rNMB) has an incidence of up to 26.7% in Spain, similar to that described in other countries. It is related to a higher incidence of postoperative complications. Our hypothesis is that there is an under-reporting of this type of incident due to a poor safety culture in this area. Our objective is to evaluate the proportion of incidents attributable to rNMB in anesthesiology and postsurgical critical care and secondarily to assess whether the morbidity attributable to these incidents is similar to the total number of incidents reported.
Materials and Methods: A a cross-sectional descriptive study was made out of data collected from the Spanish system for notification of incidents in Anesthesiology and Resuscitation (SENSAR) to detect the percentage of events related to rNMB of all incidents reported. SENSAR is a multicentre, anonymous non-punitive notification system of incidents related to the perioperative environment. Within each hospital, a group of professionals evaluates, classifies and validates the information following the taxonomy of the "London Protocol". All incidents reported in SENSAR were included. Only those classified as related to the rNMB were selected. Each incident was analyzed individually. Results are shown in form of percentages.
Results and Discussion: In our study, 490 out of the 6719 incidents reported were identified by our search criteria. 51 (0,14%) could be related to rNMB, and 10 incidents (0,07%) were identified as a consequence of rNMB (19,6%). Lack of an adequate reversion is identified in 71% of the incidents. In addition, only 9,8% of these patients were objectively monitored. PACU and ICU is where most of these events take place (62,7%). According to our data, rNMB almost doubles the morbidity (33,3% vs. 76%) and increases the referable incidence of all events, especially those associated to either major morbidity (4% vs 19,6%) or death (1,7% vs. 3,9%). Deficient monitorization may lead to an absence of diagnosis and thus disregard the insufficient reversion of NMB, potentially increasing complications and morbi-mortality. Further studies, may be needed to prove this association.
Conclusion: Absence of convenient monitorization of NMB due to underestimation of risks, may be the cause of unawareness of incidents and lack of notification.

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14AP01-10
Could you emply anaesthetic drugs in Antarctica? Research on pharmacological effectiveness.

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Background and Goal of Study: Anesthesiologists can be obligated to work in new situations or complex environments in which medical supply weakens, or drug efficacy is altered due to environmental factors. These situations can generate a factor of uncertainty for the anesthetic plan, with a subsequent impact on patient safety. The goal of study is to evaluate four anesthetic drugs (fentanyl citrate, etomidate, rocuronium bromide and suxamethonium chloride) subjected to extreme weather conditions in Antarctica by using high pharmacological performing liquid chromatography.
Materials and Methods: In vitro prospective descriptive study in which vials of fentanyl citrate, etomidate, rocuronium bromide and suxamethonium chloride subjected to extreme climatic conditions on Deception Island were evaluated by high resolution liquid chromatography after 24, 48 and 72 hours. The following variables were analyzed: a) independents: daily temperature (maximum/minimum), wind (maximum/minimum), atmospheric pressure (maximum/minimum), relative humidity (maximum/minimum), rain (maximum/minimum), insolation (maximum/minimum) and solar radiation (maximum and minimum); b) dependents: deterioration of the vial container (yes/no), type of deterioration of the vial container (rupture/crack), deterioration of the medication (color change/freezing / precipitation) and percentage loss of potency of the drug; c) control: date of drug production and expiration date of the drug.
Results and Discussion: Fentanyl citrate, etomidate, rocuronium bromide and suxamethonium chloride vials subjected to 24, 48 and 72 hours under polar climatic conditions in Deception Island (Antarctica) suffered a poor degradation and linear pattern of their effectiveness, all of them with the margin of security (99% -110%) that allows its administration.
Conclusions: This pharmacological analysis by high resolution liquid chromatography does not discourage the use of the aforementioned drugs (fentanyl, etomidate, rocuronium bromide and suxamethonium chloride) in this extreme environment.

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Firth PG. Of Penguins, pinnideps, and poisons, Anesthesia on Elephant Island. Anesthesiology 2016;125(1): 25-33.
Gentili ME. Chloroform Anesthesia, Antarctica, 1908. Anesthesia Analgesia 2017;124(2):703-4.
Hindle EM, Henning JD. Critical care at extremes of temperature: effects on patients, staff and equipment . J Royal Army Medical Corps 2014, 160 (4) 279-85.
Acknowledgements: CEMILFAR, E.T

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14AP02-1
Fabrication and clinical application of a wireless-power-transmission-type medical device

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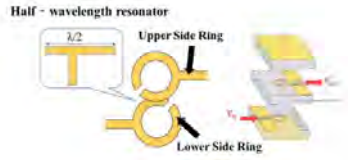
Background and Goal of Study: Wireless power transmission (WPT), as a new power supply technique, is expected to revolutionize the world. By introducing WPT in an operating room, significant improvement in hygiene of the operating room, cancellation of the cable spaghetti syndrome, decrease in medical accidents, and overall improvement of medical quality can be expected. WPT systems incorporate methods such as electromagnetic induction and resonance-binding, and sources such as microwaves (MWs) or lasers. In this study, we report the current status of WPT in a medical device using MWs.
Materials and Methods: The frequency of the electromagnetic waves used in this study are within the industrial, scientific and medical (ISM) band. Two methods were employed for WPT: contactless remote method (WPT system in a shield box) and contactless proximity method (open-ring system). A semiconductor material incorporated in a rectenna circuit was used as a silicon diode. This diode had a Schottky barrier type structure.
Results and Discussion: 1. Open-ring system: Fig. 1 shows the ring diameters of an open-ring resonator and their relationships with the MW wavelengths. The ring diameter is inversely proportional to the frequency.

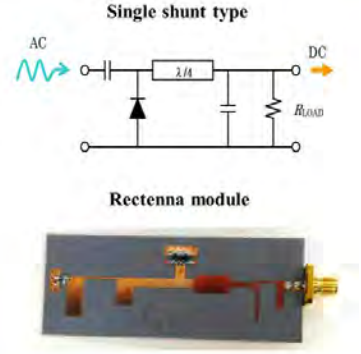
Fig. 1

Frequency	Wavelength (λ : In air)	Ring diameter (λ/4)
10 MHz	30 m	2.4 m
900MHz	33 cm	2.6 cm
2.45Hz	12 cm	9.7 mm
5.8GHz	5.2 cm	4.1 mm
24GHz	1.25 cm	1.0 mm



2. WPT system in the shield box: Fig. 2 shows the circuit diagrams of the rectenna. The power transmission efficiency using MWs at a frequency of 2.4 GHz was high for both single diode type modules and was approximately 65%.

Fig. 2



Conclusion: The circuit for the electromagnetic induction method needs a large coil, which means that the circuit is bulky and heavy. In contrast, the system proposed here using MWs enable developing a small-sized and lightweight circuit. Therefore, we suggest that the system using MWs is ideal for application to medical devices.
Acknowledgements: This work was supported in part by SCOPE Grant from MIC (#185009003).

14AP02-2
How deep the Sherlock3CG system can detect the peripherally inserted central catheter tips? - simulator study -

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Background and Goal of Study: It is shown that Sherlock 3CGRTip Confirmation System(TCS) for finding the malposition of the catheter tip is effective when the peripherally inserted central catheter (PICC) is inserted. There are some limitations for our clinical use. One of them is that the detectable depth of the catheter tip is 10 cm from the body surface. However, the depth to which the device can detect the catheter tip has not been investigated. In this study, we conducted an experiment on how deep the device can detect the catheter tip from the body surface using a simulator.
Materials and Methods: The PICC insertion model is created. The model is water filled plastic container (12cm of water depth) and the polyvinylchloride tube is fixed in the container created. One side of the fixed polyvinylchloride tube is 1cm deep and the other side of the tube is 12cm deep. The PowerPICC 3CG catheter (5Fr Medicon, USA) was chosen for the study. The PICC catheter was connected to the Sherlock 3CG TCS (Medicon, USA) and calibrated for the tip detection. The catheter passed through the polyvinylchloride tube, and the limit depth of the tip detection was measured. After that, the catheter was extracted from the depth where the tip could not be detected (i.e. from 12cm), and the tip detection depth (re-sensed depth) was measured. Each depth measurement was repeated six times, and the average was obtained.
Results and Discussion: The limit detectable depth of the catheter tip was 10.8±0.09cm. The re-sensed depth of the catheter was 8.0±0.97cm. The difference between the insertion depth and extraction was 2.8cm. Our result can show the uncertainty of the catheter tip detection in the depth from 8 to 11cm using Sherlock 3CG TCS. We should consider preparing other insertion tools for the patient who has the deep vein.
Conclusions: The detectable depth of the insertion and the extraction were different. Using Sherlock 3CG, the depth that a PICC catheter can be safely inserted seems to be within 8 cm. The understanding of the characteristics of equipment is important to provide a safe medical care.

14AP02-3
Intraoperative transthoracic echocardiography increases the safety in complications of obstetric anaesthesia

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Background: Intraoperative transthoracic echocardiography (TTE) plays an important role in identifying the undifferentiated causes of cardiogenic shock during a cesarean section (1). This case report supports its importance in a pulmonary embolism (PE).
Case Report: A 43-year-old primipara was indicated for an emergency cesarean section due to fetal distress. It was performed under spinal anesthesia, and a healthy newborn was delivered. Following delivery of the placenta, patient suddenly became unconcious and O2 saturation decreased and no pulse could be palpated. ECG changed from sinusal rythm to ventricular taquicardy. Cardiopulmonary resuscitation was immediately started and sinus rhythm returned. Tracheal intubation revealed 9 mmHg of end-tidal carbon dioxide suggesting PE. Intraoperative TTE ruled out other pathologies and right ventricle (RV) dysfunction was found. After that, PE was identified on computed tomography pulmonary angiogram (CTPA) and heparin was administrated.
Discussion: The sudden development of hypotension, hypoxia, and a drop in end-tidal CO2 are typical signs of a PE. However, other pathologies may mimic those symptoms as venous air embolism, amniotic liquid embolism, pneumothorax or ischemic heart disease. Therefore, early detection is very important.
Current guidelines do not recommend measurement of D-dimer levels because they are raised in normal pregnancy. Chest radiography can rule out other pulmonary pathologies. Although CTPA or ventilation/perfusion scan are the most reliable test in PE, they are not available at the operating room.
According to international guidelines on PE, TTE is only recommended in the diagnosis of suspected PE in hemodynamically unstable patients as in this case (1). TTE is very feasible and could reveal alternative causes of the observed clinical signs, such as cardiac tamponade or significant valvular lesions. Although, typical signs of PE like evidence of RV dysfunction can be detected in various comorbilities, there are some characteristic echocardiographic signs like the McConnell sign and right heart thrombus (2).
References:
1. A. T. Dennis, et al. Int J Obstet Anaesth.2011 Apr;20(2):160-8
2. K. Kurnicka, et al. J Am Soc Echocardiogr.2016 Sep;29(9): 907-13
Learning points: The application of intraoperative TTE in a suspected PE during a cesarean section, helps to a rapid diagnosis and treatment. Then, it increases the patient safety and should be recommended it.

14AP02-4
Remote wireless monitoring on the ward for early detection of deteriorating patients - a case series

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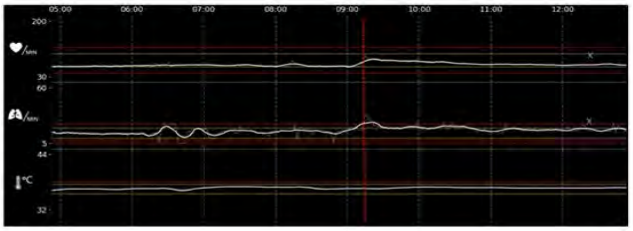
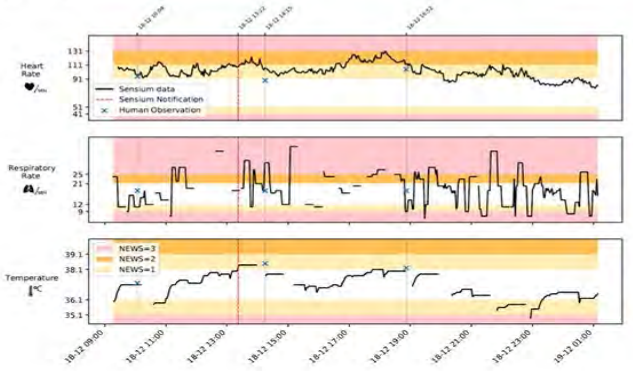
Introduction: Detection of deteriorating patients on the general ward often goes unnoticed for prolonged periods due to intermittent measurements of vital signs by ward staff. Continuous remote wireless monitoring of vital signs on the ward might therefore improve early detection of deteriorating patients. We here present two cases whereby a remote monitoring system led to early detection of a pathological vital sign.
Case Serie: Case 1: In a 85-year old male patient after hemihepatectomy a nurse discovered on postoperative day 2 tachypnoea and the patient himself felt tired. The nurse determined a Modified Early Warning Score (MEWS) that showed deviating vitals: a respiratory rate 20 breaths per minute and a saturation of 85%. Oxygen therapy was started. A CT angiography showed pulmonary embolisms. Data of the remote monitoring system (used without notifications) showed increased respiratory and heart rate already 3,5 hours before the abnormal MEWS (fig 1).
Case 2: A 75 year old male went for a laparoscopic anterior resection for rectal cancer. On postoperative day 4, his nurse was alerted by the remote monitoring system at 13:22 due to tachycardia and pyrexia. Blood cultures were taken and the patient was sent for a chest x-ray to identify the source of the presumed sepsis. Antibiotics were commenced. The patient had last had his MEWS recorded at 10:04; it was unremarkable. His next observations were due at at 14:15 and still showed no cause for concern. It was only at the next set of observations at 18:52 that the patient began to exhibit signs of sepsis on his MEWS chart (HR 105, Temperature 38.2°C). The remote monitoring system identified the signs of sepsis over five hours earlier than regular MEWS observations (fig 1).

Figure 1

Case 1: Respiratory rate and heart rates increasing at 9:00 hours (red line) 3,5 hours before before human observation of deteriorating vitals (blue cross)



Case 2: Alarm Remote monitoring system (red line) many hours before human observation of deteriorating vitals (blue cross)



Discussion: Continuous wireless remote monitoring might help recognizing deteriorating patients earlier than normal observation rounds and might contribute to improved patient outcome.

14AP02-5
A modified approach for ultrasound-guided axillary venipuncture in the infraclavian region

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Background and Goal of Study: Axillary vein catheterization in the infraclavicular region has an important advantage in patients with long-term, indwelling central venous catheters. The two most commonly used approaches include the long-axis/in-plane approach and the short-axis/out-of-plane approach in the axillary vein, but there are certain drawbacks to both approaches. We have modified the technique for axillary vein catheterization: the oblique-axis/in-plane approach.
Materials and Methods: This descriptive study retrospectively collected the data of patients who underwent ultrasound-guided placement of the axillary vein infusion port in the infraclavicular region, in the Central Venous Access Clinics of Zhongshan Hospital, affiliated with Fudan University, between 2014 and 2017. A novel approach for catheterization was introduced, and the patients' general data were summarized, as well as the venipuncture success rate, venipuncture site and immediate complications associated with venipuncture. The detailed method is described as follows: the axillary artery and vein were first located and identified in the short-axis view in the infraclavicular region. Then, the probe was rotated to show the long-axis view of the axillary vein based on the short-axis view. At this point, a segment of the axillary vein may be visualized, and the artery and vein could sometimes be simultaneously visualized. At last, the lateral edge of the probe was rotated towards the head for 45 degrees based on the long-axis view of the axillary vein.
Results and Discussion: Between 2014 and 2017, a total of 858 patients underwent placement of the axillary vein infusion port in the infraclavicular region in our centre. The oblique-axis/in-plane approach was used for all patients, and the venipuncture success rate was 100%. Two accidental arterial punctures and one local haematoma were reported, and no other complications such as pneumothorax or nerve damage were reported. In the oblique-axis/in-plane view, it has combined the advantages of long- and short-axis views to simultaneously display the artery, the vein and the needle tip, and an enlarged vascular section, which can maximize the view and minimize the risk.
Conclusions: The oblique-axis/in-plane approach is a safe and reliable alternative to the real-time, ultrasound-guided routine approach for axillary venipuncture.

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14AP02-6
Improved Compliance with Anesthesia Quality Measures After Implementation of Automated Monthly Feedback

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Background: Minimization of postoperative complications is important in cancer patients. We wished to improve compliance with anesthesiology quality measures through staff education reinforced with automated monthly feedback.
Materials and Methods: The anesthesiology department implemented a program to capture and report quality metrics. After staff education, monthly email reports were sent to each anesthesiology physician and nurse anesthetist detailing individual compliance rates for a set of quality measures. For each measure, the proportion of cases which passed the measure before and after implementation of the program was compared using a two-sample proportion test.
Results and Discussion: After exclusions, we analyzed 15 quality measures out of 23. Of the 15 measures, 11 were process measures and four were outcome measures. Of the 11 process measures, seven demonstrated statistically significant improvements ($P > 0.01$). The most improved measure was TEMP-02 "Core Temperature Measurement" from 69.6% to 85.7% (16.1% difference, $P < 0.0001$.) Also improved were PUL-02 "Low Tidal Volume - Less than 8 mL/kg IBW" (15.4% difference, $P < 0.0001$) and NMB-01 "Train of Four Taken" (12.2% difference, $P < 0.0001$.) The outcome measure TEMP-03 "Perioperative Temperature Management" had a statistically significant increase of a very small magnitude (0.2% difference, $P < 0.0001$.) No other outcome measures showed statistically significant improvement.
Conclusion: After implementing a comprehensive quality improvement program our group observed significant improvements in anesthesia quality measure compliance for several process measures. Future work is needed to determine if this initial success can be preserved and associated with improved outcomes.

14AP02-7
Complications associated with the surgical position in robotic surgery

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During the last 20 years, an evolution has been observed in the different surgical specialties with a trend toward minimally invasive techniques. The latest of these technologies includes the use of the Da Vinci robotic system. The benefits of practicing robotic surgery for the patient are several: fewer surgical complications, less pain, lower risk of infection, as well as the lower blood loss. However, it is not a discipline free of complications: a longer learning period, longer surgical and anesthetic times and extreme surgical positions for long periods. The General University Hospital of Valencia is the center where, since November 2017, the first robotic surgeries have been carried out in the Valencian Community in the specialties of Urology, General Surgery and Gynecology and the first in Europe in Thoracic surgery. Given the clinical impact of the complications related to the surgical position, an analysis is made of the possible appearance of these in the different interventions of Robotic Surgery, based on our experience during the months of November 2017 to March 2018. During this period, a review is made of 55 interventions (16 in Urology, 16 in Gynecology, 15 in General Surgery and 8 in Thoracic Surgery) during the learning phase. In this period, the different factors related to the distribution of the operating room and positioning of the patient were studied. As a general rule, a special padded mattress was placed on the surgical table and in direct contact with the skin to protect the patient from friction and excess pressure in certain areas of the body (occipital area, scapula, shoulders). We also used eye protection and padded head protection, thorax and knee-level fixation straps and pneumatic socks for the prevention of vascular complications. Of the 55 surgeries performed, only one complication appeared in a patient associated with the extreme Trendelemburg position after radical robotic prostatectomy; a left brachial plexus neuroapraxia, but it was solved 3 days after admission and without symptoms at hospital discharge. It is necessary a collective specialized in robotic surgery. Knowledge of the disposition and management of the different elements of robotic surgery is essential to achieve the best results. Proper positioning is an important factor to facilitate the surgical technique and ensure patient safety.

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14AP02-8
Cerebral monitoring guided general anaesthesia in critically ill patients: a step toward improved outcome

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Background and Goal of Study: Patients designated American Society of Anesthesiologists Physical Status (ASA PS) III or higher undergoing emergency surgical procedures may be highly unstable and therefore a big challenge for the anaesthesia team. Due to economic reasons, non-invasive depth of anesthesia monitor is not routine practice in Greek hospitals, especially for non-elective procedures. The goal of this study was to compare the accuracy of qCON2000 and qNOX index with standard monitoring methods in ASA PS III /IV/V patients undergoing emergency surgery, by evaluating the opioid and vasopressor demand, together with the incidence of hemodynamic events intraoperatively.
Materials and Methods: In this retrospective study, 52 patients were divided into two different groups, Group I(N=35, patients were monitored using standard methods) and Group II (N=37, patients were monitored using qCON and qNOX). For Group I, adequacy of hypnosis and analgesia was based on hemodynamic changes as part of the standard monitoring methods. For Group II, intraoperative aims were a qCON level between 40 and 60 for adequately modulating general anaesthesia and a qNOX level between 40 and 60 for analgesia control.
Results and Discussion: Patients in Group II presented with significantly fewer hypotension episodes (N=3) in comparison with the incidence for hypotension in the standard Group I (N=71) ($p<0.05$). Furthermore the Fentanyl demand in Group II patients was significantly lower ($p < 0.0001$, difference between means 5.000 ± 0.038 , with a 95% confidence interval 4.9250 to 5.0750). In addition the demand for vasopressor medication was also lower in Group II ($p < 0.0001$, difference between means 0.960 ± 0.063, 95% confidence interval 0.8.334 to 1.0866).
Conclusions: Anaesthesia-related complications can be reduced, and the intraoperative status and clinical outcome can both be improved by implementing the use of multimodal depth of anesthesia monitoring in ASA III or higher patients undergoing emergency procedures.

14AP02-9
Inguinal hernia repair and tissue monitoring oxygenation with near infrared spectroscopy in a patient with a left ventricular assist device.

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Background: Measurement of tissue hemoglobin-oxygen saturation with near infrared spectroscopy (NIRS), with the goal of identifying tissue hipoxia, can prevent patient harm.[1]The patient implanted with a left ventricular assist device (LVAD) may exhibit minimal to significant pulsatility that may affect the reliability of the pulse oximeter.[2]
Case Report: A 73-year-old male with a LVAD (HeartWare^{R}) for destination therapy; was scheduled for an elective inguinal hernioplasty.The LVAD was implanted six months before this proposed elective surgery and the patient had a marked improvement in his heart failure symptoms. Intraoperative monitoring consisted of electrocardiogram, non-invasive blood pressure cuff, pulse oximetry, end-tidal CO2 and NIRS (Somanetics INVOS^{R}).The sensors were placed on right and left flank muscles. General anaesthesia was induced using fentanyl and etomidate. A laryngeal mask (LMA) was inserted for airway management. Anaesthesia was maintained with inhaled sevoflurane with oxygen/air mixture and infusion of remifentanil. An echo guided ilioinguinal nerve block was performed. The surgery was uneventful and the patient remained hemodynamically stable. The right and left flank muscles INVOS were respectively 45% and 48% on room air, 51% and 60% during surgery, 52% and 59% after LMA was removed. The pulse oximeter did function intermittently and indicated no oxygen desaturations.
Discussion: The use of an INVOS which does not require a pulse and provides a regional measurement of venous – weighted oxyhemoglobin saturation, has been reported both as an adjunct to the pulse oximeter as well as a gauge of cardiac output.3 We placed the INVOS sensors on right and left flank muscles because, in contrast to muscle, hypoperfusion in the brain is a trailing indicator of tissue hypoperfusion because of autoregulation. Skeletal muscle is therefore a leading indicator of global hypoperfusion compared with the brain.Multiple potential measurement sites are available. These sites are usually defined by the underlying musculature under the assumption that the underlying muscle body serves as a relatively homogeneous tissue compartment. In our case INVOS monitoring allowed measuring tissue oxygen hemoglobin saturation in a patient with a continuous - flow LVAD who the pulsatility is diminished as a result of vasodilation and decreases in preload to the supported ventricle and the device after the induction of general anesthesia.

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14AP02-10
Are Forced Air Warmers Cooling Your Patients? Results from heat signatures of 150 surgical patients to evaluate device efficacy

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Background and Goal of Study: Keeping patients perioperatively normothermic prevents adverse surgical outcomes, including morbid cardiac events, surgical site infections and surgical bleeding. While improvements in temperature recording and active warming have been reported in the literature, a corresponding reduction in hypothermia has not been observed in one recent study (1).
Materials and Methods: We performed a prospective randomised trial of 150 patients undergoing routine general surgery at a hospital in Queensland, Australia. Patients were randomised to one of three arms (50 per arm) each using a different forced air warming device. We controlled for atmospheric and individual patient temperatures. Forced Air Warmers were independently sourced, tested and calibrated by members of the study team to ensure accuracy. We collected heat signatures using a fixed Forward Looking InfraRed (FLIR) camera at multiple time points throughout surgery (0 mins; 15 mins; 30 mins; 45 mins; 60 mins). We aggregated heat signatures using simple statistical analysis for each time point and compared findings between each device at single time points and longitudinally.
Results and Discussion: Statistically significant variations (p=<0.01) were found in the effectiveness of the heat signature from one of the three models of Forced Air Warming device used compared to the remaining two Only one device maintained a constant heat signature across all 5 time points. All devices were ineffective for maintaining core temperature at the 0 minute and 15 minute time points. We validated our FLIR data with oesophageal temperature monitoring across these time points.
Conclusions: FLIR is a valid method for capturing Device evaluation at the point of care must underpin the selection of forced air warming devices as one of the three devices was observed to actively cool the patient even after independent calibration. We recommend more robust methods to assess forced air warmers including FLIR thermal imagery over selected operative time points. We suggest pre-warming patients is necessary to ensure an appropriate heat signature preventive of hypothermia throughout the perioperative admission.

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14AP03-1
Avoiding routine unnecessary preoperative testing: development and implementation of a protocol for selective testing.

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Background and Goal of Study: Although evidence supports selective preoperative testing based on medical history and physical examination, batteries of tests remain commonplace. Even though the poor utility of these, medico-legal concerns among others keep clinicians ordering them. We developed a protocol for selective preoperative testing in our hospital, and a plan to implement it.
Materials and Methods: We conducted a literature search on preoperative testing in elective surgery during 2017. We classified the invasiveness of the most commonly performed surgeries, and reached consensus on which tests should surgeons order routinely for preanesthesia evaluation depending on that and on the ASA physical status. Later, additional tests could be ordered by the anesthesiologist if patient's anamnesis suggested it. We presented the protocol to every surgical department, and after agreement, the protocol was approved by the Quality department and made official as from 1st March 2018. The new protocol was presented at the general hospital clinical session. We compared data of the ECG and Chest x-ray ordered for preanesthesia evaluation between 1st March and 31st October 2018, and the same period of 2017. It was not possible to obtain data for blood tests. As preanesthesia evaluations raised an 8.5% in 2018, a correction factor was introduced to compare the number of tests ordered.
Results and Discussion: Between March and October 2017, 8212 preanesthesia evaluations were performed (6077 ECG and 1708 chest x-ray ordered) compared to 8976, in the same period of 2018 (1661 ECG and 233 chest x-ray). There was a reduction of 74.81% on the number of ECG and 87.43% on the number of chest x-ray performed after implementing the protocol. Although the Spanish Society of Anesthesiology published a document to limit the number of routine preoperative tests performed, clinicians keep ordering them. Routine preoperative tests have not been proven useful, have significant economic implications and may be harmful, as they can generate new tests in order to evaluate abnormal results, delay surgery, generate anxiety and the application of unnecessary treatments. In few occasions the results of these tests change patient management.
Conclusions: The number of unnecessary preoperative tests ordered is high. Specific protocols should be implemented to follow the published guidelines, avoid needless x-ray exposure, and conduct a cost-effective management of health care resources.

14AP03-2
ERAS (Enhanced Recovery After Surgery) in elective colorectal surgery in the University Hospital of Guadalajara (Spain): A MULTIVARIABLE ANALYSIS.

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Introduction: The aim of this study was to evaluate which were the variables that independently influenced in hospital length of stay (LOS) and readmissions in elective colorectal surgery with an ERAS protocol.
Methods: 256 patients were included. We compared the first 121 consecutive patients that participated in the ERAS protocol with 135 consecutive patients that were operated prior to its implementation. The inclusion criteria were: elective colorectal surgery, ≥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, Fisher exact and the Student t test was used. Multivariable lineal regression was used to assess the impact of several confusion factors such as male sex, age, ERAS protocol, laparoscopic surgery and severe Clavien-Dindo (3-5) complications in LOS and logistic regression were used to analyze the impact of those confusion factors in 30-days readmission rates. Results were considered statistically significant when $p<0.05$.
Results: The two groups were homogeneus. 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 (11.1%), p 0.756) or the number of postoperative complications (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). The presence of severe complications increases LOS by an average of 6.7 days (B6.7, 95% CI: 5.41 to -8.05 days, $p<0.001$) by adjusting for the independent variables mentioned above and every year of age increases LOS by an average of 0.041 days (B0.041, IC 95%: 0.009-0.074, p 0.041) .The ERAS protocol (B-0.91,95% CI: -1.74 to -0.083, p 0.031) and the laparoscopic surgery (B-1.3, 95% CI: -2.23 to -0.39, p 0.006) were independent predictors that decreases LOS. Laparoscopic surgery (OR: 0.2, 95% CI: 0.1-0.8, p 0.02) and 3-5 Clavien Dindo complications (OR 3.5, 95% CI: 1.2-10.2, p 0.021), adjusted for those variables, were independently associated with readmissions.
Conclusions: Severe complications increased LOS and readmissions in an independent way, but the ERAS protocol and the laparoscopic surgery decreased LOS. Laparoscopic surgery decreased readmission in an independent way.

14AP03-3
Implementation of a 5-point program to reduce the incidence of iatrogenic pneumothorax and its consequences in a university third-level hospital

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Background and Goal of Study: In our era of ever increasing invasive procedures and more accurate diagnostic tools, iatrogenic pneumothorax (IPT) has become an important indicator because of its outpatient impact and morbidity. The goal of this study was to describe the characteristics of IPT in our hospital and identify weak assistance points in aim to improve our results.
Materials and Methods: Data collected from our Assistance Quality Program showed poor benchmarking results regarding the security indicator of IPT. We observed 42 cases of IPT during 2014 and 2015, resulting in 109% more than we expected. Increased hospital stay and global mortality rise was also associated. A retrospective observational analysis was performed to describe the situation of IPT between 2016 and 2017. Current opinion and literature references were taken in to update our clinical practice.
Results and Discussion: We detected similar incidence from 2014 to 2017; the main causes of IPT being: subclavian vein catheterization, pacemaker implantation and barotrauma. A resident physician was involved in most of the events. 21% of cases were diagnosed after 48 hours and there was a great variability in the withdrawal of the chest drainage. Following the data, 5 measures were established:

GUIDELINE	Intrahospital new protocol for pneumothorax and chest-tubes management.
KNOWLEDGE	Performing safer approaches by identifying high-risk patients.
CLINICAL PRACTICE	Early change of approach or more experienced physician in case of technical difficulties.
TECHNOLOGY	Early diagnosing of pneumothorax by bedside ultrasound.
TRAINING	Simulation-based training in central vein catheterization and thoracocentesis for residents.

Conclusions: Routine acquisition of quality and security assistance indicators as well as following-up our complications should be essential in our clinical practice. Developing a new intrahospital protocol, new training methodology and clear guidelines of IPT management could be necessary steps to reach optimal clinical practice. A forward study is mandatory to assess the effectiveness of the 5 proposed measures.

14AP03-4
Is “2222” an internal cardiac arrest pager number in the Spanish hospitals?

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Background and Goal of Study: In 2015, the European Board of Anaesthesiology (EBA) and the European Resuscitation Council (ERC) recommended the standardization of the 2222 number as in-hospital cardiac arrest pager number in Europe. It would benefit the security of the patient, increasing the effectiveness of the emergency response inside the hospital, especially considering staff movement between hospitals. The aim of this study was to assess how many hospitals in Spain follow this recommendation and use 2222 as cardiac arrest pager number.
Materials and Methods: Using the 2018 catalogue of National Hospitals, we identified 799 Spanish hospitals. We undertook a stratified random sampling by using the number of hospital beds (less than 80 hospital beds, 81 to 200, 201 to 500 and more than 500) and we calculated a sample size of 288 hospitals. We compiled the information by phone interviews and email information request for three questions: What medical team treats the cardiac arrest in your hospital? Is it available any specific cardiac arrest pager number?; if affirmative, what number is used?
Results and Discussion: We missed information from 27 hospitals (9.3%). The 21.53% of our sample used a standard cardiac arrest pager number. Only 5 (8.06%) hospitals used the 2222. The rest of the hospitals had different numbers and some of them were not used exclusively for cardiac arrest. More than 51 different numbers were identified. A resuscitation team is available in 141 (48.96%) hospitals. The 20.14% of the surveyed hospitals use 112 to get emergency support for their cardiac arrest patients. This happened more frequently in smaller hospitals. The Intensivists are in charge of the resuscitation team in 32.27% of the cases. We found a wide diversity of cardiac arrest page numbers in Spanish hospitals. There is a gap between our survey results and the EBA and ERC recommendations. Despite this, we observed that there are specific response protocols for in-hospital cardiac arrests in Spanish hospitals . This strategy should be jointly defended by Intensive Care and Anaesthesiology National Societies to convince the hospital managers and administration to improve the internal emergency response.
Conclusions: This survey is a good starting point to move for standardization of the 2222 as in-hospital cardiac arrest number in Spain. The Spanish experience may be useful for other European countries.

14AP03-5
Dial ´2222´ as a standard Cardiac Arrest call telephone number in European hospitals: current status in The Netherlands

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Background and Objective: In 2015, a standard in hospital cardiac arrest (IHCA) call using 2222 has been advocated by the Patient Safety Quality Committee of the European Society of Anesthesiologists, as well as by the European Board of Anaesthesiology (EBA).(1) In Denmark and Ireland, more than 70% of hospitals already use this number.(2) In the Netherlands, numerous hospital staff works at more than one location and confusion in the correct telephone number to call the resuscitation team can result in the loss of precious time, putting patient´s lives at risk. The aim of this observational study is to determine the current Cardiac Arrest call telephone numbers in Dutch hospitals.
Materials and Methods: A total of 222 Dutch healthcare facilities were asked for details concerning cardiac arrest call numbers and cardiac arrest teams with a predefined questionnaire. When first or second tier contact were not aware of the 2222-iniative they were informed via eSurvey in CastorEDC and asked if they were willing to change to call sign 2222.
Results and Discussion: Up to now, information from 84 institutions (44%) is available. In these hospitals, there are already 32 different cardiac arrest call signs used. The most common Cardiac Arrest telephone number used is 5555 (13%). Some hospitals reacted to the earlier statement of the EBA and changed to ‘2222’, or added it as an accessory telephone number. However, to date only 8 % of responding institutions use 2222 as primary Cardiac Arrest telephone number.
Conclusion: There is a great variety in Cardiac Arrest telephone numbers in Dutch hospitals and only a minority (7%) uses the suggested European standard telephone number 2222. Efforts should be made to further implement 2222 as Cardiac Arrest telephone number, increasing patient safety for patients with IHCA.
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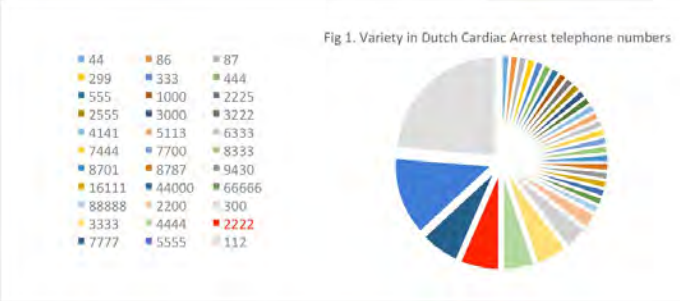

14AP03-6
Knowledge and Attitudes about Helsinki Declaration on Patient Safety: A Questionnaire Study

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Background and Goal of Study: In our study, it is aimed to evaluate the knowledge and experiences of anaesthesiologists in Turkey on Helsinki Declaration(HD).
Materials and Methods: After ethics committee approval and participants consent electronic questionnaire was sent via the web to anesthetists working in Turkey.
Results and Discussion: The number of anesthesiologists participated in our study was 137.The mean age of the participants was 44.08±7.98, 53.3%were female, 46.7%were male. Education on patient safety was received by 58.4%of the participants;56.9% claimed their knowledge as sufficient, 37.2%as limited, and 5.8%as insufficient. It is claimed that 59.9%of institutions provide patient safety education and 47.4%of them stated that health insurance funds provide for patient safety. The knowledge of participants about HD was 31.4% sufficient, 38.7%limited, 8.8%insufficient and 21.2%had no knowledge. Definition of the HD was made by 18.2%of the participants and 40.1%of them reported that the HD was applied at their hospital. Patient safety as stated by 29.2%of the participants was improved by implementation of the HD but 62.8%have no idea about the subject. It has been stated that Minimum Monitoring Standards recommended by EBA are complied with 90.5%in operating rooms and 75.9%in recovery units. Safe practice standards in sedation applications were not followed by 25%of the participants. It is stated by the participants that Safe Surgical Checklist is used by 94.2%and patients are informed about the anesthesia and all procedures by 96.4%; labeling of high-risk drugs in the operating room is specified as 87.6%.It is reported by 45%of the respondents that the precautions and results for patient safety in their institutions were reported annually, and 60.6%reported that hospitals provided financial resources for patient safety.
Conclusions: The HD was signed in 2010 by Turkish Society of Anaesthesiology and Reanimation representative, was translated into Turkish and put on the web site of the association. Since then, our association has addressed issues related to patient safety and the HD at all scientific meetings. Despite all the educations only 30%of the participants stated that they had sufficient knowledge of the HD and 40%of them applied the HD routinely. In order to increase this rate, we think that it will be effective for the Ministry of Health and TARD to make the necessary arrangements in cooperation.

14AP03-8
Preventive of arterial hypotension during spinal anesthesia

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Background and Goal of Study: Phenylephrine a common standard for the correction of hypotension during spinal anesthesia. We provide a real alternative for phenylephrine with additional positive (safe and soft) effects. The rapidly arterial hypotension usually expect an early side effect of spinal anesthesia for cesarean section. Usually, its correction using phenylephrine, or other sympathomimetics. Another typical unpleasant perioperative condition shivering, which reduced by variety of drugs, including nefopam.
Materials and Methods: Using nefopam to reduce arterial hypotension was studied in 50 obstetric patients during anesthesia for caesarean section. Premedication before spinal anesthesia necessarily included dexamethasone and atropine. Immediately prior to the spinal puncture, we started intravenous infusion nefopam (0.71 mg/min, total 20 mg).
Results and Discussion: Infusion of nefopam completely eliminate perioperative shivering. It has successfully preventive arterial hypotension during spinal anesthesia for cesarean section: nefopam infusion has reduced the number of phenylephrine boluses (50 mcg) from 5-10 to 0-1. Overdose symptoms and side effects in our practice have not been recorded.
Conclusions: Promptly started intravenous infusion of nefopam not only completely prevents perioperative shivering, but also provides almost fully absence of hypotension during spinal anesthesia.

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14AP03-9
Efficacy of the WHO Surgical Safety Checklist

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Background and Goal of Study: Completion of the three parts of the SSC is compulsory for all hospitals in the National Health Service (NHS) in the UK since 2010. Typically reviews of this topic describe the degree of completion of the checklist itself. Our review looks beyond this and ascertains whether the SSC has resulted in the actual implementation of one of the actions required: the administration of required antibiotics at the appropriate time.
Materials and Methods: We reviewed 25 consecutive case notes for each of three surgical specialties: neurosurgery, spinal surgery, emergency laparotomies for the years following SSC implemantation:2010- 2013 and 2015, and for 2009, the year before the SSC. Completion of the three parts of the SSC was noted, as was the administration of antibiotics for the procedure. Using descriptive statistics we compared these results to the antibiotic administration in 2009, to ascertain the effect of the SSC introduction on timely antibiotic administration.
Results and Discussion: The completion of the individual parts 1,2,and 3 of the SSC improved over time, mainly due to initially weak, then improving completion of part 3 (Figure1).

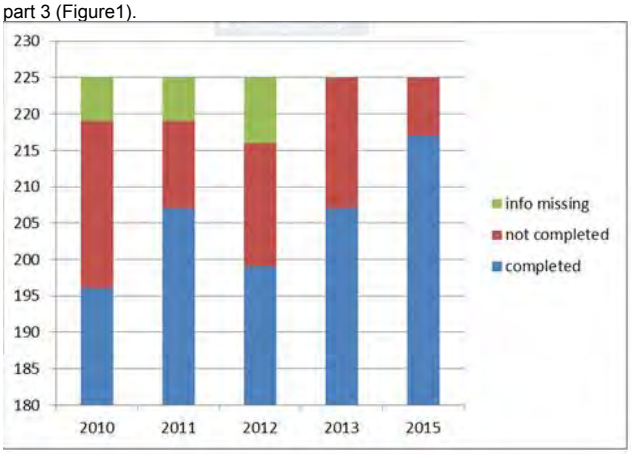

Figure 1:

Completion of individual parts 1, 2, and 3 of the SSC checklist for the 75 cases reviewed.

Timely antibiotic administration was achieved in 72-90% of cases. Of note: results for 2010 and 2011 were worse than those in the year without the SSC (Figure 2). And 38 antibiotic doses not given/not timely given: for 36 of these the relevant part of the SSC had been completed yet the required action did not follow, while in other instances antibiotics were given correctly though the checklist had not been completed.

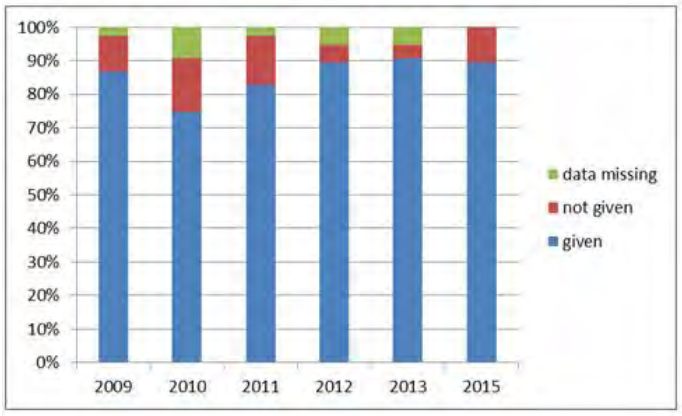

Figure 2:

Administration of antibiotics at the required time.

Conclusions: Improving team communication and safety culture are positive developments commonly linked to the SSC introduction. Our results show that timely administration of antibiotics in our institution is achieving high standards, yet this is not clearly linked to the SSC use.

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14AP04-1
Analysis of claims reported after tonsillectomy from 3 French insurers between 2008 and 2017

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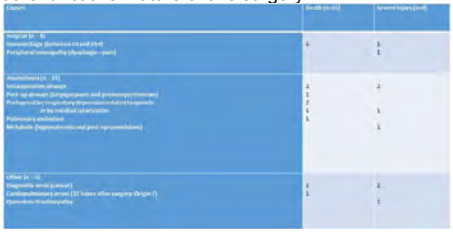
Background and Goal of Study: Postoperative morbi-mortality after tonsillectomy are not negligible: more than 10% of returns for consultation and haemorrhagic mortality of 1/50000. Complications related to anaesthesia as well as respiratory depressions related to the use of opioids are also causes that can lead to death after tonsillectomy. In 2013, the National Agency for Medicines recommended to no longer use codeine in this context for children
Materials and Methods: The objective was to identify the claims and assess the causes of morbidity and mortality after tonsillectomy and consequences, from insurers databases.
This retrospective study collected claims reported over 10 years (2008 to 2017) from 3 French insurance registries (SHAM, MACSF, Branchet). A grid of reading collected the characteristics of patients, the time of occurrence and the causes of the disaster as well as their consequence
Results and Discussion: 118 cases of tonsillectomy. Average age was 26 years (66 adults, 52 children)
Causes of the damage were: dental injuries (n = 23), haemorrhage (22), retained sponges (15), peripheral (n=15) or central (n=3) nerve injuries, respiratory distress (11), burn (6), surgical result imperfect (6), infectious (4), diagnostic error (4) or other (9). The incident was considered due to a surgical cause in 43 of the cases, secondary to anaesthesia (18), a hazard (38), a lack of information (4) or equipment (7) or no cause found (9)
Consequences were death (n = 15), severe (9) or minor (48) or none (46) injury. Table reports the aetiology
Conclusion: The analysis confirms the life-threatening risk of tonsillectomy. 16 deaths were found over the period. Anaesthesia and surgery were the 2 main causes of death or serious injury after tonsillectomy with a frequency quite similar. Difficulty in airway management and postoperative respiratory failure was identified as the two main causes leading to death or severe injury secondary to anaesthesia. 2 fatal cases of opioid morphine-related respiratory depression were identified. This study also recalls the obligation to provide information on the risks to be weighed against the functional nature of this surgery



14AP04-2
First look on accidental awareness during general anaesthesia related incidents in the Spanish Anaesthesia Incident Reporting System after nine years of incidents reporting

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Background and Goal of Study: Accidental awareness during general anaesthesia (AAGA) is one of the most feared complications by both anesthetists and patients. It involves the failure of the main purpose of general anesthesia: the loss of consciousness. Our aim was to describe the AAGA related incidents reported in the Spanish Anaesthesia Incident Reporting System (SENSAR) and the measures proposed to prevent its appearance.
Materials and Methods: Using the SENSAR incident database, we searched for incidents reported between November 1, 2009 and November 1, 2018. We used the word search by following key words: “intraoperative awareness”, “awake”, “BIS” to find the AAGA related incidents. Two anaesthesiology trainees manually review the incidents from the initial search to select those AAGA incidents that met any grade from 1 to 5 of Wang’s classification of intra-operative cognitive states. In case of disagreement a third anaesthesiology trainee was involved in the process.
Results and Discussion: During the studied period 14160 incidents were reported in the SENSAR database. After careful selection, we identified 40 cases of AAGA. Of these, 21 were women and 19 men, 26 were <65 years old and 14 ≥65. The 60% were cases associated with Total Intravenous Anaesthesia (TIVA) vs 22,5% non TIVA and 20% unknown. In 19 cases BIS was used as a monitor of depth of anaesthesia. The main contributing factor referred was the failure in the administration systems (40%), related to problems with venous system and infusion pumps, followed by human factor (37,5%). In 17,5% no contributing factor was identified. Regarding morbidity,15 cases had subsequent recall of intra-operative events.
Conclusions: The incidence of AAGA reported in the Spanish Anaesthesia Incident Reporting System is low. We could find some clearly identifiable contributing factors: mainly human errors and failures in administration systems. Even though, there are cases where no rational cause can be identified for appearance of AAGA.
Preventive measures, crucial to reduce its incidence, included: correct monitoring of the anaesthetic depth, alarm configuration, experience with the equipment and repeated control of its proper functioning, including the fixation of venous catheters and visual control of routes of medication administration.

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14AP04-3
Fire skin burns secondary to the use of alcoholic chlorhexidine in an emergency cesarean section

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Background: Over 600 operating room fires are reported annually in the United States and many more are likely unreported. For a fire to occur, all three points of the fire triad must be present: an oxygen source, an ignition source, and a fuel source[1-2]. Preoperative cleansing of the skin of the patient with alcoholic chlorhexidine is superior to cleansing with povidone iodine for preventing surgical-site infection after clean/contaminated surgery[3]. We report accidental fire skin burns caused by the use of electrocautery and chlorhexidine alcohol solution during an emergent cesarean section.
Case Report: 30-year-old woman, ASA I, BMI 29, at full term pregnancy, was admitted to the maternity unit in active labor. A lumbar epidural catheter was placed for pain relief and then a perfusion of 0.125% levobupivacaine (8-12ml·h-1 as needed) was started for a suitable analgesic level. Four hours after, she underwent an emergency caesarean section due to fetal distress secondary to a sudden umbilical cord prolapse. The skin of abdomen was prepared with 2% chlorhexidine in 70% alcohol as usual and the patient was draped. As soon as diathermy incision was used, a flame was seen on the abdomen of the patient, as well as under the drapes. The fire was put out immediately and the cesarean section could be safely completed with the birth of a healthy newborn (Apgar score 8/10). The burnt area amounted to 6,5% body surface area, mainly in her both flanks and thighs. She was discharged to the plastic surgery department for control and treatment. No residual scarring was observed after two months.
Discussion: Alcohol-based skin preparations favor surgical fires. Even without pooling and waiting 3 minutes as recommended, flash fires have been described. Skin preparation with isopropylic chlorhexidine has been eliminated from our hospital protocols when an extremely emergency situation occurs and there is no enough time for a safe skin drying. At present, alcohol-free preparations are used.
References:
1. Anesthesiology 2013; 118:271-90
2. J Am Col Surg 2017; 225:160-65
3. Anz J. Surg. 2004; 74: 382-385
Learning points: An oxygen source, an ignition source, and a fuel source must be all presented for a fire to occur. Skin preparations containing alcohol are flammable and it is recommended to wait at least 3 minutes for skin drying before using cautery. When an emergent situation occurs alcoholic preparations should be avoided in order to prevent fire hazards.

14AP04-4
Situation awareness errors in anaesthesia in 131 critical incidents of a Spanish Hospital.

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Background and Goal of Study: Situation Awareness (SA) in addition to involving environmental perception, comprehension and projection, is a non-technical skill that can help in decision-making to avoid errors during anaesthesia and critical care. The aim of this study was to determine the frequency and type of SA errors in reported anesthesia related incidents.
Materials and Methods: In this single centre observational retrospective study, we reviewed all anaesthesia incidents reported between January 2016 to November 2018 in the Spanish Anaesthesia and Intensive Care incident reporting system (SENSAR). We selected Anaesthesia Department incidents that took place in Hospital Universitario Fundación Alcorcón (Madrid). Two anesthesiology residents with human factor training manually evaluated every reported incident searching for SA errors, and if affirmative, they determined the level of SA error: perception, level I; comprehension, level II or projection, level III. In case of disagreement, consensus was obtained by discussion between them and two additional residents.
Results and Discussion: We analyzed 131 reported cases: 23 of them were discarded for SA error analysis because there was no patient involved. Among the remaining 108 analysable cases, SA errors were identified in 88 cases (67.2%). During the analysis, researchers agreed in 88.5% of the cases. The SA error type was identified as level I (35.1%), level II (18.3%) or level III (13.7%).We could not find any relationship (p>0.01) between SA error appearance or type and the patient ASA classification, the time when the situation happened or the type of procedure (scheduled or urgent).
Conclusions: SA is indispensable for patient safety. SA errors are very frequent, especially regarding perception. Compared to previous data, we found a lower incidence of SA error than Schulz et al (1) (67.2% vs 81.5%) with a similar type of SA error distribution. Despite being a single center study, SA errors seem to occur in patient safety incidents in other countries. We believe that knowledge and training in this skill could improve medical performance and obtain better patient outcomes.
References:
1.Schulz* CM, et al. Situation awareness errors in anesthesia and critical care in 200 cases of a critical incident reporting system. BMC Anesthesiology (2016) 16:4
2.Zamudio D, Arnal D. Situation awareness during crisis in the OR. Hospital Healthcare Europe 2017; 86-8

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14AP04-5
Wrong side errors. Why do they still exist? Can we reduce them to zero?

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Background and Goal of Study: A wrong side error (WSE) is defined as any procedure performed on the incorrect side of a patient. Even though it is considered as an avoidable event when the correct security measures are applied, its current incidence is still estimated in 1/16000 surgical interventions. The aim of this report is to develop several safety recommendations that will minimize the risk of WSEs. To do this we analysed incidents reported to SENSAR (Spanish Safety Reporting System in Anaesthesia and Resuscitation), their latent factors and corrective measures.
Materials and Methods: We searched for incidents reported SENSAR database between 2007 and 2018 using the words “block”, “wrong”, “side” and “incorrect”. Inclusion criteria were all those incidents that related with WSEs during surgery.
Results and Discussion: 81 incidents met our inclusion criteria. The most affected specialities were orthopaedics (48.1%) followed by ophthalmology (28.4%). 44.4% of the collected WSEs were related to the surgical procedure and the intervention was performed in half of the occasions. The remaining 55,6% involved the anaesthetic technique and, in these, an actual incorrect nervous block was performed in 91% of the cases. Severe harm was caused in three occasions. The most frequent latent factor identified was the absence or incorrect use of the surgical check-list (66%). Other latent factors suggested in the reports include sedation of the patient, rushing and lack of communication amongst the team. As corrective measures everyone agrees in the need of adequate training and appropriate use of check-lists, as well as in the creation and standardization of a site marking protocol. WSEs are considered indicators of assistential quality, as potential harm derived from them is very large. For this reason, they have been subject of numerous studies, always concluding that standardized protocols are needed. However, today, they are still not included in medical routines. Furthermore, it is a highly overlooked issue as WSEs are frequently not notified to incident databases, from where most studies obtain their statistics.
Conclusions: In order to avoid WSEs we have developed the following recommendations: The correct implementation of surgical check-list (with every team member present), the creation of a standardized surgical site marking protocol, the correct revision of clinical history and imaging tests, and finally, involving patients in their own safety.

14AP04-6
Iatrogenic pneumothorax: a retrospective observational study in a Spanish third-level hospital

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Background and Goal of Study: Iatrogenic pneumothorax (IPT) has become an increasingly recognized entity, usually occurring as a result of invasive procedures at the thoracic level, such as: transthoracic or transbronchial biopsies, thoracocentesis, subclavian venous catheterization or barotrauma due to mechanical ventilation. However, it can also appear as a complication after procedures or surgeries involving the neck, axilla or abdomen. The goal of this study was to analyze the IPT behaviour in our hospital.
Materials and Methods: A retrospective observational study was performed to analyse the incidence, etiology, risk factors and morbidity associated to IPT between 2016 and 2017. We screened all the patients with IPT as secondary diagnostic in the clinical history. Thoracic and cardiac surgery, traumatic patients, previous pleural effusion as well as lung or pleural biopsies were excluded.
Results and Discussion: A total of 22 IPT were observed, 59% female, being the average age 59.4. Half of the cases had risk factors for IPT. The most frequent causes for IPT were: subclavian venous catheterization (54.5%), peacemaker or IAD implantation (27.3%) and barotrauma due to mechanical ventilation (9.1%). Other causes were abdominal or chest wall surgeries. A resident was involved in 77.3% of IPT. Non-elective admission patients were 45,5% of the cases. The diagnostic was delayed 48 hours after the procedure in 22,7%. Subclavian venous catheterization caused 80% of IPT. Chest drainage was needed in 91% of patients; being 4 days the average of its withdrawal.
Conclusions: The appearance of IPT in our hospital followed the expected standards, regarding risk factors and etiology, underlining that it is a university hospital. Non-elective patient admission was a relevant group for IPT, probably because of higher risk factors, although paradoxically, elective patients went more unnoticed. A new protocol is mandatory in order to reduce IPT incidence, detect high-risk patients and promote earlier diagnostic.
References:
- De Lassence A, Timsit J, Tafflet M, Azoulay E, Jamali S, Vincent F, et al. Pneumothorax in the Intensive Care Unit: incidence, risk factors, and outcome. Anesthesiology. 2006;104(1):5–13.
- John J, Seifi A. Incidence of iatrogenic pneumothorax in the United States in teaching vs. non-teaching hospitals from 2000 to 2012. J Crit Care. 2016 Aug;34:66-8.

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14AP04-7
Cardiac Rupture in the Electrophysiology Laboratory: a case study

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Background: Catheter ablation treatments have suffered great technological development. Auricular fibrillation is one of the most commonly treated arrhythmias. Cardiac tamponade is the most frequent major complication (0,7%)[1] and high level of clinical suspicion is mandatory.
Case report: 64-year-old woman, ASA III, proposed for pulmonary vein isolation ablation due to paroxysmal auricular fibrillation. Irrelevant previous anesthetic history for spontaneous esophageal rupture. Total intravenous anesthesia (TIVA) was performed with ASA standard monitoring, BIS® and orotracheal intubation (OTI). Anesthesia induction was eventless. After 50 minutes, arterial pressure and pulse wave amplitude fell. Cardiac silhouette enlargement and progressive immobility after the transeptal incision made us suspect of cardiac tamponade, confirmed by transthoracic echography. Pericardiocentesis was performed. Nevertheless, progressive clinical worsening with ongoing pericardial effusion motivated urgent surgical intervention and transfer to the Operating Room (OR). A left atrial appendage laceration was identified and corrected. Invasive monitoring and vasopressor agents were used. Successfully discharged on day 6.
Discussion: Electrophysiology laboratories (EL) in remote areas present challenges: OR distance, poor assisting staff, procedures unfamiliarity, restricted patient accessibility with limited airway and peripheral accesses management. Literature suggests that general anesthesia provides greater analgesia, comfort, imobilization[2,3], technical quality and mapping due to catheter stability[4], with less complications and superior long-term results. We normally perform TIVA with laryngeal mask. Airway protection with OTI because of the precedent esophageal rupture was advantageous. Early recognition and treatment of the complication (table 1) was crucial to avoid a catastrophic outcome. To provide safe and qualified anesthetic care outside the OR, it is crucial to be aware of the EL's specificities and to improve staff's training in critical scenarios.
References:
1-Vasheghani-Farahani A et al. Acute Complications in Cardiac Electrophysiology Procedures: A Prospective Study in a High-volume Tertiary Heart Center. Res Cardiovasc Med 2018;7:20-5.
Learning points: Physical and technical challenges of the EL. Staff's training in elective and emergent anesthetic procedures. Clinical impact of prompt complications' recognition, diagnosis and treatment.

14AP04-8
Accidental extubation at the end of cervical spine surgery using a Mayfield head pin holder

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Background: Perioperative airway management difficulty in patients with cervical spine disease and trauma are common thus we must treat them carefully. This report is about some risk we should notice in patient with a Mayfield head pin holder.
Case Report: A 32-year-old woman denied major systemic diseases suffered from 4 limbs weakness after chiropractic for her cervical spine. After series of CT and MRI, C1-2 subluxation with cord compression was diagnosed thus emergent surgery was suggested. We performed awake nasal intubation with fiberoptic bronchoscopy and post-op ICU admission without extubation was planned after discussion with the surgeon. At the end of surgery, the surgeon removed the head pins and released the Mayfield head pin holder at prone position by himself. Unfortunately, the ET-tube (fixed together with the head pin holder) was removed at the same time. We performed directed laryngoscopy and fiberoptic bronchoscopy but failed. Finally, FasTrach LMA was successfully inserted with adequate ventilation and ET-tube was re-intubated with tube exchanger. The patient recovered smoothly without any long-term complications after this event.
Discussion: As the arrows in picture 1, the distal parts of Mayfield head pin holder is movable, thus anything fixed with it is at risk of being removed together. In patients with possible airway management difficulty, all team members should cooperate carefully when any step is made. Standard operating procedures is essential and must be discussed according to patient safety and the requirement of the team. Supraglottic airway device is good choice when difficult intubation is encountered. It provide adequate ventilation and give us time to prepare other devices to establish a secure airway. FasTrach LMA combined with tube exchanger successfully helped us in this circumcision.
References:
1. Emergency Airway Management with Fiberoptic Intubation in the Prone Position with a Fixed Flexed Neck. Hung MH, Fan SZ, Lin CP, Hsu YC, Shih PY, Lee TS. Anesth Analg. 2008 Nov;107(5):1704-6.
2. Miller's Anesthesia. Chapter 36. Patient Positioning and Anesthesia.
Learning points:
1. Mayfield head pin holder is movable, thus anything fixed with it is at risk of being removed together.
2. FasTrach LMA combined with tube exchanger is good choice when difficult intubation is encountered after cervical spine surgery

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14AP04-9
Unusual complication following baclofen pump implantation

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Background: Inadvertent intrathecal injections are rare and reported injectants vary in the literature(1). Intrathecal baclofen delivery via implantable pump represents an important modality for symptomatic relief of spasticity. Herein, we report a patient in whom neurotoxicity developed following baclofen pump implantation. Baclofen was suspected however intrathecal contrast turned out to be the cause of toxicity. Despite a prolonged recovery, the patient survived but she developed aphasia. This may be the first report of inadvertent intrathecal contrast administration via Baclofen pump.
Case Report: A 27-year-old female with neurological complaints was scheduled to undergo a baclofen pump revision. She had dystonia unresponsive to oral muscle relaxants and dysarthria. Her laboratory results were normal except low vitamin d. Anesthesia was induced with propofol and rocuronium, maintained with sevoflurane and remifentanil without additional muscle relaxant. During the procedure, patient suddenly had a hypotensive attack. Surgeons administered contrast to ensure placement of pump. Surgery lasted 1.5 hours. She was extubated after 30 minutes of cessation anesthetic drugs. She was unresponsive and hypotonic in the PACU, discharged to ICU, intubated and barbiturate coma was induced. Barbiturate was stopped at the 1st week, patient woke up 1 week after with aphasia.
Discussion: Baclofen toxicity may result in CNS depression, bradycardia, hypotension/hypertension, respiratory failure, seizures, coma and death. Since our patient was hypotonic in the recovery unit, baclofen toxicity was suspected. However, inadvertent intrathecal contrast administration is also associated with neurotoxicity(2). It may be difficult to distinguish both diagnosis, especially in such a case with underlying neurological symptoms. Cerebrospinal fluid lavage and cardiopulmonary support seem to be the mainstay of treatment.
References:
1.Liu H, Tariq R, Liu GL, Yan H, Kaye AD. Inadvertent intrathecal injections and best practice management. Acta Anaesthesiol Scand 2017;61:11-22.
2.Nakazawa K, Yoshinari M, Kinefuchi S, Amaha K. Inadvertent intrathecal administration of amidetrizoate. Intensive Care Med 1988;15:55-7.
Learning points: Intrathecal contrast may cause severe and fatal neurotoxic reactions due to their hyperosmolarity and ionic nature, therefore, it is contraindicated. Management includes hydration, elevation of head, CSF lavage, barbiturate coma and long-term follow-up.

14AP04-10
Block needle blocked

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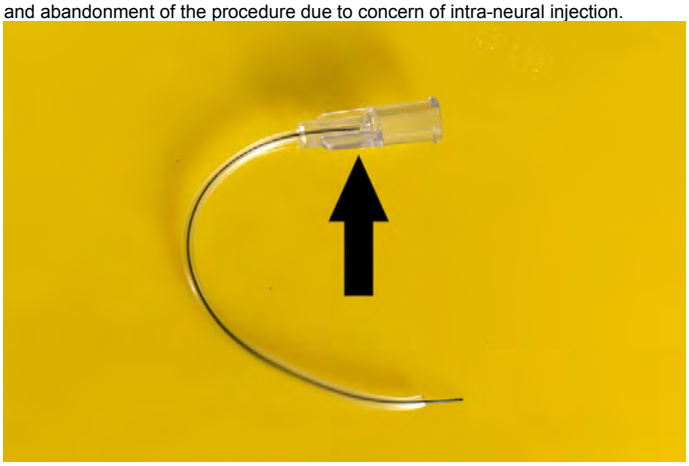
Background and Goal of Study: We recently encountered an issue with a regional anaesthesia block needle that highlights the importance of testing equipment prior to use.
Materials and Methods: A 44-year-old man was scheduled for emergency MUA and K-wiring of finger under axillary brachial plexus blockade. Prior to needle insertion, an attempt was made to prime the needle (22G * 80 mm SonoTAP, Pajunk, Germany) with local anaesthetic solution. However, there was a very high resistance to injection and no solution flowed. The procedure was completed successfully using another block needle from the same manufacturer. Surgery then proceeded uneventfully. Subsequently, we inspected the needle by attempting to pass a suture material (Size 0, Mersilk USA) through the lumen and identified a block at arrow in Fig 1. The patient was spared unnecessary duplicate needle insertions and abandonment of the procedure due to concern of intra-neural injection.



Results and Discussion: If we had not tested the needle beforehand, we would have subjected the patient to unnecessary duplicate needle puncture or incorrectly concluded that inadvertent intra-neural injection was occurring.(1)
Conclusion: Always test equipment before use on patients to reduce risks of harm.
Reference:
1. Hadzic A, Dilberovic F, Shah S, et al. Combination of intraneural injection and high injection pressure leads to fascicular injury and neurologic deficits in dogs. Reg Anesth Pain Med. 2004 Oct;29(5):417–23.
Acknowledgements: The issue with the equipment was reported to the manufacturer and internally.

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14AP05-10
Anesthesia management in patient with myopathy: case report

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Background: Myopathy is the most common muscle weakness in the clinic as well as it is a disease with symptoms such as exercise intolerance, pain, myotonia, pseudo hypertrophy (1). The aim of this case is to draw attention to the general anesthesia method and important points in a patient myopathy due to triomalleolar fracture operation.
Case Report: In the preoperative neurological examination of 33-year old woman who had been followed and treated due to diagnosis of myopathy, it has been observed the deep tendon reflexes were symmetrical hypoactive, while relived bilateral ptosis is present when compared to the first medical examination, CK:2069 and preoperative value in previous day:715 in the laboratory values. Dantrolene preparation was performed by considering as risky in terms of malignant hyperthermia sensitivity. Anesthesia machine and ventilator were prepared by operating with 4lt/min 100% oxygen for 18 hours, preoperatively. LMA was placed without the use of neuromuscular blocker and maintenance of anesthesia with total intravenous anesthesia was performed. Hemodynamic findings were stable.
Discussion: Peripheral and neuraxial regional anesthesia are not contraindicated in neuromuscular diseases unless there is rapid disorder in the neurological state. Regional anesthesia was not preferred in order to prevent to trigger the current neuromuscular disease.
Increased sensitivity against the non-depolarizing neuromuscular blocker and insufficient reverse effect against the anticholinesterase may result in delayed recovery in these patients (2). Therefore, neuromuscular blocker was not used.
Propofol from anesthetic agent does not activate the ryanodine receptor Ca 2+ channels in patients prone to malign hyperthermia, therefore it is accepted that it can be used safely instead of inhalation agents (3).
References:
1) Kuruoglu R., et al. Dıagnosıs and treatment guıdelınes for neuromuscular diseases 2006.
2) Allison KR., et al. Muscular dystrophy versus mitochondrial myopathy: the dilemma of the undiagnosed hypotonic child. Paediatr Anaesth 2007; 17:1-6.
3) Fruen BR., et al. Effects of propofol on Ca regulation by malignant hyperthermia susceptible muscle membranes. Anesth. 1995; 82: 1274-82.
Learning points: In our case with diagnosis of myopathy, safe anesthesia and rapid recovery was achieved by applying total intravenous anesthesia with LMA, without using neuromuscular blocker after careful preoperative evaluation.

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14AP05-2
Greek Anaesthesiologists' Burnout levels: Preliminary results.

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Background and Goal of Study: To investigate the burnout level among Greek Anaesthesiologists and its association with individual characteristics of Residents and Consultants Anaesthesiologists.
Materials and Methods: The study was approved by the Ethics Committee of the University Hospital of Larissa. A survey questionnaire was distributed to Anaesthesiologists at the National Anaesthesiology Congress (September 2018 Greece). The Maslach Burnout Inventory (MBI) was also used to assess the three components of the Burnout syndrome: Emotional exhaustion (measuring feelings of being emotionally overextended and exhausted by one's work, EE), depersonalisation (measuring an unfeeling and impersonal response toward recipients of one's service, care treatment, or instruction, DP), and personal accomplishment (measuring feelings of competence and successful achievement in one's work, PA). The questionnaire was validated for use in the Greek population, with sufficient construct validity and satisfactory internal consistency reliability. The statistics were performed using the statistical package IBM SPSS Statistics (version 22.0; IBM Inc., New York, USA). A probability of <0.05 (two-tailed) was considered significant in all tests.
Results and Discussion: 123 Anaesthesiologists were included in our study (90 female, 33 male). High burnout emotional exhaustion, high burnout levels of depersonalisation and high burnout levels of personal achievement were seen in 38.2, 24.4 and 0.8% of respondents, respectively. We found statistically significant differences between the burnout parameters and the current occupational status of Anaesthesiologists. Specifically, Senior Consultants experience the highest emotional exhaustion and Consultants B the highest depersonalisation, while the highest average values in the Lack of Personal Accomplishment scale were observed in the Directors and the Academic personnel.
Conclusions: The incidence of Burnout Syndrome among Greek Anaesthesiologists is high and it is mainly expressed with feelings of emotional exhaustion, while the levels of depersonalisation and personal accomplishment are moderate and very low, respectively.
References:
Huan-Fang Lee, Hui-Ting Kuo, Cheng-Li Chang, Chia-Chen Hsu, Tsair-Wei Chien (2017). Determining Cutting Points of the Maslach Burnout Inventory for Nurses to Measure Their Level of Burnout Online,History Research, 5(1): 1-8.

14AP05-3
Anthropometric variables in anesthesia: Concordance between self-reported weight and height and the values measured in surgical patients

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Background and Goal of Study: The anesthesiologist plans every case based on patient weight and height to calculate medications doses and ventilator parameters. There are many studies in anesthesia that evaluate the concordance of estimate visually and measured weight and height finding 32.8% of difference it could affected the outcomes for subdosificate or infradosificate medications (especially in narrow therapeutic range). The objective is to determine the concordance between self-reported weight and height and measured values.
Materials and Methods: It is a concordance study at National Hospital of Colombia, participants (N: 90) adults, 46% male and 53% female, 18-84 years of age (mean 47) scheduled for surgeries NCEPOD 2-3-4. Each participant was asked weight and height then a qualified person determine measured value. The Pearson correlation coefficient and Lin's concordance correlation coefficient were obtained and Brad-Altman plot was used for concordance analysis
Results and Discussion: Pearson correlation coefficient between self-report and objectively measured height and weight: 0.98. Lin's Concordance correlation coefficient were for weight 0.98951 (IC95% 0.9792 – 0.99) for height 0.9626 (IC95% 0.9479 – 0.9732)
Conclusion: Findings provide support for the utility of self-report height and weight, self-reported values can be used in surgical patients that can't be measured.
References:
Anesthesiology. 2009;110(4)759-765.
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14AP05-4
Do Obese patients encounter different types of problems during anaesthetic compared to Non Obese?

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Background: The BIGAA (Bariatric Issues in General Anaesthesia relating to Airway) study explored issues relating to airway management in obese patients.
Methods: BIGAA was a prospective observational study running in 39 hospitals affiliated to Pan London Research and audit network (PLAN). Data was collected for adult elective cases. Complications were grouped into 'induction and perioperative' and 'recovery'.
Results: 1874 cases submitted to BIGAA . 32% patients were obese. Overall complication rate in obese patients(O)was significantly greater than non-obese(NO). (8.1%vs3.4% p=0.000011).
Induction problems occurred significantly more in O (5.54%vs2.59% p=0.0012, OR 2.2 (95% CI 1.3-3.6)). See Table1.

Problem Type	Incidence in O (%)	Incidence in NO (%)	OR (95% CI)
Airway Trauma	0.50	0.08	6.5 (0.7-62.2)
Aspiration	0.17	0.00	6.4 (0.3-158.4)
Problem with SAD	2.01	0.86	2.4 (1.0-5.4)
Desaturation	2.01	0.63	8.7 (2.5-31.1)
Difficult intubation	0.84	0.86	1.0 (0.3-2.8)
Oesophageal Intubation	0.00	0.08	0.7 (0.0-17.6)

Problems at recovery were more likely to occur is O but not significantly. (2.52% vs 0.78% p=0.002, OR 3.3 (95% CI 1.3-8.0)). See Table2.

Problem Type	Incidence in O(%)	Incidence in NO(%)	OR (95% CI)
Airway Trauma	0.34	0.23	1.07 (0.2-5.9)
Desaturation	2.01	0.23	8.7 (2.5-31.1)
Failed BVM	0.00	0.08	0.7 (0.0-17.6)
Reintubation	0.00	0.08	0.7 (0.0-17.6)
Respiratory Arrest	0.00	0.08	0.7 (0.0-17.6)
Unplanned ITU	0.17	0.08	2.1 (0.1-34.4)

Conclusion: BIGAA found that the overall incidence of problems was significantly higher in O. Notably desaturation <90% was significantly more likely in O at recovery. The incidence of difficult intubation was similar between groups.
Using BMI to predict the type of anaesthetic problem our patients may experience, could allow us to plan accordingly and mitigate incidents.

14AP05-5
Minute ventilation of obstructive sleep apnea patients and risk of postoperative hypoventilation

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Background: Patients with obstructive sleep apnea (OSA) are at increased risk of postoperative respiratory complications, and are often monitored longer for adequate ventilation in the post-anesthesia care unit (PACU). Here we measured minute ventilation and the incidence of hypoventilation in OSA and non-OSA patients using a respiratory volume monitor (RVM) to predict which patients would continue to experience hypoventilation in a lower acuity environment.
Methods: A RVM (ExSpiron, Respiratory Motion Inc., Waltham, MA) was used for up to 48 h post-surgery to measure minute ventilation (MV) as a percentage of predicted MV (MV_{PRED}), based on body surface area and sex. Low MV events (LMVe) were used as indicators of hypoventilation, and were defined as MV<40% of MV_{PRED} sustained for ≥1 m in the PACU or ≥2 m on the general hospital floor (GHF). Patients were separated into groups based on predicted risk of LMVe and OSA diagnosis. Patients with no LMVe during the final 1 h in PACU were "Not-At-Risk" on the GHF, while patients with ≥1 LMVe were "At-Risk".
Results: Out of 293 patients, 16 (5.5%) had an OSA diagnosis. OSA patients had almost equal % of MV_{PRED} in the PACU (90 vs 89%) and on the GHF (97 vs 101%) as those without OSA. However, OSA patients had significantly higher LMVe rate (1.13 vs 0.29 LMVe/h, p=0.008) compared to non-OSA patients (Fig 1). Only 3 out of 16 OSA patients were "At-Risk" of respiratory compromise on GHF. For the non-OSA population only 29 out of 277 were "At-Risk". "Not-At-Risk" OSA patients did not have any LMVe in the PACU, and continued to have significantly lower LMVe rate on the GHF compared to "At-Risk" OSA patients (0.06 vs 1.48 LMVe/h, p<0.001).
Conclusions: OSA patients were more prone to low minute ventilation; however, this was attributed to particular "At-risk" OSA patients. This study suggests that the majority of OSA patients maintain adequate ventilation, while only a smaller percentage warrant further monitoring and a higher acuity environment. MV monitoring could be used to identify patients with sufficient ventilation in order to discharge them earlier, while continuing to monitor at-risk patients.

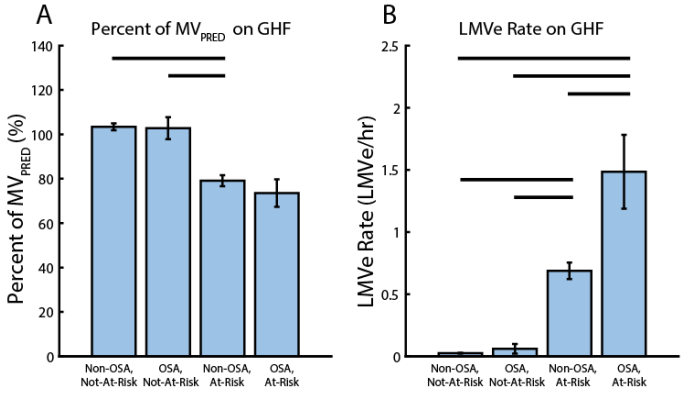

Figure 1. A) The MV, measured as the percent of MV_{PRED}, for each of the four groups during their stay on the general hospital floor (GHF). Horizontal lines indicate statistically significant differences between groups ($p < 0.01$). **B)** The low minute ventilation event (LMVe) rate on the GHF for each of the four groups. Horizontal lines indicate statistically significant differences between groups ($p < 0.001$).

14AP05-6
Comparing low minute ventilation in the PACU and clinical criteria as predictors of respiratory depression on the hospital floor

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Background: Opioids are often used to manage pain postoperatively, but can result in opioid-induced respiratory depression. Preoperative and demographic data are currently used in clinical practice to identify patients at risk of respiratory depression. Here we used a non-invasive respiratory volume monitor (RVM) that directly measures minute ventilation to identify patients in the PACU who are at risk of respiratory depression on the general hospital floor (GHF).
Methods: Patients were monitored with an RVM (ExSpiron 1Xi, Respiratory Motion Inc., Waltham, MA) for up to 48 h on the GHF following abdominal surgery. The RVM recorded minute ventilation (MV), expressed as percent of MV predicted based on body surface area and sex. A Low MV event (LMVe) was defined as MV <40% MV predicted sustained for ≥1 min. Patients who had 0 LMVe in the last hour of PACU stay were considered not-at-risk, while those with ≥1 LMVe were at-risk. Patients were also classified as at-risk based on ASA physical status, BMI, OSA history, low respiratory rate (RR), pulmonary disease, sex, and age. Receiver operating characteristic (ROC) curves were generated for each classifier's ability to predict patients with ≥0.5 LMVe/h on the GHF.
Results: 293 patients (149 males, Age: 47.8±15.1 yrs, BMI: 26.4±4.8 m^2/kg) were monitored for 2.9±1.4 h in the PACU and 43.5±9.4 h on the GHF. At-risk patients (n=32) experienced 100x higher LMVe rate in the PACU and 28x higher LMVe rate on the GHF (p<0.001). LMVe in the last hour of the PACU had 100% sensitivity and 95% specificity in predicting patients with ≥0.5 LMVe/h on the GHF. Demographics, preoperative information and RR monitoring generated ROC curves equivalent to a random classifier (Fig 1).
Conclusions: Minute ventilation monitoring in the PACU was able to identify with high sensitivity and specificity the small percentage of patients who developed respiratory compromise on the hospital floor. Conversely, the use of demographics, preoperative information and respiratory rate monitoring did not yield useful predictive information. By identifying patients at risk of respiratory early on clinicians can modify opioid dosing and patient monitoring.

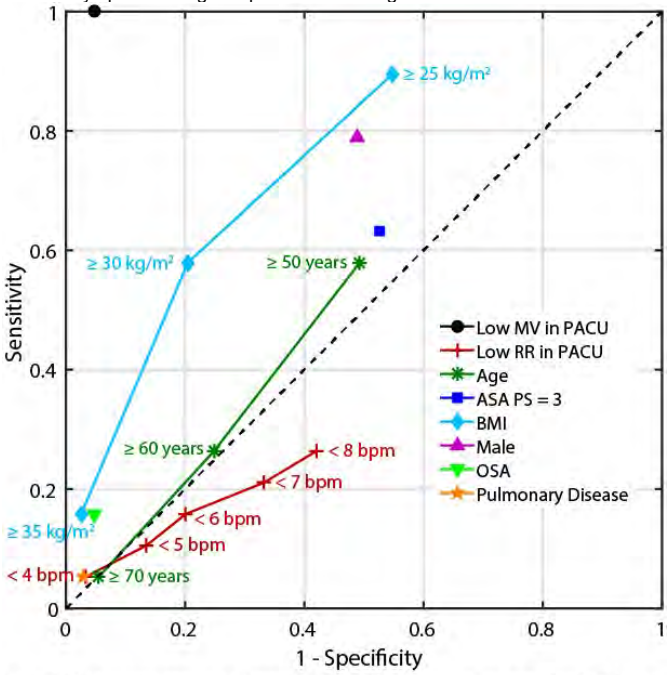

Figure 1. Receiver operator characteristic (ROC) curves comparing the ability for a variety of factors to predict whether a patient will have ≥ 0.5 LMVe/h on the general hospital floor. ASA PS: American Society of Anesthesiologists Physical Status; OSA: Obstructive Sleep Apnea.

14AP05-8
The comparison of optimal timing for intravenous cannulation during sevoflurane induction between healthy children and children with developmental disabilities.

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Background and the Goal of Study: Sevoflurane induction of anesthesia is a widely used technique in pediatric patients. However, too early attempt to place an IV line immediately after the loss of consciousness could result in patient's movement or respiratory complications. Especially, appropriate depth of general anesthesia in children with developmental disability might depend on their own conditions, which may result in abnormal neuronal activity. The aim of this study was to compare the relationship between healthy children and children with developmental disability in the optimal timing for IV cannulation at sevoflurane induction of anesthesia with or without nitrous oxide, retrospectively.
Materials and Method: The study period was from April 2012 until October 2018. Patients were children aged 4-15 yrs who underwent oral maxillofacial surgery under general anesthesia. Patients were divided into 2 groups; healthy children (Children group) and children with developmental disability (Disability group). Additionally, they were divided again with or without nitrous oxide. The following parameters were recorded patient's backgrounds, time for IV cannulation, end-tidal sevoflurane concentration at IV cannulation and the use of nitrous oxide.
Results and discussion: One hundred seventy patients were suitable for this study. There were no significant differences in demographic data among 4 groups. When nitrous oxide was not used, the end-tidal sevoflurane concentration was 5.1±1.1% in Children group (n=55), and 4.9±1.3% in Disability group (n=55). When nitrous oxide was used, the end-tidal sevoflurane concentration was 4.2±0.7% in Children group (n=30), and 4.1±0.7% in Disability group (n=30). There was no significant difference between these groups. In both groups, however, nitrous oxide significantly decreased end-tidal sevoflurane concentration ($p<0.05$). However, there were no significant differences in cannulation time. Children group without nitrous oxide took 349.3±151.7s and Disability group without nitrous oxide took 381.1±263.9s. Children group with nitrous oxide took 346.0±206.5s, and Disability group with nitrous oxide took 338.7±185.7s.
Conclusion: Nitrous oxide could significantly decrease the end-tidal sevoflurane concentration in both Children group and Disability group at optimal timing for IV cannulation. However, our retrospective data showed that nitrous oxide could not shorten the cannulation time in both groups.

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14AP05-9
Aspiration of Bismuth Subgallate from the Post-Nasal Space after Adeno-Tonsillectomy

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Background: Bismuth subgallate (BSG) is a heavy metal compound applied topically to enhance haemostasis after adeno-tonsillectomy. Reports of BSG aspiration are scanty in the literature, and in cases that are reported, the resultant respiratory difficulty did not require endotracheal intubation (1).
Case Report: A 6 year old boy ASA 1 presented for an elective adeno-tonsillectomy. The patient was intubated uneventfully using a size 5.0 endotracheal tube, cuffed at 20 cmH2O. Anaesthesia was maintained using sevoflurane, fentanyl, oxygen and air. No muscle relaxant was used. The patient was spontaneously ventilating and vitals remained stable throughout. Electrocautery was used for the tonsillectomy with sharp dissection of the adenoids. During surgery, BSG was applied to the tonsil beds and the nasopharynx. The oropharynx was thoroughly cleared by the surgeon before extubation. After surgery the patient was extubated in a deep plane of anaesthesia in lateral position, and maintained spontaneous breathing. After few minutes he manifested a sudden airway obstruction followed by respiratory arrest and desaturation. Bag-mask ventilation with 100% FiO2 was performed with negligible air entry. On suctioning, a considerable amount of BSG was removed. The child was re-intubated following a bolus of propofol and suxamethonium and SpO2 returned to >96% on 100% FiO2. A pulmonary suction catheter aspirated BSG from the trachea. The child was subsequently extubated in a light plane of anaesthesia, manifesting cough and need for supplemental O2 to maintain SpO2 > 96%. He was transferred to the recovery room for two hours and returned to the paediatric ward where he had an uneventful postoperative course. He was discharged home after 1 day of hospitalisation.
Discussion: Previous documented cases of BSG aspiration (1) described respiratory difficulty, reduced oxygen saturations in the recovery room but this is the first documented case of complete upper airway obstruction.
References:
1) Murray AD et al. Respiratory Difficulty Following Bismuth Subgallate Aspiration. Arch Otolaryngol Head Neck Surg. 2000;126(1):79–81.
Learning points: Our case demonstrates a rare cause of upper airway obstruction following adeno-tonsillectomy. It is our hypothesis that BSG applied in the post-nasal space was aspirated by the child following extubation. This has been discussed within our department and its use in this regard will be reviewed.

14AP06-1
Effects of "anesthesia report cards" on provider performance and clinical outcomes

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Objective: We investigated anesthesia provider compliance after implementation of quality reporting metrics and its effects on postoperative complications. We hypothesized that there would be increased compliance after implementation of intraoperative management guidelines for various anesthesia performance metrics. Compliance was gauged by monthly "report cards" comparing individual performance to benchmarks on selected metrics. The effects of improved compliance in these anesthesia performance metrics was assessed by correlation with postoperative outcomes.
Methods: Our department implemented a program to capture and report quality metrics. After staff education, individualized monthly "anesthesia report cards" were sent to all anesthesia providers, detailing individual compliance rates for a set of 14 quality measures (Table 1).For each measure, the proportion of cases which passed the measure before and after implementation of the program was compared using a two-sample proportion test. To examine whether program implementation decreased the rate of complications, the proportion of complications pre- and post-program implementation was analyzed using Fisher's Exact test.
Results: We analyzed 14 quality metrics in our dataset. 6 demonstrated statistically significant improvement in compliance ($p<0.05$) (Table 1). Of these, BP-02, NMB-01, PUL-01, PUL-02, and TEMP-02 had statistically significant improvement to $p<0.001$.We also found a statistically significant decrease in any complication (experienced within 7 days of service) in the post-program group (N=142, 5.5%) as compared to the pre-program group (N=294, 7.6%).This was statically significant to an adjusted p-value of 0.003 (Table2).
Conclusion: After implementing a comprehensive anesthesia quality improvement program, we observed significant improvements in anesthesia performance metric compliance for several process measures. Additionally, we found that these improvements were associated with a decrease in any postoperative complication (experienced within 7 postoperative days). Future work is needed to determine if this initial success can be preserved as well as replicated at institutions beyond our own.

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14AP06-2
Introducing the AAGBI Quick Reference Handbook: local staff survey and lessons from the implementation process

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Background and Goal of Study: The Association of Anaesthetists of Great Britain and Ireland (AAGBI) has recently made available a set of guidelines for crises in anaesthesia termed the Quick Reference Handbook (QRH), a freely available resource which is based on similar initiatives in the United States and elsewhere. [1] It is customisable under a Creative Commons licence. The key components of the QRH are (a) a customisable list of where to find emergency equipment and (b) a set of evidence-based guidelines for managing various emergency situations. We sought to establish the need for the QRH at our 650-bedded district general hospital which has a total of 19 theatres split across three theatre complexes.
Materials and Methods: All members of the anaesthetic department were asked to complete a survey in October 2018. The survey was designed to assess self-reported (a) knowledge of where to find emergency equipment and (b) confidence in managing the various emergency situations to which the QRH guidelines pertain.
Results and Discussion: A total of 33 members of the anaesthetic department took the survey, almost 50% of whom were consultants. Good knowledge of where to find core emergency equipment such as the difficult airway trolley, cardiac arrest trolley, videolaryngoscope and front-of-neck access kit was almost universal. Knowledge of where to find less commonly needed items such as cell salvage, the jet ventilator, cooled fluids/ice, flexible scopes and evacuation points was poorer with only 10-20% of anaesthetic staff confident that they could locate these items. Most staff were confident they could manage scenarios such as cardiac arrest, hypoxia, arrhythmias and hypo/hypertension without reference to guidelines. Confidence in managing emergency evacuations, tamponade, malignant hyperthermia, oxygen/electrical failure and patient fire was weaker (<75%). All respondents indicated their desire for the QRH to be locally implemented.
Conclusions: Our survey demonstrated a pressing need to introduce the QRH in order to ensure that accurate guidance was easily accessible, particularly for rare but serious anaesthetic or hospital-wide crises. This survey led to the introduction of the QRH to our hospital. We advocate a low-complexity solution in order to ensure that updates can be easily and cheaply incorporated.
References:
1. AAGBI. Quick Reference Handbook [online]. Available from URL: http://www.aagbi.org/qrh [last accessed 14 November 2018].

14AP06-3
The culture of quality and patient safety in belgian anesthesia departments: room for improvement!

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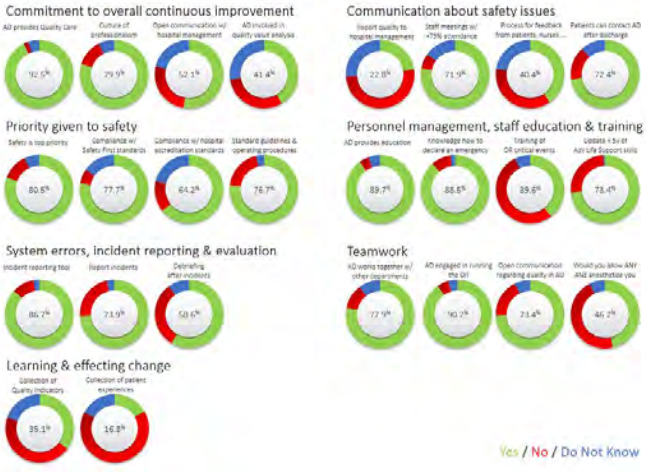
Background and Goal of Study: Quality and Patient Safety (QPS) is becoming increasingly important in the organization of healthcare. QPS in anesthesia is guided by the 'Safety First' standards of the Belgian Society of Anesthesia-Resuscitation. However, compliance with the standards is not the synonym of a good culture of QPS. The goal was to assess the culture of QPS within Belgian anesthesia departments (AD).
Materials and Methods: A SurveyMonkey® survey was open for all Belgian anesthesiologists (ANE) between March 1st and April 8th, 2018. The study was approved (n° B012201835189) by the Committee for Medical Ethics of az Sint-Blasius. All data were acquired anonymously. Questions were assigned to dimensions of the Manchester Patient Safety Culture Assessment Tool. Subgroup analysis was done for experience (n years after graduation) and AD size (n ANE, including trainees). Chi-square and Fisher Exact tests with p<0.05 are statistically significant.
Results and Discussion: 425 of 3073 ANE answered the survey. 26 incomplete answers were excluded. 399 (13%) completed the survey. The results are displayed below. Trainees lack knowledge about communication w/ and reporting quality to management, involvement in quality analysis, compliance with national and hospital accreditation standards (all p<0.0001), communication within AD, collection of quality indicators (QI) (all p<0.01) and patient experience data, processes that allow for feedback, and if patients can contact the AD (all p<0.001). Experienced ANE show more knowledge about communication w/ management (p<0.0001) and consider more often patient safety a top priority (p<0.001). Larger AD show more standardization and communication w/ management (p<0.0001), and collect more often QI and patient experience data (p<0.05).
Conclusions: Although ANE believe that they provide high quality care, this survey reveals several gaps. Communication with hospital management and within AD could be improved. As continuous improvement starts with collecting data, AD should start to collect data about QI and patient experience. Trainees lack knowledge about QPS, so QPS education should be more integrated in their training.



14AP06-4
Failure mode and effects analysis (FMEA) of the intraoperative anesthetic process in cardiac surgery at Clinico San Carlos Hospital. Madrid.

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Background and Goal of Study: The failure mode and effects analysis (FMEA) has been used as a tool in proactive risk management and patient security improvement. The goal of this study is to identify the weaknesses in the anesthetic processes related to the intraoperative cardiac surgery patient, in order to improve the safety of the patient undergoing usual procedures.
Materials and Methods: A multidisciplinary team was created to analyze each of the critical points, identified as possible failure modes, in the anesthetic process of cardiac surgery. For each failure mode, the possible causes and effects were identified, criticality was calculated using the risk priority number and the possible corrective actions were discussed. After the implementation of the corrective actions the final RPN was calculated in order to evaluate their impact on the process.
Results and Discussion: Eight sub-processes or phases were defined in the process. Starting with the arrival of the patient to the surgical ward until the patient is transferred to the Critical Care Unit. The FMEA identified 128 failure modes, being the administration of IV drugs and IV infusions sub-processes the most likely to generate errors. Improvement actions were taken when the risk of the failure mode was high (Risk priority number > 200).
We proposed 23 improvement actions established in the AMFE to be implemented in 46 risk situations. The improvement actions could not be implemented in only 8 failure modes, mostly depending on hospital management. The improvement actions that did not need budget increases were easily implemented. These measures were those depending on changes in work procedures and protocols in the surgical ward. Afterwards, we analyzed again the process and we observed a decrease in the occurrence of the failure modes and an improvement in the frequency of the error detection (reduction in the value of risk priority numbers).
The improvement actions that were successful were those depending on changes in work procedures and protocols in the surgical ward. Those depending on hospital budget are in standby.
Conclusions: The FMEA is a useful tool in proactive risk management because it allows us to identify where we are making mistakes and analyze the causes that originate them, to prioritize and to adopt solutions to risk reduction.
The FMEA improves process safety, team work and promotes safety culture.

14AP06-5
My value on my safe surgery "MVOS", an user-driven toolset for improving surgical safety. A pilot project.

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Background and Goal of Study: To involve the patient in his scheduled surgical process by improving the transmission of information given by doctors about the care required for getting a safe surgery. We evaluate the ability of MVOS to make patient aware of the importance to be involved in surgical preparation, to relieve stress associated with the surgery and to decrease surgical cancellations and health costs due to poor preparation.
Materials and Methods: MVOS is a multidevice toolset designed by a group of anesthetists of the national healthcare system in collaboration with SENSAR (Spanish System of Notification and Safety in Anesthesia and Resuscitation). MVOS educates every kind of patients scheduled for surgery through passive interaction (associative messages on waiting room screens and brochures) and/or active participation (app and web). MVOS provides guidelines and recommendations for the specific surgery preparation and its recovery. In order to test the tool, a prospective observational study was conducted with two groups of patients (without MVOS and with MVOS) which was compared by a survey conducted in two different scenes: in pre-anesthetic consultation 105 patients without and 131 with MVOS and in operating room 93 patients without and 89 with MVOS, between May 1 and August 31, 2018. The patient must answer freely a questionnaire in which there are three possible options YES, NO or DO NOT PROCEED and it is evaluated the difference of the number of YES responses with and without MVOS. It is analyzed surgical cancellations before and after MVOS. A frequency difference analysis was performed with Pearson Chi-square and a descriptive study with ANOVA.
Results and Discussion: MVOS improved in a significant way (p<0'05) the preparation for pre-anesthetic visit in 3 of the 5 aspects analyzed and in the preparation for surgery in 3 of the 7 aspects analyzed. Also, it is showed its capability for relieve stress and improvement customer satisfaction with surgical process by more than 80 percent. Surgical cancellations due to medical reasons were halved.
Conclusions: The involvement of the patient in his intervention by enhancing the communication with doctors improves its preparation and reduces stress which influences on increasing surgical safety and lowering costs.

14AP06-6
Prospective Observational Study on the Anaesthesiology On-Call Team Activity in a Tertiary Hospital

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Background and Goal of Study: On-Call anaesthesiologists have increasing responsibilities that are often underestimated leading to exhaustion and burnout. Aim of the study was to analyse their on-call activity over the last 4 years (2014-2017) in a tertiary hospital.
Materials and Methods: This prospective, observational, descriptive study recorded the anaesthesiologist's on-call activity with an anonymous survey at the end of every shift. Six working areas were identified: ICU (12 beds), Labour Ward (LW), OR (2), Pain Management (PM), Outside Anaesthesia (OA) and Cardiopulmonary Resuscitation/Traumatic Patient Management (CPR/TPM). Resident's sleep hours and quality (≥ 3 interruptions at night) were also registered. Data are presented in percentages and mean values.
Results and Discussion: 1175 questionnaires were analysed (80% response rate). Results for every year are presented in the following table:

Year	2014	2015	2016	2017
Patients in ICU $\bar{x}$	8.07	8.01	8.85	8.99
ICU Admissions $\bar{x}$	0.7	0.97	1.02	1.11
ICU Consults $\bar{x}$	0.37	0.81	1.54	1.28
Epid. Reinjections $\bar{x}$	3.51	2.21	2.08	2.2
Epid. PCA $\bar{x}$	0.34	0.82	0.86	0.76
C-Sections $\bar{x}$	0.69	0.61	0.64	0.6
Number of Surgeries $\bar{x}$	4.11	4.19	3.89	2.57
OA procedures $\bar{x}$	1.55	1.88	1.5	1.48
CPR/TPM $\bar{x}$	0.43	0.79	0.72	0.66
PM Consults $\bar{x}$	0.84	0.71	0.7	0.48
Residents Sleep > 5h %	33.5	29.5	17.5	16.6

$\bar{x}$/call %/year
ICU admissions and consultations had an upward trend with a decrease in resident's sleep which allowed us to obtain one extra staff on call and to open two more ICU beds. New pain protocols and introduction of PCA pumps in the LW decreased PM consultations and epidural reinjections.
Conclusions: Our on-call team works in high complexity areas requiring quick decision-making under increasing workload during the last 4 years. It is crucial to document their activity in order to adapt and optimise workload to the available resources and to increase patient's safety and quality of care.

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14AP06-7
Anesthesia quality and safety standards – are they being fulfilled outside the operating room?

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Background and Goal of Study: There has been a significant increase in the number and complexity of procedures performed outside the operating room (OR) requiring anesthesiologist's assistance. These locations may lack some of the safety and practice standards we require in the OR. With the aim to assess recommendations to the standards of care that ensure patient safety and the quality of our practice, we conducted an audit.
Materials and Methods: National SPA (Portuguese Society of Anesthesiology) and international ASA (American Society of Anesthesiology) safety and care standards regarding anesthesiology in remote location were reviewed. We assessed compliance to both guidelines in all out of the OR areas in our hospital -Bronchology, Electrophysiology, Gastroenterology, Hemodynamics, Intervention Radiology (IR), Magnetic Resonance Imaging (MRI), Reproductive Medicine (RM).
Results and Discussion:
Regarding ASA standards all units fulfilled most requirements. However, only 3 areas had an anesthesia machine equivalent to that employed in the OR and a system for scavenging waste anesthetic gases. Four locations didn't have the desirable amount of space and some lacked standardized devices: capnography was not available in RM; Bronchology and RM did not have defibrillator. All locations had an anesthesiologist, assisted by adequately trained staff and a suitable post anesthesia care unit.
Regarding SPA standards
Regarding pre-procedure standards we outline that only Hemodynamics had routine pre-anesthetic consultation.
In the intra-procedure only Bronchology and IR had equipment to monitor neuromuscular block and temperature was not regularly assessed in any unit. Difficult airway cart was only available in Bronchology.
In the post-procedure units some of the recommended equipment was not present: defibrillator was absent in 3 units; 3 units lacked forced air warmers; none had a difficult airway cart.
Conclusions: Most ASA and SPA standards are in compliance. There is qualified staff present in all units. Some areas lack monitoring and management devices. We will issue recommendations to comply with all of these standards in remote locations, conduct regular audits and acquire the necessary equipment.

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14AP06-8
Perioperative staff feedback of patient experience as a tool to improve safety culture.

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Background and Goal of Study: Job satisfaction, connection to purpose and meaning in work are closely linked with patient outcomes and experience. Healthcare has traditionally had a Safety I focus where teams look at harm but there is increasing evidence of the importance of understanding how we get things right (Safety II) and the beneficial effects of celebrating positive outcomes. Positive feedback is an essential means to understand the great work that teams perform, and as a counter to staff burnout.
Materials and Methods: Safety Culture was measured using the SCORE survey in the 30+ theatres and perioperative areas of a 900+ bed tertiary teaching hospital in the UK. Staff were asked to complete a simple questionnaire asking specifically about patient feedback. Iterative testing using paper questionnaires was used to create a patient experience template. This was converted to an electronic version on an iPad and tested for patient acceptance. Patient volunteers were identified and asked to participate in the project to test the feasibility of them collecting the data from patients. Previous work has piloted an electronic collection method but has not been sustained due to a lack of staff to collect the patient feedback. We are currently undertaking iterative testing of the use of patient volunteers to collect the perioperative feedback and identifying the best methods to feed this back to staff.
Results and Discussion: The safety culture response rate was 58% (526). It demonstrated that over 70% of staff reported work setting burnout and that over 60% of perioperative staff perceive that they do not receive frequent, meaningful, useful or positive feedback about the patients they care for. Further questioning identified that 100% of staff questioned would like more feedback on the peri-operative patient experience and 86% of staff agreeing with the statement that "Knowing more about patient outcomes would improve my job satisfaction" and 71% agreeing that "Knowing more about patient outcomes would improve theatre morale." We anticipate having full results of this for Euroanaesthesia 2019.
Conclusions: We believe that we will demonstrate the feasibility of using patient volunteers to collect perioperative patient experience to feedback to theatre staff. We hypothesise that this will have a positive effect on the theatre teams' working culture and decrease perceptions of burnout and has the potential to improve patient outcomes and experience.

14AP06-9
Does short time-periods of prewarming prevent perioperative bleeding?

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Background and Goal of Study: Perioperative hypothermia is a frequent complication in patients submitted to general anaesthesia. Its occurrence is associated to a higher perioperative bleeding. Preoperative warming prevents hypothermia, but its clinical effect on perioperative bleeding has not been elucidated. We aimed to assess the effect of different time-periods of prewarming in the prevention of hypothermia and its effect on reducing perioperative bleeding.
Materials and Methods: After the approval of the Ethics Committee, we carried out a prospective controlled study. Seventy-five male patients who had undergone laparoscopic surgery were included. Twenty-five patients were not prewarmed (control), prewarming was performed for 15min (p15) in 25 patients and for 30min (p30) in other 25 patients. The following data were recorded: age, weight, height, ASA physical status, basal temperature, duration of anaesthesia, intraoperative bleeding, intraoperative fluid therapy, operating room temperature, body temperature throughout the perioperative period and change between preoperative and postoperative haemoglobin values. Results among groups were analysed using SPSS 24.
Results and Discussion: Patients underwent prostatectomy (57%), nephrectomy (36%) and pyeloplasty (7%). No significant differences were found among groups regarding patients' characteristics, surgery, duration of anaesthesia, intraoperative fluid therapy or operating room temperature. Body temperature throughout the intraoperative period was significantly higher in p15 and p30 than in the control group ($p<0.005$). At the end of the surgery, the temperature in the control group was 35.81ºC, in p15 36.32ºC ($p=0.02$) and in p30 36.65ºC ($p=0.0001$). No statistically significant differences were found regarding temperature between p15 and p30. Although intraoperative temperatures were higher in p15 and p30 than in the control group, intraoperative bleeding was not different among groups (average 316±273, $p=0.42$). We did not find significant differences among groups regarding the change between preoperative and postoperative haemoglobin values ($p=0.84$).
Conclusions: Prewarming for 15 or 30min prevents hypothermia at the end of urological laparoscopic surgery. Nevertheless, these prewarming time-periods neither reduced intraoperative bleeding nor diminished the decrease in postoperative haemoglobin.

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14AP06-10
Comparative safety of different anesthetic techniques for gastrointestinal endoscopic procedures: A retrospective cohort study

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Background and Goal of Study: Propofol sedation is an effective and safe anesthetic technique that has replaced general anesthesia for endoscopic procedures. However, sufficient evidence for improved safety with propofol sedation is lacking. We compared the incidence of significant adverse events between adult patients scheduled for elective ambulatory gastrointestinal endoscopic procedures (GIEPs) using two different anesthetic strategies: anesthetist-performed sedation with propofol target-controlled infusion (TCI) and general anesthesia (GA) with sevoflurane. We also investigated the associations between potentially related variables and hypotension and hypoxia events in the propofol sedation group.
Materials and Methods: Medical records of 1,041 patients (age>18 years, American Society of Anesthesiologists physical status classification system : ASA I-III) undergoing elective ambulatory GIEP were retrospectively reviewed. Of them, 823 had received TCI propofol sedation during June–September 2018 and 218 had received GA with sevoflurane during September–December 2015 (historic control group). We compared the incidence of significant intraoperative adverse events between groups. These included hypoxia (arterial oxygen saturation<90%), hypotension (systolic blood pressure<90 mmHg), bradycardia (heart rate<50 bpm), requirement of vasoactive drugs, unplanned tracheal intubation or supraglottic device insertion, and need for advanced life support. A multivariable logistic regression model was used to identify associations between potentially related variables and hypotension and hypoxia events in the propofol sedation group.
Results and Discussion: Demographic characteristics were similar between groups. The GA group had a significantly higher incidence of hypotension (22% vs. 12.6%, $p=0.001$) and vasoactive drug requirement (26.6% vs. 19.2%, $p=0.016$); the difference remained significant after adjustment for potential confounders (age and ASA). In multivariable analysis for the propofol sedation group, colonoscopic procedures (OR 2.97, 95% CI 1.40-6.31) and higher propofol doses (mg/kg) (OR 1.14, 95% CI 1.02-1.29) were associated with hypotension events. Hypoxia incidence was higher in obese than in non-obese patients (12.5% vs. 4.98%, $p<0.001$). Advanced airway management was needed in 0.5% of patients under propofol sedation.
Conclusions: Propofol sedation with TCI appears to be a safer anesthetic technique than GA during GIEPs.

Geriatric Anaesthesiology

15AP01-1
Combined epidural-general anaesthesia compared with general anaesthesia reduces delirium after major surgery in older adults: a multicentre randomised controlled trial.

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Background and Goal of Study: Delirium is a common complication in the elderly after major surgery and is associated with worse outcomes. Compared with general anaesthesia, neuraxial block can effectively alleviate surgery-related stress response and inflammation. However, the impact of neuraxial block on delirium occurrence after surgery remains conflicting. The purpose of this study was to investigate whether combined epidural-general anaesthesia is superior to general anaesthesia in decreasing the incidence of postoperative delirium.
Materials and Methods: We did this multicentre, randomised controlled trial in 5 tertiary hospitals in Beijing. Patients were enrolled from November 21, 2011 to May 25, 2015. 1802 elderly patients (age range 60-90 years) who were scheduled to undergo major (≥2 hours) abdominal or thoracic noncardiac surgery were randomised to receive either combined epidural-general anaesthesia plus postoperative epidural analgesia (E-GA group) or general anaesthesia plus postoperative intravenous analgesia (GA group). Delirium was assessed twice daily using the Confusion Assessment Method for the Intensive Care Unit. The primary outcome was the incidence of delirium within 7 days after surgery, which was compared between the two groups using the Chi-squared test. The trial was registered with Chinese Clinical Trial Registry (ChiCTR-TRC-12002371) and ClinicalTrials.gov (NCT01661907).
Results and Discussion: Of the enrolled patients, 1720 completed the study and were included in the intention-to-treat analysis. The incidence of postoperative delirium within 7 days was significantly lower in the E-GA group than in the GA group [1.8% (15/857) vs. 5.0% (43/863); odds ratio [OR] 0.340; 95% CI 0.187-0.616; $P<0.001$]. Regarding secondary outcomes, the overall incidence of postoperative non-delirium complications within 30 days ($P=0.389$), the length of stay in hospital after surgery ($P=0.778$), and 30-day all-cause mortality ($P=0.175$) did not differ significantly between groups. Patients in the E-GA group developed more hypotension during surgery ($P=0.002$).
Conclusions: Compared with general anaesthesia plus postoperative intravenous analgesia, combined epidural-general anaesthesia plus postoperative epidural analgesia reduces the incidence of postoperative delirium in elderly patients after major noncardiac surgery.
Acknowledgements: Supported by a fund from Peking University Health Science Center (PUCRP201101).

15AP01-2
Risk factors and clinical outcomes of postoperative delirium in elderly patients after non-cardiac surgery: A prospective cohort study

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Background and Goal of Study: The incidences of postoperative delirium (POD) vary from 10-60%. Many preoperative and intraoperative factors have been reported as risk factors of POD. The purpose of this study is to determine the incidence, risk factors and clinical outcomes of POD in elderly patients undergoing non-cardiac surgery.
Materials and Methods: A total of 429 patients aged 60 years and older who underwent scheduled non-cardiac surgery between November 2013 and December 2014 were enrolled. Delirium was assessed using the Confusion Assessment Method algorithm and Confusion Assessment Method for Intensive Care Unit. Cognitive function was examined using the Mental Status Examination Thai 10 (MSET10) and Montreal Cognitive Assessment (MoCA) by two trained interviewers. Functional status was evaluated using barthel index of daily activity of living. Risk factors of POD were analyzed using binary risk regression analysis.
Results and Discussion: Forty-four patients (5.1%) developed POD. Hyperactive delirium was the most common (63%), followed by hypoactive (4%) and mixed subtypes (4%).The median duration of delirium was 1(1-2) days. Delirious patients had significantly lower preoperative MSET10 (19.2± 5.2 vs 22.6± 4.5, p<0.001), MoCA scores (13.4±4.4 vs 16.8±4.7, p<0.001) and barthel index (17.7±5.5 vs 23.1 ± 4.2, p= 0.002) than non-delirious patients. There were significant differences in mean barthel index scores of delirious patients at discharge compared to their preoperative scores (p< 0.001). Delirious patients had significantly higher incidence of intensive care unit admission (27.3% vs 3.7%, p<0.001), higher mortality rate (4.5% vs 0.2% (p = 0.004) and higher length of hospital stay (15.5(8-19) days vs 8(5-11) days,p<0.001).The independent risk factors of POD included age >70 years (RR:3.6,95% CI:1.3-9.6,p=0.013),preoperative cognitive impairment (RR:2.8,95%CI:1.1-7.0,p= 0.032),history of psychiatric disorder(RR:4.9,95%CI:2.2-10.7,p<0.001) and preoperative hemoglobin ≤10 g/dl (RR:2.5.95%CI:1.1-5.9,p=0.044) .
Conclusions: POD can cause higher morbidity and mortality. Identification of risk factors of POD could lead to correct some modifiable risk factors, use preventive strategies, and provide postoperative surveillance in order to minimize severity of POD and improve postoperative outcome.
Acknowledgements: This study was supported by a grant from the National Research Council of Thailand.

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15AP01-3
Genome-wide association study in older patients with postoperative cognitive dysfunction

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a common neurocognitive disorder after surgery, particularly in elderly patients. Numerous pathogenic pathways leading to POCD have been discussed. Various studies have suggested genetic risk factors. This prospective cohort study aimed to detect genome-wide associations with POCD in older surgical patients.
Materials and Methods: After ethical review board approval, study participants aged ≥ 65 years completed a battery of neuropsychological tests consisting of the Consortium to Establish a Registry for Alzheimer's Disease-Neuropsychological Assessment Battery, Trail Making Tests A and B, and the Phonemic Fluency Test (S-words) before and one week and three months after major noncardiac surgery. Test variables were converted into standard scores (z-scores) based on demographic variables (age, gender, and level of education). POCD was diagnosed if the decline was > 1 standard deviation of z-scores in two or more of the 15 variables in the test battery. A genome-wide association study (GWAS) was performed to determine potential alleles that are linked to the phenotype POCD.
Results and Discussion: Sixty-three patients with blood samples were included in the study. POCD was present in 47.6% of patients one week after surgery and in 34.2% of patients three months after surgery. Insufficient quality of blood samples and missing genotype data lead to the exclusion of 26 patients. In the remaining 37 patients, the GWAS was performed, but no association was found with POCD.
Conclusions: In this patient cohort, a GWAS did not reveal an association between specific genetic alleles and POCD one week and three months after surgery. Future genetic analyses should focus on specific candidate genes for perioperative neurocognitive disorders.

15AP01-4
The influence of the type of general anesthesia on the myocardial function and inflammatory response in the elderly

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Background and Goal of Study: The issue of prevention of cardiac complications during non-cardiac elective surgery in elderly is an actual problem. Decompensation of cardiac function in elderly may be cause of postoperative lethality, significantly increase the duration and cost of treatment. However, cardiac decompensation can be caused not only by the presence of concomitant cardiac diseases, but by inflammatory changes, initiated by surgery and anesthesia. The goal of study was to evaluate cardiovascular condition in elderly after intravenous versus volative anaesthesia and define the relationship with markers of Inflammatory Response.
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, Euroscore. TNF, IL-6, IL-10 in EDTA-plasma determined by enzyme immunoassay (set Biomedica) (1) preoperative, (2) 1-st day, (3) 5-s day. To control the cardiovascular condition we used echocardiography, ECG-monitoring and central hemodynamics analysys by thoracic rheography. As a marker of myocardial damage was used troponin I by cytotest. Data are presented as M±m, statistically significant value of p< 0,05.).
Results and Discussion: Echocardiography did not show significant changes of the main parameters in patients during of the perioperative period. Baseline hemodynamic parameters were not statistically significantly different. In the group after total intravenous anesthesia were significant afterload reduction with a significant tachycardia. Inhalation anesthesia due moderate and gradual decrease in afterload without developing tachycardia and stable mean blood pressure. After anesthesia, the level of IL6 in the group with intravenous anesthesia was significantly higher and increased near to 2651% (p = 0.002). TNF alpha also increased significantly in the group with intravenous anesthesia from 1 day and slightly decreased by 5 days. The concentration of anti-inflammatory cytokine 10 increased in inhalation group. In several patients with intravenous anesthesia, we also found a positive troponin unchanged on the ECG.
Conclusions: The use of inhalation anesthesia in the elderly allows maintaining central hemodynamic parameters in optimal mode, accompanied reduction of markers of inflammatory response, as well as the absence of a marker of myocardial damage.

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15AP01-5
Characterization of intraoperative hypothermia in the elderly surgical population

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Background: Demographic changes suggest a dramatic growth in elderly patients undergoing surgery. Hypothermia is a common perioperative complication, even when mild is associated with perioperative complications. Age>65y and male gender were reported to be predictive factors for intraoperative hypothermia in addition to severity of illness, anemia, chronic renal failure, unintended weight loss and Alzheimer's disease. Still, knowledge regarding the occurrence of hypothermia in different age groups is scarce. Thus in a prospective study we aimed to evaluate the rate and progress of hypothermia in the super-elderly (age>80) vs. the elderly (age 65-80).
Methods: Consenting patients, aged>65 undergoing surgery under general anesthesia that spent>2 hours in the operating room (OR) were recruited. Data including demographics, medical history and type and duration of surgery were collected. Temperature (Temp) in various times through the perioperative period was assessed: 1. Baseline (in the department) before arriving the OR; 2. Within 30 min of anesthesia induction; 3. Delta between baseline and first OR Temp; 4. The lowest in the OR (nadir); 5. First in the recovery room (RR) (within 30 min); 6. Area under the curve (AUC) for Temp<36°C during surgery.
Results: 190 patient were recruited, 127 aged 65-80 (72.1±3.8) and 63 aged>80 (85.3±3.9). There were no differences in demographics, type and duration of surgery between groups. Baseline Temp were similar between groups. The incidence of intraoperative hypothermia (Temp<36°C) and severe hypothermia (Temp<35.5°C) was not significantly different between the groups (77.2%, 76.2% and 52.8%, 55.9% in the elderly and super elderly, respectively). No differences were found between the groups in any of the measured parameters, except for the first Temp in the RR which was significantly lower among the super-elderly (36.1±0.6 vs. 36.3±0.44 p=0.02). The highest drop in Temp for both groups was from baseline to first following induction of anesthesia (~1°C).
Conclusion: Intraoperative hypothermia is common in the elderly population. Perioperative heat loss patterns are similar in the elderly and super-elderly population. The significant difference in the first Temp in the RR might suggest that for the super-elderly it is harder to re-warm after reaching the nadir temperature. Thus, we should be very strict about preventing temperature drop in all patients but specifically more in the super-elderly.

15AP01-6
NIRS in the frail elderly with hip fracture: a case report

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Background: Anesthetic management of hip fracture (HF) in frail elderly patients is a challenge given the significant morbi-mortality associated with it[1]. There is evidence that near-infrared spectroscopy (NIRS) may be useful in this setting[2]. We present the case of an elderly woman admitted for HF surgery who developed neurocognitive dysfunction preoperatively, where NIRS helped to guide resuscitation and postoperative neurological improvement.
Case Report: A 100 year-old woman with a history of hypertension and mild chronic renal failure was referred for surgical repair of an intertrochanteric femoral fracture. Her previous cognitive status allowed her to be independent for basic life activities; however, she arrived to the operating room with a Glasgow Coma Score of 8 (M5 V2 O1). Standard monitoring according to ASA and cerebral oximetry (INVOS-Somanetics®) were used. With baseline arterial pulsioximetry of 83%, left/right NIRS values were 45/48. After oxygen, 50 mcgr fentanyl administration, fascia iliaca compartment block and spinal anaesthesia, NIRS increased to 58/64. Further increase to 61/65 was achieved with red blood transfusion (Figure 1). In the recovery room the GCS was 14 (M6 V5 O3). She was uneventfully discharged 7 days later.
Discussion: Brain tissue oximetry has been reported to improve neurological postoperative outcome in patients undergoing arthroplasty[2]. Intraoperative desaturation has been associated with perioperative neurocognitive disorders (PND), especially in the frail elderly3. Absolute values under 50 or a relative decrease of 20% or more from baseline values should warn us of either hypoxia, hypoperfusion or anemia[2]. The improvement in our case was a result of a drop in sympathetic outflow with analgesia, further enhanced by an increase of oxygen delivery after fluid therapy and transfusion. These measures translated into evident neurological improvement.
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Learning points:
-Anaesthetic management determines outcome in the frail population.
-PND may be associated with inadequate perioperative cerebral oxygenation.
-NIRS values reflect DO2/VO2 balance. NIRS might guide resuscitation and could be associated with better outcomes.

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15AP01-7
Is it too late to blame the cement? A Case Report

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Background: Bone cement implantation syndrome (BCIS) is a poorly understood phenomenon and currently has no agreed definition.1 Usually, it occurs at the time of cementation, prosthesis insertion, reduction of the joint or deflation of a limb tourniquet. Its presentation may be hypotension, hypoxia or even cardiovascular collapse.1,2 However, sometimes patients only have manifestations later on. Can we still blame the cement?
Case Report: 84-year-old female with femoral neck fracture, proposed for hip arthroplasty. Relevant medical issues included hypertension, severe aortic stenosis with pulmonary hypertension, dyslipidemia and hypothyroidism. While waiting for the surgery schedule, she developed a type II respiratory failure due to an aspiration pneumonia, accompanied by an acute pulmonary edema, atrial fibrillation with rapid ventricular response and acute renal failure. After clinical stabilization in an Intermediate Care Unit, she was submitted to a cemented hip arthroplasty under combined anaesthesia (general and femoral block).Five minutes after cement application, hypotension set in, treated effectively with phenylephrine bolus. No surgical intercurrences reported. A few minutes after extubation severe hemodynamic instability occurred, leading to an impending cardiac arrest situation, treated with adrenaline bolus and noradrenaline infusion, airway was immediately secured. She stayed for 12 days in an Intensive Care Unit, and was afterwards transferred to trauma ward.
Discussion: BCIS may have a delayed presentation hence its clinical presentation may be misinterpreted. Because data concerning this syndrome is rare, this report intends to highlight the importance of a through preoperative assessment with recognition of high-risk patients: grade III or IV ASA levels, old age, poor pre-existing physical reserve, significant cardiac disease, pre-existing pulmonary hypertension and concomitant hip fractures. Preoperative optimization and modification of surgical technique, including the type of prosthesis, may help reducing cardiopulmonary compromise.
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Learning points: BCIS effects may be reduced by identifying high-risk patients and tailoring techniques to individual patients' condition.

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15AP02-1
FRailty, surgical and Anaesthetic Complications in older adults undergoing urologic surgery: the FRAC study.

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Background and Goal of Study: In older adults, frailty, a marker of biological age, predicts negative outcomes in different pathologic conditions and related interventions. In anaesthesia, the ASA Physical Status Classification is widely used to predict risk, but might have ceiling effects. We evaluated if, in the preoperative visit, an easy assessment of physical performance, a marker of frailty, is associated with complications after urological surgery.
Materials and Methods: Cohorts study. Population: patients>70 years old undergoing scheduled urological surgery. We measured physical performance using the Short Physical Performance Battery (SPPB, a quick clinical tool integrating gait speed, balance and strength tests) in the preoperative evaluation (<10 indicates frailty), plus demographic data, comorbidity, cognitive function (Mini-Cog), frailty using the visual Clinical Frailty Scale (CFS), physical activity (in Metabolic Equivalent of Tasks) and ASA classification. Outcome: surgical complications at discharge (Clavien-Dindo scale), and surgical-medical medical complications at 30 and 90 days.
Results and Discussion: During 2017 we enrolled 187 patients (mean age=78.3, 95%CI=77.3-79.1; 79% male, 59.3% ASA 3-4); 47% were frail according to SPPB. An SPPB<10 was not associated with complications at discharge, but independently predicted 30 (OR=1.9, 95%CI=1.01-3.5) and 90 days (OR=1.9, 95%CI=1.001-3.41) postoperative complications as well as mortality (OR=9.2, 95%CI=1.1-76.2), after adjusting for age, gender, cognitive function, CFS, METs and ASA.
Conclusions: In our sample of older adults undergoing urologic surgery, physical performance independently predicts complications. If these results are confirmed, SPPB could be an informative, useful, easy and cheap tool in the preoperative evaluation of these patients.

15AP02-2
Enhanced recovery care after colorectal surgery versus standard care in elderly patients

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Background and Goal of study: It has been demonstrated that Enhanced Recovery After Surgery (ERAS) programs in colorectal surgery reduce complication rates and hospital stay; these better outcomes reduce costs. However, the feasibility of this programs in elderly patients has been questioned. The aim of this study is to analyse complication rate in elderly patients underwent colorectal surgery in ERAS protocol and compare them with standard care patients (before ERAS implantation)
Materials and Methods: We compared two groups:
-Non- ERAS group (retrospective): 9 patients more than 80 years (5 men /4 women) between January 2015 and December 2015 previous to protocol implantation.
-ERAS groups (prospective): 39 patients more than 80 years (20 men/ 19 women)
We analysed complication rate based on Clavien-Dindo (CD) classification, readmission and postoperative hospital stay. We stablished objective discharge criteria (solid oral tolerance, pain control with oral analgesics, deambulation, gas/ stool output, no nausea, correct stoma self-care, no postoperative complications, PCR <50 and wanted discharge), and evaluate rate of patients who reach them at postoperative 5 day, and the real discharge rate on postoperative day 5.
Results and Discussions: Non- ERAS group, mean age of 83.9 ±2.1 years (laparoscopic 44.4%, rectal surgery 22.2%). Complication rate, classified in CD I, II, III, IV, V was 55.6%, 88.9%, 22.2%, 33.3% and 0%. Urinary tract infection was present in 44.4%. Postoperative hospital stay was 11.8±8.7 days. Readmission rate was 11.1%. 22.2% of the patients fulfil discharge criteria but finally only 11.2% were discharged.
ERAS group was formed by 39 patients with a mean age of 82 ±7.78 years (laparoscopic 69.2%, 30.8% rectal surgery). About 56.5%, 25.6%, 10.3%, 12.8% and 0% of patients had a Clavien-Dindo I, II, III, IV and V complications respectively. Comparing with group A, urinary tract infection was present in 2.2%. Postoperative hospital stay was 11.6±8.5 days. Readmission rate was 12.6%. 30.8% fulfil the discharge criteria on day 5 but were finally discharged 25.6%.
Conclusion: It seems that older patients have less complicate postoperative period within ERAS protocol. However, this fact has apparently no impact on postoperative hospital stay. There were no differences in readmission.

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15AP02-3
Enhanced recovery care after colorectal surgery in elderly patients

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Background and Goal of study: It has been demonstrated that Enhanced Recovery After Surgery(ERAS) programs in colorectal surgery reduce complication rates and hospital stay; these better outcomes reduce costs. However, the feasibility of this programs in elderly patients has been questioned. The aim of this study is to see if we also observe these results in a cohort of patients under 80 years submitted to colorectal surgery within an ERAS program.
Materials and Methods: ERAS program on colorectal surgery was implemented in our hospital in January 2017. We collected data prospectively from all patients who had colorectal surgery from January 2017 to May 2018 following an ERAS program. We divided these 274 patients into two groups:
Group A: patients under 80 years, n= 235 (134 men /101 women)
Group B: patients more than 80 years, n=39 (20 men/ 19 women)
We analysed complication rate based on Clavien-Dindo(CD) classification, readmission and postoperative(PO) hospital stay. We stablished objective discharge criteria (solid oral tolerance, pain control with oral analgesics, deambulation, gas/ stool output, no nausea, correct stoma self-care, no PO complications, PCR <50 and wanted discharge), and evaluate rate of patients who reach them at PO 5 day, and the real discharge rate on PO day 5.
Results and Discussions: Group A, mean age of 63 ±11.46 years (laparoscopic 63.4%, rectal surgery 30.3%). Complication rate, classified in CD I, II, III, IV, V was 40.8%, 12.4%, 5.6%, 6.0% and 0%. Acute kidney injury (AKI) was present in 3.5%. PO hospital stay was 8.6±7.2 days. Readmission rate was 13.9%. 61,7% of the patients fulfil discharge criteria but finally only 36.9% were discharged.
Group B was formed by 39 patients with a mean age of 82 ±7.8 years (laparoscopic 69.2%, 30.8% rectal surgery). About 56.5%, 25.6%, 10.3%, 12.8% and 0% of patients had a CD I, II, III, IV and V complications respectively. Comparing with group A, AKI was present in 25%. PO hospital stay was 11.6±8.5 days. Readmission rate was 12.6%. 30.8% fulfil the discharge criteria on day 5 but were finally discharged 25.6%.
Conclusion: It seems that older patients have more complicate PO period, that prolong the length of stay. However, this fact has apparently no impact on mortality or readmission rate. When they reach discharge criteria on PO day 5, it seems that we feel more comfortable with real discharge in group B than in group A.

15AP02-4
Impact of Perioperative Management in the outcome of elderly patients undergoing surgery for Colorectal malignancy.

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Background and Goal of Study: Elderly patients often present with reduced physiological reserves and comorbidities. Additionally, colorectal malignancies in combination with advanced age limit treatment options for the Anaesthetist and promote complications. Anaesthetic Perioperative involvement play crucial role in the outcome of these patients.
Materials and Methods:142 patients, age>80 years old, ASA III, males and females undergoing minimally invasive surgery for colorectal malignancy. 92 patients (64,8%) nutritional status was affected and supported for a week before surgery with protein diet and multivitamins. In addition, preoperative fasting was restricted to 6 h without food and 2 h without clear fluids and preoperative drinks were administered for hydration. 105 patients (74%) had anaemia and treated as early possible with IV Iron supplements. 34 patients (24%) had cognitive deficit after cognitive assessment. Despite cognitive assessment, all patients in this study did not receive premedication with benzodiazepines, and BIS monitoring for depth of anaesthesia was used for all patients. All patients had C/V assessment and optimization, as well as respiratory optimization. All patients had GA and regional anaesthesia (Epidural, spinal or TAP block).
Results and Discussion: 6 patients transferred to ICU postoperatively and stayed just for one night. 7 patients had arrhythmias postoperatively, mainly AF and were treated successfully. Only 2 patients needed to be transfused with allogenic blood products. 2 patients had mild cognitive impairment which improved within 4 hours. Pain control was satisfactory for all patients. Patients had early nutrition and early mobilization postoperatively. Mean duration of hospital stay was 6.2 days.
Conclusions: Elderly patients undergoing major surgeries are prone to perioperative complications. Preoperative assessment, optimization and process plan provide ideal setting to identify and prevent potential issues.
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15AP02-5
Evaluation of perioperative anesthetic risk in elderly patients in neurosurgery with intracerebral brain tumors.

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Background and Goal of Study: Patients of elderly is a certain group of the population with physiological and functional problems that require a certain integrated approach before the operation. In order to ensure a safe perioperative period, comprehensive preoperative preparation will be useful for detecting anesthetic risk factors, as well as the relationship between it and the effects of comorbidities. Determination of perioperative anesthetic risk factors in elderly patients in neurosurgery with intracerebral brain tumors.
Materials and Methods: The prospective study group included 18 patients ,who underwent surgery using general anesthesia. Inclusion criteria were: patients age 70 - 84 years, MMSE score > 10 points, CIRS-G scale < 30 points, ECOG scale <2, index Karnofsky > 50%, ASA I-III, MNOAR scale <5.5 points. For patients with a history of stroke, the MRS score is < 4. Laboratory parameters were assessed preoperatively: lipid panel, blood glucose, serum creatinine, hormones TSH and DHEA, urinary creatinine, urine albumin, hsCRP, NT-proBNP) . We used CGA scale set: IADL, TUGT test, MMSE, GDS, MNA-SF, CIRS-G, Charlson index, ASA, also Goldman score. Predictive assessment of postoperative mortality and morbidity was carried out using the POSSUM scale.
Results and Discussion: Of the 18 patients, 6 people had complications: two patients had cardiac complications (atrial fibrillation, rest angina), two patients had a fever, one patient had pulmonary artery thromboembolism, one patient has pain syndrome. A comprehensive assessment of the scales revealed that the overall score on the CIRS-G scale, index Chalson, the POSSUM scale directly affects the risks of any postoperative complications. DHEA gave a direct connection with further somatic complications with a decrease in the index < 1.4 μmol / l. hsCRP was elevated in all patients with complications. Deviations in lipid panel were found in a group of patients with postoperative complications.
Conclusions: With what scales and laboratory indicators to assess anesthetic risks, the risk of complications? What are the main indicators of physiological status? How to correctly evaluate possible complications in patients of elderly? And in these patients in neurosurgery? Each of these issues is relevant in the practice of the entire global medical community.

15AP02-6
Mortality and morbidity after emergency laparotomy in patients aged 80 years and above

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Background and Goal of Study: Emergency laparotomy is a high-risk procedure in very old patients due to frailty and underlying comorbidity. Available evidence regarding outcomes after emergency surgery in very old patients is limited. The aim of this study was to investigate mortality and morbidity after emergency laparotomy in patients ≥ 80 years of age.
Materials and Methods: A single-center retrospective study was undertaken at Haukeland University Hospital, Norway. The electronic operation planning system was searched for patients aged ≥ 80 years undergoing emergency surgery by midline laparotomy between 01.01.2015 - 31.12.2016. Exclusion criteria were palliative surgery and emergency vascular surgery. Primary outcome was mortality, secondary outcomes were in-hospital complications and level of care at discharge. Data were retrieved from the medical records and age, sex, ASA physical status, comorbidities and residential status were registered. The operative procedures, in-hospital complications, length of stay, level of care at discharge and mortality at 30 days, 90 days and 1 year were collected. Complications were defined according to the European Perioperative Clinical Outcome (EPCO) definitions and registered if ≥ Clavien-Dindo grade 2.
Results and Discussion: Patients (n=106) were between 80-96 years old (median 84) with 63% females and 17 patients living in a nursing home. Comorbidities were present in 102 patients and 62 had cardiopulmonary disease (COPD, arrhythmia, ischemic heart disease or heart failure). The ASA physical status was ASA 2 (11), ASA 3 (58) and ASA 4 (32). The surgical procedures performed were adhesiolysis(31), colectomy(28), small bowel resection (21), enteroraphy (12), reoperations (10), and other (17). At least one complication occurred in 89 patients. Postoperative pulmonary complications were most frequent (51) followed by delirium (42), paralytic ileus (23), and kidney failure (23). The number of intrahospital deaths was 21 (20 %), of the remaining 85 patients 52(62 %) were discharged to a nursing home. Median length of stay was 9 days (range 0.6-50).The 30-day, 90-day and 1 year mortality was 26 %, 33 %, and 45 %. Corresponding mortality rates among the 17 nursing home residents were 35 %, 53 % and 77 %, respectively.
Conclusions: Our data demonstrates high mortality, morbidity and risk of functional decline after emergency laparotomy in very old patients.

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15AP02-7
An investigation of the independent risk factors of mortality after hip fracture surgery in elderly patients

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Background and Goal of Study: Hip fracture is a common injury among elderly population and despite the advance in medical care, the 1-year mortality rates after surgical intervention were 22% and 15% for male and female in Taiwan. This study aims to explore the independent risk factors on mortality after hip fracture surgery with particular emphasis on the effect of general anesthesia and blood transfusion.
Materials and Methods: After the approval of Institutional Review Board, we conducted this retrospective cohort study in Taipei Veterans General Hospital in Taiwan to collect patients aged 80 or more with hip fracture surgery between January 2005 and December 2015. Demographic variables, ASA physical status, chronic renal insufficiency, preoperative hemoglobin level, perioperative blood transfusion, type of anesthesia, anesthesia time and so on were collected as well. Univariate and multivariable Cox proportional hazards models were used to evaluate the effect of collected variables on overall survival after surgery. Stepwise model selection processes were also employed to identify independent risk factors of overall survival after hip fracture surgery and the adjusted effects of general anesthesia and blood transfusion were further evaluated under the final selected model.
Results and Discussion: A total of 2219 patients were included in the analysis and 905 (40.8%) of them received general anesthesia and 1314 (59.2%) received spinal anesthesia. After the model selection, five variables were identified as the independent risk factors of postoperative mortality, including female gender (HR = 0.62), level of hemoglobin (HR = 0.86), ASA physical status, duration of operation (HR = 1.33), and serum creatinin level (HR = 1.25). The effects of general anesthesia and blood transfusion on overall survival become non-significant after the adjustment for those risk factors.
Conclusions: No association was noted between general anesthesia or blood transfusion and overall survival among elderly with hip fracture surgery. Worse medical conditions and low hemoglobin, instead of general anesthesia and blood transfusion, were associated inferior long-term outcomes after hip fracture surgery.

Education

16AP01-1
Description and assessment of a low cost procedural simulator for loco regional anesthesia learning for novices.

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Background and Goal of Study: The locoregional anaesthesia learning based on simulation is very costly and need particular organisation. In this study we describe our experience using a homemade low cost procedural simulator based on animal steak to teach novice resident in anaesthesia how to use echography in locoregiobnal anaesthesia.
Materials and Methods: In this observational study, novice residents assisted to simulation program using a homemade simulator based on turkey leg in which we inserted an olive. Residents learned how to identify different anatomic structures and to find the olive than to simulate local anesthesia injection. We evaluated the utility of this procedural simulator using kirckpatrick scales (recations, learning, transfer and changing behavior)
Results and Discussion: 20 anaesthesia trainee were included. 18 of them appreciated the degree of realism of this simulator. 95% of participants learned how to identify different structures after one learning session. All residents used echography for locregional anaesthesia and 13 used it for vascular puncture in the first week following this learning under clinical supervision.
Conclusions: The use of this low cost simulator allowed novice residents to learn and to improve their capacity to use echography in locoregional anaesthesia.

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16AP01-2
In situ simulations as a tool to improve hospital teamwork

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Background and Goal of Study: Miscommunication between medical professionals leads to significant errors in 60 to 80 % of incident cases and is the reason of 30% hospital deaths. Non-technical skills such as teamwork and its related failure correlates to number of reversible adverse events during emergency situations. *In situ* simulations has a great impact on improvement of interaction among medical professionals. This benefits in better performance and increase patient safety. The goal of the study to implement *in situ* simulation training to increase level of knowledge and self confidence among medical professionals. To compare the results before and after training using simple questionnaire and call center data.
Materials and Methods: We identified dpt. which more often calls resuscitation team and organized two days resuscitation refresher training using high fidelity manikin placed in real unit environment. There were two weeks between both training days. There were 12 practitioners involved in training. Doctors were divided in four groups to collaborate together. Nurses and other personnel of the unit were not informed of what exactly will happen to make it more natural. We trained interdisciplinary teamwork between people, who works routinely together. They used usual available equipment in the unit. We fixed helper, resuscitation trolley and defibrillator arrival time since accident. After the second day in two weeks we compared fixed time.
Results and Discussion: During the first day of training helpers came approximately in 1.18 minutes (1- 1.3 minutes). Resuscitation trolley arrived in 2.5 minutes (1.8-3.4 minutes) average. Defibrillator was started in 4 minutes (3.2-4.6 minutes). We found that resuscitation trolley does not contain bag-mask ventilator. The second training showed significant improvement. Helpers appeared on the scene 20-30 seconds earlier, fully equipped resuscitation trolley arrived 1 minute earlier with defibrillator. The available data from Call center showed that amount of calls “blue code” from the unit decreased from 8-10 per month to 1-2 per month.
Conclusions: 1.*In situ* simulations improves the quality of performance and teamwork in emergency cases, while trained in place. 2.Simulation increases the level of self-confidence of personnel involved in resuscitation. 3.*In situ* simulation shortens the time of appropriate equipment and personnel involvement in resuscitation process.

16AP01-4
New operation room in-situ simulation-based testing for Taiwan Board Examination in Anesthesiology

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Materials and Methods: In spite of conventional written and oral tests, simulation based testing (SBT) had now been incorporated into the board examination of Taiwan Society of Anesthesiology for several years. Here we report the newly designed SBT and the results. A Medical Simulation Committee was set up by experts from accredited anesthesiologist training hospital. They involved in the process and development of SBT.
1. Terminology: Questionnaire survey and summit to define the SBT for Taiwan Board Examination in Anesthesiology and rectify the Chinese terminology for SBT
2. Examination qualification: residences after 30 months training
3. Designed structured scenario editing format
4. Designed new scoring system, including performance checklist, ANTS and global rating. Each category and item were weighed, and Critical Points were set up according to the objectives of each scenario
5. Enrolled raters, conducted train-the-rater workshop, set up, renewing and maintaining certification criteria
6. Audit system for scenario and checklist validity and variability
7. Four OR in-situ simulation stations on each examination day
8. Scoring in each station: total score would be divided by 2 if the examinee failed to pass the critical point in this station
9. Determine the passing score after linear regression (borderline regression) of each scenario (sectional passing mark) and, keep at least 2 from 4 stations total score were above the passing mark

Results and Discussion: The SBT was conducted 3 times per year since 2011. In the constructive stage, from 2011 to 2015, the SBT played the role of training and mock examination while the examinees were not familiar with the SBT. Since 2016, the Examinees must pass the SBT before becoming the written and oral testing. The pass rate ranged from 89%, 96%, 100% in 3 SBTs in 2017, 2 and 3 failed in 2 SBTs in 2018. The scenario editing format and audit system were useful. The majority of raters and examinees agreed that OR in-situ simulation, rather than simulation outside the OR, helped to achieve more reliable assessment because of the real working place and equipment. The new scoring system was useful in SBT. According to the feedback questionnaire, most raters and participants found the SBT is reasonable for the board examination.

Conclusions: SBT could be one of several standardized tests to evaluate the preparedness of individuals for the practice of anesthesiology. OR in-situ simulation is a useful option.

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16AP01-5
Effectiveness of high-fidelity simulation when training residents in difficult airway management

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Goal of Study: To determine if simulation-based education (SBE) improves residents' performance during airways management crisis and ensures longer retention of practical skills in comparison with a theoretical course of lectures on the topic of difficult airway management (DAM).

Materials and Methods: The 30 1-st year residents were divided into 2 equal groups. The both groups received a lectures course. Further, in group 1, each resident participated as anesthesiologist in each of three different simulated scenarios on the topic of DAM (unanticipated difficult airway, failed intubation during RSI, post-extubation stridor) using a "human patient simulator" (HPS, CAE) followed by debriefing. After 1, 3 and 6 months, all residents underwent a knowledges assessment with 50 MCQs (max. score 100) and one of 3 simulated scenarios. Performance evaluation scores with checklists, developed for each scenario (max. score 100), were completed. A comparison between the groups was made based on the results of testing and the results of the performance assessment during the simulated scenarios.

Results and Discussion: The testing results showed high retention of knowledges in gr.1 (after 1 month - 89, 84.3 - 91.2; 6 months - 84.5, 80.4 - 88.9), statistically significant ($p<0.05$) decrease in the level of residual knowledges in group 2 (after 1 month - 79, 74.2 - 89.2 to 67 after 6 months, 60.7 - 72.2). The evaluation of the residents' actions in group 1 showed high effectiveness of after 1 month (91.3, 90.4 - 93.3), while after 6 months the score decreased insignificantly and amounted to 88.4 (78,5 - 91,1) points. In group 2, residents' actions were less effective after 1 month (70, 57.5 - 73) and the score was significantly lower in comparison with the first group ($p<0.05$). After 3 months, the effectiveness of actions further deteriorated (66, 60,5 - 72,2) with significant difference between the groups; after 6 months residents' actions score in group 2 significantly increased (83, 67.5 – 85.7) and was not much different from that of group 1.

Conclusions: Anesthesiologists improved their performance and retained DAM theoretical knowledges and skills for up to 6 months after participating in high-fidelity simulation scenarios in comparison with traditional course of lectures. Regular repeating of algorithms during high-fidelity simulation scenarios enhances the performance of residents who initially received only theoretical knowledges during lectures.

16AP01-6
Using real-time simulation feedback to improve CPR quality of 3rd year medical students during their Anesthesiology/Peri-Operative Medicine clerkship in preparation for EPA #12

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Background and Goal of Study: CPR is critical to learn and master in medical school, however it is not feasible to teach or evaluate CPR in real time with patients. Simulation offers a unique, safe opportunity for medical students to improve their CPR technique as well as master (perform unsupervised) CPR as required for EPA #12.
The purpose of the research presented here is to investigate the ability to use simulation to objectively improve CPR quality of 3rd year medical students during their Anesthesiology/Peri-Operative Medicine clerkship in preparation for EPA #12. Our null hypothesis is there is no difference in CPR (Day 0 vs Day 2) with simulation feedback (Day 1 "treatment").

Materials and Methods: Using the Laerdal SimMan 3G, 3rd year medical students performed CPR three times during their Anesthesiology clerkship. On Day 0 (baseline) they performed CPR for 2 minutes without feedback from the mannequin ("blinded"). On Day 1 they performed CPR while receiving real-time mannequin feedback displayed on a computer screen (rate, depth, recoil). On Day 2 they once again performed CPR without feedback ("blinded").

Results and Discussion: Preliminary results from our first 48 medical students is presented here. Using the paired two-tailed t-test, compressions/minute ($p<0.005$), mean compression depth ($p<0.005$), and % recoil ($p=0.079$) improved after simulator feedback. In addition, % adequate rate of 100-120 compressions/minute ($p=0.007$) and % adequate depth ≥50mm ($p<0.005$) improved. Students also reported increased confidence in performing CPR on a patient after these simulation sessions.

CPR Simulation feedback for 3rd year medical students

	Day 0	Day 2	Pearson Correlation	P(T<=t) two-tail
Compression rate/min	96.24	109.58	0.424	<0.005
Mean Compression Depth(mm)	39.23	48.21	0.555	<0.005
% Recoil	93.54	98.13	0.396	0.079
% Adequate Rate (100-120/min)	47.81	68.69	0.269	0.007
% Adequate Depth ≥50mm	16.02	48.34	0.506	<0.005

Conclusions: Our preliminary results show using simulation feedback can improve CPR performed by 3rd year medical students. Objective measurements improved, as well as medical student confidence. Thus, simulation can be used to improve medical student CPR techniques in preparation for EPA #12.

16AP01-7
Major haemorrhage simulation in a remote operating centre

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Background and Goal of Study: Worcestershire Acute Hospitals NHS Trust is split geographically and has three major sites. Kidderminster Treatment Centre (KTC) is one of these and contains four operating theatres for day-case surgery and a minor injuries unit (MIU). There is no blood service on-site with only a small volume of O-ve blood stored locally; the main trust blood bank is an 18 mile drive away.
Materials and Methods: We ran a multi-disciplinary simulation morning involving orthopaedic and gynaecological theatre teams to practice major haemorrhage (MH) protocols at this remote site. Objectives focussed on human factors and included ensuring all team members knew their role, to develop a clear understanding of how a major haemorrhage is activated, to practice the process and logistics set out in the major haemorrhage protocol and to identify those human factors that may contribute to difficulties. We ran two scenarios with two theatre teams. In each we simulated an unexpected major haemorrhage. Blood bank were involved in our planning and processed requests and sent blood across the trust in real time.
Results and Discussion: Feedback was very positive and 25 potential improvements to the process were highlighted and discussed. Staff reported they felt more prepared to manage a major haemorrhage in the future and that training in their usual teams helped with morale, team working and patient safety. Respondents were unanimous in wanting more regular simulation training.
Conclusions: Simulation is an ideal medium to train for rare but potentially catastrophic events. As a direct result of our major haemorrhage protocol simulation, deficiencies in the process and logistics were identified and are well on the way to being fully addressed.
Simulation proved to be a vital tool with staff reporting that they felt more prepared to manage major haemorrhage and training in their usual teams helped with morale, team working and patient safety.

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16AP02-1
Comparison of learning endotracheal intubation of medical students using McGrath video laryngoscope as direct laryngoscope versus as video laryngoscope

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Background and Goal of Study: We aimed to compare the training effect on skill improvement of Macintosh direct laryngoscopy following training with McGrath video laryngoscope as direct laryngoscope or indirect video laryngoscope.
Materials and Methods: Thirty-seven medical students were randomly divided into one of two groups by cluster randomization method (Group Direct, training with McGrath™ as direct laryngoscope; Group Indirect, as video laryngoscope). The lecture on airway anatomy and management, tutorial videos on the technique of direct laryngoscope, introduction of McGrath™ video laryngoscope were given. All participants performed 5 intubations on manikin using McGrath™ video laryngoscope as direct laryngoscope or indirect video laryngoscope with instructor's direct feedback. Finally, the students performed tracheal intubation twice for each scenario using Mcintosh direct laryngoscope in the same manikin in the following scenarios: 1) normal airway in the supine position and 2) cervical immobilization with a semi-rigid foam neck collar. We used t-test or Mann-Whitney test for continuous variables and Chi-squared tests or Fisher's exact test for categorial variables as appropriate. We used the linear mixed model to analyze intubation times and the degree of difficulty and generalized linear mixed model with binomial distribution, generalized estimating equations methods to analyze the intubation success rate.
Results and Discussion: The mean intubation time for the intubation attempt before education was 54.6 ± 23.4 s in group Direct, 56.8 ± 34.5 s in group Indirect. Intubation time after education has decreased significantly compared to before education. There was a significant effect of time (time effect, P = 0.012). The intubation time in group Direct was shorter than in group Indirect and the difference was significant (group effect, P = 0.043) while the time × group interaction was not significant (P = 0.307). The degree of difficulty showed similar trends with intubation time.
Conclusions: The McGrath video laryngoscope allowed teaching and supervising the intubation process of the novice and improved the intubation skill of Macintosh direct laryngoscope in normal and difficult manikin scenario. The education with McGrath video laryngoscope as direct laryngoscope improved the intubation skill with Macintosh direct laryngoscope better than that with McGrath video laryngoscope as indirect laryngoscope in manikin.

16AP02-3
Comparison of palpation and sonoanatomy identification methods for localisation of cricothyroid membrane, before and after training

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Background and Goal of Study: The aim of this study was to compare the determination of the cricothyroid membrane by using palpation and sonoanatomy identification (USG) methods in different patient groups in terms of success and efficacy
Materials and Methods: Twenty-six enrolled and 20 volunteer were enrolled in this study. volunteers were divided into 4 subgroups according to gender and BMI. Participants were asked to identify the cryothyroid membrane in two different methods in each groups. The participants were asked to determine the cricothyroid membrane starting from the method that they know better firstly. Detection time and accuracy of localizations were also recorded and training was given to all residents by an experienced anaesthesiologist with both methods. The training was continued until each participant was able to correctly determine the cricothyroid membrane three times in succession. After sequential training, all participants were asked to determine the cricothyroid determinations, starting with the preferred method again. Detection times and accuracy were recorded Statistical analysis was performed with GraphPad Prisma V.3.
Results and Discussion: Regardless of the methods, the success rate was increased after training in all groups, (p <0.001). Success rate of palpation was significantly higher than USG in all groups before training(p<0.001).There was no significant difference between two groups after training (p>0.005).The length of fixation by USG was longer in all groups compared to palpation method before training (p <0.001)and no significant difference after training. (p> 0.05). Method preferences of the assistants after the training changed significantly in favour of USG. (P <0.0001).Detection of the cricothyroid membrane during Invasive airway interventions can be life-saving. Residents should be encouraged to evaluate the cricothyroid membrane (1) According to our results, the detection rates were increased and the detection times were shortened, after sequential trainings, regardless of the methods.
Conclusions: Our results emphasise the importance of the trainings on detection of cricothyroid membrane and USG may be an alternative technique to the palpation method for the evaluation of cricothyroid membrane

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16AP02-4
Sub-speciality basic training in cardiac anaesthesia: Earlier better than later?

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Background and Goal of Study: Not only does sub-speciality training during residency provide skills and knowledge to trainees, but it also gives them opportunities to explore their possible interest areas as an anaesthetist. We hypothesised that the earlier the trainees expose themselves to sub-speciality areas, the more likely they were to achieve and be motivated to carry on to the next advanced-level training.
Materials and Methods: This study was carried out at a 1200-bed teaching hospital in Tokyo over an 8-year period. Self-evaluation forms were distributed to all anaesthetic trainees before and after their mandatory basic cardiac anaesthesia training. It contained 73 question items regarding cardiac anaesthesia which they had to rate their performance on a scale of 1-5 (e.g. I can use transoesophageal echocardiography for guiding anaesthetic management.). The trainees were divided into 2 groups depending on when they started the training; the early residency group (group E) within their first 2 years of residency, and the late residency group (group L) in or after their 3rd year of residency. As the primary outcome, the difference in scores (mean post minus pre-training scores) of the 73 questions items between these 2 groups were compared. For the secondary outcome, the number of trainees who proceeded to the advanced level cardiac training programme, which was not mandatory, were compared. A Mann-Whitney test was used to analyse the difference in scores and the Fisher's exact test for the number of trainees who proceeded to the next level of training. P value of 0.05 was considered significant.
Results: 62 trainees completed our basic cardiac anaesthesia training. 11 were in group E, and 51 were in group L. There was no significant difference in the pre-training scores between the 2 groups (median: 1.86 vs. 1.84, P=0.905). There was no statistical difference in the change of scores (median: 1.15 vs. 1.30, p=0.871). Two in group E and 9 in group L proceeded to the advanced level training, which did not show a significant difference (18.2% vs. 19.6%, p=1.000).
Discussion and Conclusions: Our findings did not support our hypothesis; no significant difference was found between the early and late residency group in the self-assessment scores and the number of trainees who continued training in cardiac anaesthesia. However, the sample size was too small. Therefore, further studies to examine when to begin sub-speciality for trainees are needed.

16AP02-5
Smartphone and "App" usage amongst South African Anaesthetic Healthcare Providers - A Survey

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Background and Goal of Study: The use of mobile medical technology amongst the medical community is growing. There is no data on the use of medical "Apps" by anaesthetic providers in the developing world. In addition, the usage patterns of mobile health applications in the developing versus developed world, and the accessibility of this technology to resource limited environments has not been investigated in the anaesthetic fraternity. We aimed to determine what the rate of use of medical "Apps" was amongst South African anaesthetic service providers. In addition, we also aimed to identify what barriers practitioners face with regards to using mobile medical "Apps", and whether a specific national pharmacology "App" would be preferred by study participants.
Materials and Methods: A prospective, contextual, descriptive study was conducted by surveying South African anaesthetic service providers at the 2018 national congress of the South African Society of Anaesthesiologists in April 2018.
Results and Discussion: 232 voluntary surveys were completed and analysed.100% of participants utilise smartphones for work related queries. Medical "Apps" for drug referencing and calculator functionality was used most frequently with 65% of the specialists' and 54% of the registrars' responses indicating preferential use of smartphone "Apps" for these functions.
Wi-Fi availability was shown to be a statistically significant limiting factor to mobile medical "App"usage for those in the public sector (p<0,001). South Africa has relatively high mobile data costs compared to other countries and this may also be limiting the more widespread use of mobile medical technology in South Africa
169/232 (72%) of the survey participants would favour a South African based pharmacology "App" for use in their daily practice.
Conclusions: Smartphone "App" usage amongst South African anaesthetic providers mirrors international usage trends. Expected barriers to entry were confirmed in our survey results. There is a strong favourability towards a South African "App" for pharmacology referencing.
We now have the data available to spur the development of focussed "Apps" for the South African medical "App" market and to address barriers to access for smartphone use amongst health care practitioners in South Africa

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16AP02-6
The Influence of an International Teaching Visit on the Use of Quadratus Lumborum Block in Leskovac General Hospital, Serbia

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Background and Goal of Study: The use of regional anesthesia (RA) techniques in obstetric, gynecological, and abdominal surgery cases have been very low in Serbia, despite its importance in postoperative pain management. Leskovac General Hospital (LGH) is large general hospital in the south of Serbia, and is a major referral center for 250,000 people. The Department of Anesthesia at LGH asked for help in order to train physicians in the use of truncal blocks. A 4-day teaching visit by a fellowship trained regional anesthesiologist from the United States (US) was arranged. Two of the local anesthesiologists were actively involved in performing blocks under the supervision of US anesthesiologist.
Materials and Methods: Using the LGH anesthesia database from 4/24/17 to 11/30/18 data on all abdominal, gynecological and obstetric cases where quadratus lumborum block (QLB) had been used were obtained.
Results and Discussion: During the study period, either bilateral or unilateral QLB type 1 was used as a part of multimodal postoperative pain management in 301 patients following Cesarean Delivery (41 patients), hysterectomy (45), laparoscopic cholecystectomy (127), laparoscopic colon surgery (17), laparoscopic appendectomy (16), laparoscopic abdominal hernioplasty (28), bowel resection (22), nephrectomy (3), and open inguinal hernioplasty (2). We had easily provided satisfying analgesia for our patients using QLB. Based on the success of the Kybele program[1] (teaching program in area of obstetric anesthesia done in Serbia), we decided to do a similar program in RA. The local team had very limited experience in ultrasound-guided blocks so we had focus on few blocks only. During the visit, the expertise of local physicians progressively increased. Two members of the department became ready to do QLBs on their own and to teach their colleagues from the department and from other hospitals in the region.
Conclusions: A several day teaching visit can significantly improve the skills of local anesthesiologists. It is important to focus on few blocks only, so that the local team can gain experience in blocks that their patients need. We plan to organize future visits in order to teach local anesthesiologists additional peripheral nerve blocks and to train physicians from the region.

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16AP02-7
Utilization of online medical resources amongst Maltese anaesthetic trainees.

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Background and Goal of Study: The use of internet resources by medical professionals has increased. Medical students and trainees are also being progressively directed towards e-learning platforms. The aim of our study was to identify the frequency of access and types of online medical sources used by Maltese anaesthetic trainees at the department of Anaesthesia, intensive care and pain management at Mater Dei Hospital, Malta.
Materials and Methods: A self-administered electronic anonymous questionnaire was sent to all Maltese anaesthetic trainees as of November 2018. Institutional approval was obtained. A participation email, containing a hyperlink to a SurveryMonkey online questionnaire, was sent on the trainees' Googlegroup. A filled in questionnaire was considered as consent for participation. Data on years of anaesthetic training, medical online sources used during studying and the perceived quality of the resources utilised was collected. Data analysis was performed via SurveyMonkey.
Results and Discussion: Seventeen (81%) out of twenty-one trainees participated in the study. The majority of participating trainees (70.6%, n=12) were Higher Specialist trainees, with a minimum of 3 years training. Online medical resources were utilised by 74.6% of participants when they required an immediate answer; i.e. within 10 minutes to a query. Seven participants (41.2%) stated they often accessed online medical resources during a patient consultation. The majority of participants (76.5%, n= 13) utilised a hospital PC or smartphone to do so. Participants, during studying, most often looked for drug or treatment information (82.4%), abbreviations or definitions (52.3%) and diagnostic information (47%). They most often used continuously updated educational anesthesia websites such as European Society of Anaesthesia (ESA) (70.6%), general search engines like Google (58.8%) and medical search databases such as PubMed (53%). The quality of online information was determined by the date of the last update by 70.6% of participants. Restricted access, too general result lists and time constraints where the three most commonly encountered difficulties during online searches.
Conclusions: Our results highlight that online medical resources represent a quick and effective means of retrieving medical information for Maltese anaesthetic trainees. This calls for a greater inclusion of online e-learning resources and platforms in the local anaesthetic training programme.

16AP02-8
On-site availability of guidelines and standard operating procedures (SOPs): evaluation of a web-based solution in two tertiary level hospitals

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Background and Goal of Study: Guidelines and SOPs are important to improve outcomes in perioperative health care. The development, maintenance and distribution of SOPs remains a challenge (1) and implementation and adherence may be associated with on-site availability (2, 3). We describe a web-based solution for guideline maintenance in two anaesthesia departments and evaluation of the system's impact on daily perioperative practice.
Materials and Methods: WordPress™ (WP) fulfilled all the requirements given in figure 1. Use of the system generated exportable metadata: traffic, content, referrals and keyword searches. We conducted an anonymised survey to assess need for information and impact on clinical practice. The questionnaire addressed usage, cost effectiveness, and benefits resulting from the system.
Results and Discussion: WP was implemented and maintained at low cost in two tertiary level hospitals in Switzerland (Departments of Anaesthesiology & Pain Medicine, Kantonsspital Luzern, http://sop.klifairs.ch in May 2014 and Inselspital, Bern in March 2018, internal server). WP metadata showed 153,683 visitors (1,067,296 requests) in 2018 for sop.klifairs.ch. In Bern, metadata showed monthly usage by 1765 +/- 82 visitors with peaks in the morning and afternoon (figure 2). 75 (Luzern) and 103 (Bern) employees returned the questionnaire. Users feel that SOPs are necessary and the systems are beneficial (figure 2).
Conclusions: WP is a suitable solution for distributing and managing guidelines and SOPs. Metadata from the system allow live monitoring of usage. The system is accepted, highly appreciated and use leads to improvements, e.g. in patient safety and training.
References:
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2. McEvoy MD. Reg Anesth Pain Med. 2014;39(4):299-305.
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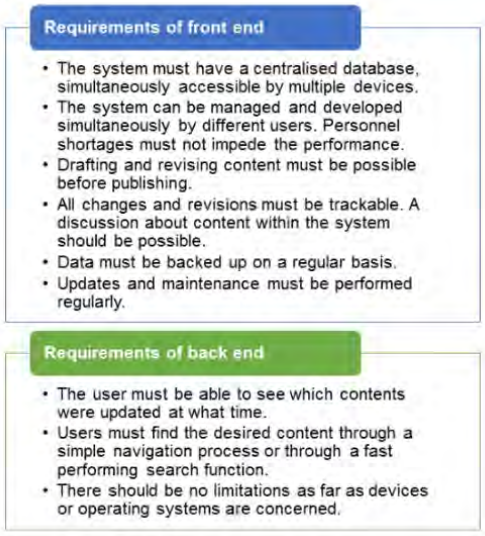
Figure 1



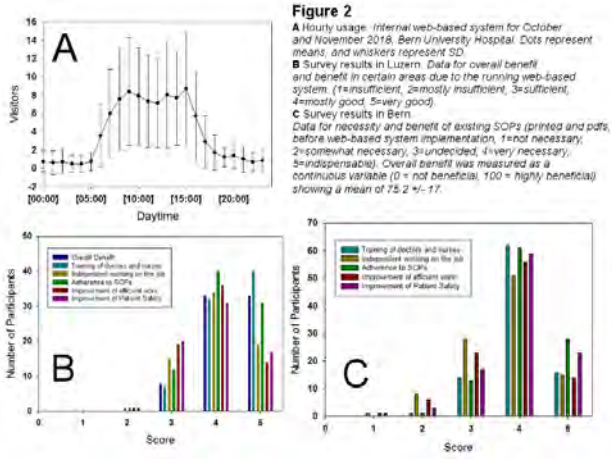


Figure 2
A Hourly usage. *Internal web-based system for October and November 2018, Bern University Hospital. Dots represent means, and whiskers represent SD.*
B Survey results in Luzern. *Data for overall benefit and benefit in certain areas due to the running web-based system. (1=insufficient, 2=mostly insufficient, 3=sufficient, 4=mostly good, 5=very good).*
C Survey results in Bern.
Data for necessity and benefit of existing SOPs (printed and pdfs, before web-based system implementation, 1=not necessary, 2=somewhat necessary, 3=undecided, 4=very necessary, 5=indispensable). Overall benefit was measured as a continuous variable (0 = not beneficial, 100 = highly beneficial) showing a mean of 75.2 +/- 17.

16AP02-9
Medicine undergraduate student satisfaction with blackboard-style videos: a pilot study in anesthesia education

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Background and Goal of Study: The use of multimedia in medical education has increased over the past decade. Video-assisted teaching is being employed to either supplement or take the place of face-to-face lectures in the classroom to explain novel concepts. Blackboard-style videos represent a novel method of teaching by showing the on-screen drawing of illustrations of concepts presented together with narrated explanations. There is a lack of publications focusing on the use of videos in undergraduate anesthesia education. Accordingly, the aim of this study was to evaluate the student satisfaction and scholar performance with the use of blackboard style videos in undergraduate anesthesia education.
Materials and Methods: Fourth-year students (n=90) participated. Students were allocated in three groups according to the Medical School Graduation Board rules (alphabetical order). The first group (Group C: n=30) was not exposed to the videos. The following two groups (Group A: n=32; Group B: n=28) received, via a mobile phone app, 4-minutes blackboard-style videos one day before the theoretical lectures. Eight videos were designed: Monitoring; Tracheal Intubation; Acid-Base Disorders; Vasoactive Drugs; Local Anesthetics; Cardiopulmonary Resuscitation; Pain Management; and Spinal Blockades. Students' opinions were evaluated by means of a short survey (containing multiple-choice and open questions) administered at the completion of the course. At the completion of the course, the students also underwent a multiple-choice style test. The grades were evaluated and compared among the groups to assess scholar performance.
Results and Discussion: The surveys indicated high level of satisfaction with the course content (Group C: 77.5%; Group A: 79.4%; Group B: 80.4%). From the analyses of the open questions, 37% of the students spontaneously pointed that the use of the videos favoured the learning process during the course. Regarding the scholar performance, higher grades were found among the students that were exposed to the videos when compared to those that were not exposed (Group C: 7.9±1.2; Group A: 9.4±0.2; Group B: 9.6±0.3; $p<0.0001$, $F=43.8$).
Conclusions: The majority of students in this study indicated that they were highly satisfied with the anesthesiology course. The use of blackboard-style videos seems to favor the learning process. The scholar performance of students that were exposed to the videos were higher than of those that were not exposed.

16AP03-1
Test Analysis on Taiwanese Board Certification Examinations in Anesthesiology using Bayesian Item Response Modelling

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Background and Goal of Study: Board certification examinations in anesthesiology is essential to assess an examinee's knowledge and ability as an anesthesiologist and the item response data obtained from the examinations contain rich information about the candidate ability, item difficulty and test quality, which is difficult to access without an in-depth statistical analysis on the complex data structure. This study aimed to analyze a series of Taiwanese board certification examinations using Bayesian item response modelling to evaluate examinees' proficiency and test quality.
Materials and Methods: This study was conducted to analyze item response data on the written tests of Taiwanese board certification examinations in anesthesiology from 2012 to 2016. Data were composed of responses to multiple choice items and covariates of examinee attributes. Both the maximum likelihood estimation (MLE) and Bayesian methods were used to estimate the parameters of the examinee ability, item difficulty and test reliability based on miscellaneous item response models. Furthermore, Bayesian item response modeling was applied to analyze more complicated multilevel item response structure and estimate covariate effects on test parameters. The potential cluster effects of examinees from the same training centers was also evaluated using a Bayesian approach.
Results and Discussion: Both MLE and Bayesian analytical approaches show acceptable test reliability (> 0.7) in all the certification examinations. Both methods generated similar estimates of item and examinee parameters in the one parameter (1-PL) Rasch model but convergence problems occurred during parameter estimation of 2-PL and 3-PL item response models in the MLE methods due to the limited sample size. The multilevel Bayesian item response analysis revealed that gender and age did not exert any covariate effects on test parameters but there was significant intraclass correlation among the ability levels of examinees from the same training centers. We also demonstrated the flexibility and versatility of Bayesian modelling.
Conclusions: Test analysis using Bayesian item response modelling on board certification examinations in anesthesiology provides more information regarding the test characteristics and examinees' ability profiles than traditional analytical approaches. Item response analysis on the certification examinations is encouraged to ensure test quality and improve test development processes.

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16AP03-2
Emotional wellbeing of the anesthesia trainee after an adverse event, an observational study.

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Background and Goal of Study: Adverse events (AE) are inevitable in healthcare. Members of the healthcare team who are affected by such an event can become second victims. Commonly reported feelings are anger, guilt and various signs of depression or post-traumatic stress disorder. What the incidence and impact is on anesthesia trainees' emotional wellbeing remains unclear. Whether support systems are available and adequate remains up for discussion.
Materials and Methods: An online questionnaire, set up in Google Forms, was sent to anesthesia trainees and recent graduates affiliated with the Catholic University of Leuven. The questions were divided into demographics, emotional findings, possible personal problems, support, coping mechanisms and organizational support structures.
Results and Discussion: The response rate was 53 out of 235 (22.5%). From these 53 people, 45 (85%) indicated that they encountered an AE. This is in line with common literature. The reported emotions were guilt, frustration and shame. Most reported problems encountered at work were reduced self-confidence and a holding back attitude. Personal issues arose such as lasting doubt of knowledge and skills, doubting continuation of the training and flashbacks or sleeping disturbances. There was an overall increase in the need of social contacts and reassuring talks especially toward the partner and colleagues. The trainees wanted feedback and follow-up of the adverse event. Professional support was asked by about one in four, need for a time out was lower. Colleagues and members of staff are definitively part of the social safety net, while the younger trainees leaned more toward the senior trainees in coping talks. These reported feelings and supportive needs correlate with previously published reports. The vast majority of the trainees were unaware of any supportive structure or protocols in the organization where the incident happened. Certain limitations and even some bias have to be taken into account for this kind of research.
Conclusion: The incidence of AE amongst trainees is high and many of them experienced some emotional or professional problems because of this. Talking to their partner, colleague or member of staff was important but the request for objective feedback remained largely unfilled. Support structures are often unavailable, unknown or remain to have a high threshold among many trainees.

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16AP03-3
Prevalence Of Burnout And Associated Risk Factors In Healthcare Workers Of The Intensive Care Units At Two Tertiary Care Hospitals In Makkah Region During Hajj Time, A Cross Sectional Study.

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Background and Objectives: During Hajj time, usually all the critical care staff are working 12 hours duties for two consecutive weeks without break; with financial incentives. So, we conducted this study to determine level and factors associated with burnout among the ICUs staff during hajj time in two tertiary hospitals in Makkah region.
Design and Settings: This is a cross-sectional study, conducted at King Abdullah medical city and Al Noor specialist hospital, Makkah during 1439/2018 hajj time.
Methods: The Maslach Burnout Inventory questionnaire was used to measure burnout. Socio-demographic, work-related characteristics were added to explore factors associated with burnout.
Results: The study included 354 participants with a response rate of 78% of the health care workers in all critical care areas in both hospitals. We found that younger staff with age below 40 years old had higher degree of burnout than older staff (20.4% vs 16.7% respectively).Furthermore, female gender had higher degree of burnout syndrome than males (22% vs 18% respectively) and the health care workers who reported non salary satisfaction (45.4%) had greater burnout. The staff who reported that their work have a bad impact on their families had severe burnout (39%) than those who reported good impact of the work on their families (15.5%). We found, however, that severe burnout was higher in the nurses than the physicians (24.2% vs 18.3% respectively) while it was much lower in technicians (RTs, 7.9%) with significant difference (p value 0.017). Moreover, We found a significant difference among the different ICUs with highest level of severe burnout in the post cardiac surgery ICU (32%) followed by the main ICU (22.2%), then the CCU (14.3%) and the least level of burnout was in the neuro-intensive care unit (6.1%) with p value 0.03. Our logistic regression analysis revealed the female gender, the younger age group, the impact of the job on the family, salary satisfaction and working in CCU are independent risk factors for burnout syndrome. In conclusion, in this study, the prevalence of burnout among the health care workers in major two tertiary Saudi hospitals was found to be frequent in Hajj time. Several factors associated with burnout have been identified. These risk factors should be studied further to better understand how best to address the prevalence of burnout and avoid its consequences.

16AP03-4
The attitudes toward intraoperative disaster management.

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Background and Goal of Study: In 2014, a fire caused by an electric scalpel occurred during surgery in our operating room, and we were struggling to respond of fire management. In recent years, natural disasters such as earthquakes, typhoons, floods occur frequently during surgery. These happens caused to consider necessary of disaster responses during surgery. However, there are few studies about the attitudes toward intraoperative disaster management. The aim of study was to confirm the consciousness concerning the disaster response of the anesthesiologists. For this purpose, we responded to our hospital anesthesiologists to intraoperative disaster management.
Materials and Methods: The study was approved by the institutional review board of the Kanazawa University School of Medicine. We investigated 21 anesthesiologists in our hospital in response to disasters occurred during surgery by anonymous questionnaire. The contents of the questionnaire were 1) responses to fires in your room that occurred during surgery, 2) responses to fires in another room that occurred during surgery, 3) responses to fires in another ward separate from the operating room during surgery, 4) responses to big earthquake that occurred during surgery.
Results and Discussion: The collection rate of the questionnaire was 85.7% (18/21) (average of 10 years of anesthesiologist's history, 4 men, 14 females, 10 specialists). Regarding the fire that occurred during surgery, there were many anesthesiologists who considered discontinuing the operation irrespective of the fire in the room or another room and considering taking measures not to cause damage to the patient as the top priority (94% in my room, 78% in another room). There were also opinions that it strives for extinguishment or protects one's own body. Regarding earthquakes, there were many ideas that surgery could be terminated as soon as possible while checking patient and self-safety (79%). However, there were opinions that have never thought of disasters during surgery (24%), and that do not understand intraoperative disaster management (33%).
Conclusions: This study observed that consciousness concerning intraoperative disaster management of anesthesiologists was various and suggested that when disaster occurred it was hard to respond.

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16AP03-5
Factors of user satisfaction regarding laryngoscopy for difficult and normal airways in mannequins by novices

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Background and Goal of Study: Direct laryngoscopy remains the gold standard for endotracheal intubation. However, an increasing number of devices are available at the market. Publications are mainly focused on devices, especially regarding difficult airway management, but rarely concerns the user dependent factors of choosing one device over another. Although, user satisfaction might have a large impact on future preferences especially by novices. We aimed therefore to explore the influencing factors of user satisfaction regarding laryngoscopy in mannequins by novices.
Materials and Methods: Fifty medical students were recruited to serve as novice users. Following a brief, standardized training, students were asked to execute endotracheal intubation with each of the devices (Airtraq®, King Vision®, Macintosh laryngoscope and VividTrac®) on Laerdal Airway Management Trainer® in normal and difficult airway scenarios. We evaluated objective factors (the time to and proportion of successful intubation, the best view of glottis, esophageal intubation, and dental trauma) and subjective factors (ease of technical use, ease of physical use and willingness of reuse/overall user satisfaction).
Results and Discussion: We experienced that only subjective factors were significantly correlated (Pearson correlation, $P < 0.01$) with user satisfaction in six out of the eight scenarios. These correlations were related to ease of technical use and ease of physical use. No significant differences were observed regarding devices (direct laryngoscope versus videolaryngoscopes) or scenarios (normal versus difficult airway). Ease of technical use was selected as a predictor for the final model with stepwise linear regression in seven out of the eight scenarios (adjusted R^2: 0,20-0,60).
Conclusions: Based upon our results, the user satisfaction is rather based on subjective than objective factors by novices. In our evaluation, approximately 20-60% of the user satisfaction could be explained with ease of technical use alone.

16AP03-6
Factors associated with patient willingness to participate in anaesthesia clinical trials: a cross-sectional study

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Background and Goal of Study: Clinical trials are essential to improve knowledge of anaesthesia and perioperative medicine. Unfortunately, many studies face participant-recruitment issues and fail to include the planned number of participants. There is limited published data about how information delivered about the study or how the experiences and attitudes of prospective participants influence willingness to participate. The purpose of this study was to identify such factors in the domain of anaesthesia care.
Materials and Methods: We performed a cross-sectional study on a sample of discharged adult inpatients admitted to a tertiary university hospital. Using questionnaires, we explored a variety of factors likely to influence willingness to participate such as patient personal factors (current health, past exposure to clinical research and anaesthesia), attitudes towards clinical research and study-related factors. Six different scenarios of anesthesia trials were assessed. Univariate and multivariate analyses were performed on questionnaires' answers. Linear regression modelling was used to assess the specific association between personal and study-related factors and willingness to participate in the studies described in the scenarios.
Results and Discussion: 1318 participants having received questionnaire were eligible. Of these, 398 returned their questionnaire fully completed. Multivariable adjustment revealed that factors related to altruistic values (β, 9.6, 95% CI 3.4 to 15.7, P = 0.002), to the feeling of benefiting from a more effective treatment (β, 4.7, 95% CI 0.2 to 9.2, P = 0.041) and to the absence of fear about double blinding (β, 5.7, 95% CI 1.3 to 10.2, P = 0.012) were positively associated with willingness to participate. Conversely, concerns about drug-related adverse effects (β, –11.7, 95% CI –16.9 to –6.5, P<0.001) and anxiety about surgery (β, -5.2, 95% CI –10.0 to –0.5, P = 0.031) were negatively associated with willingness to participate.
Conclusions: The better understanding of patients' personal values or their concerns about study process may contribute to improve the quality and pertinence of the information provided during participants' recruitment process. This may ultimately improve the level of participation to clinical trials.

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16AP03-7
Analysis of 4-years' experience of Objective Structured Clinical Examination (OSCE) for summative assessment of residents in anesthesiology.

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Background and Goal of Study: Utility of OSCE in assessment of different domains of anesthesia skills was previously reported. Aim of this study was to evaluate the results of the implementation of the OSCE in the educational process in faculty of anesthesia and intensive care in Military-Medical Academy.
Materials and Methods: in 2014 were developed the following OSCE stations: preoperative patient assessment, airway management (tracheal intubation, SGA, cricothyreotomy), neuroaxial anesthesia, advanced CPR, vascular access (including ultrasound-guided), "anesthesia" and "intensive care" (totally 20 SCEs' using high-fidelity patient simulators and real medical equipment). Performance assessment was made by using the checklists (maximum score – 100 points, passing - 70). The final score for the OSCE was calculated as the average of the score for all stations. We evaluated the results of the OSCEs for 4 years; analyzed the reliability of checklists; used a self-questionnaire to assess the residents' subjective impression of the OSCE.
Results and Discussion: totally 246 residents underwent OSCE in 2015-2018 y.y. The average score for the manual skills stations was 89.5 $\pm$ 8.2 p. for all years; the score for the simulation stations in 2015 was 74 + 8.2, which required an increase of time of ACRM-course in educational process (2 days per each 3 month) and in 2018 the performance score of simulation was 86 $\pm$ 5.5. The residents stated, that OSCE stimulated them to go and learn more about CRM in anesthesia (94%), OSCE was a lot like real life clinical encounters (92%), OSCE helped them identify their strengths and weaknesses (96%) and OSCE evaluated their skills fairly (96%). 100% would recommend passing OSCE to all residents, 94% considered simulation stations as most difficult to pass and 86% felt emotional stress during passing SCE. Estimated intererater consistency of checklists was 93-95%.
Conclusions: The result of this study allows us to consider OSCE as reliable, highly valid assessment tool that stimulates the improvement of the quality of resident training.
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16AP03-8
Knowledge and perceptions of anaesthesiology among fourth-year Greek medical students

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Background and Goal of Study: Several studies reported that medical students lack adequate knowledge about the anaesthesiology practice. [1] In this study, we investigate the knowledge as to the anaesthesiology in fourth-year medical students.
Materials and Methods: We performed a survey using a theoretical knowledge questionnaire regarding the specialty of anaesthesiology and perceptions of several aspects such lifestyle etc. The questionnaire have been distributed to 104 students, 65 (62.4%) male and 39 (42.2%) female during their first in-class session of the anaesthesia core rotation.
Results and Discussion: The students' primary sources of information regarding Anaesthesiology were university experience (N=35, 33.6%) and media (N=27, 25.9%). Most of them wish to learn more about the specialty and almost half of them 44 (42.2%) are thinking of choosing Anaesthesiology as their specialty. Also, 94 (90.2%) students knew that the anaesthesiologists work in the operating room, while 81 (78%) and 75 (72%) believed that the anaesthesiologist practices medicine in the medical ward and the pre-admission clinic, respectively. Of the 104 students, 57 (54.7%) and 60 (57.6%) reported that the anaesthesiologist works in the Emergency Department and the Intensive Care Unit, respectively. Furthermore, 71 (68%) stated that we are some kind of psychiatrist, 50 (48.9%) and 43 (41.2%) that the anaesthesiologists have no place in the recovery room and the pain clinic, respectively. Additionally, 35 (33.6%) students strongly disagreed that the Greek Anaesthesiologists are overpaid, while they were not able to make a decision regarding overworking compared to the other medical specialties. Regarding the preferred method of studying Anaesthesiology, 45 (43.2%) favoured the hands-on skills session.
Conclusions: Although the general knowledge of our students about Anaesthesiology is poor, almost half of them 44 (42.2%) are thinking of choosing Anaesthesiology as their specialty. We intent to collect the same informations from our students by the end of their clerkship to determine if, how and why their knowledge, perception and attitudes have changed after their education in Anaesthesiology.
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16AP03-9
Scientific interest among Spanish anaesthesiologists

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Background and Goal of Study: To identify the interest of Spanish anaesthesiologists about doing a PhD or master´s degree, publishing articles and presenting abstracts at congresses.
Materials and Methods: Anonymous survey sent to Spanish anaesthesiologists between March 2018 and November 2018.
Results and Discussion: A total of 1627 answers were collected, representing a 23% response rate. 17,5% of the surveyed anaesthetists have a PhD (26,1% are interested in doing it in the future and 56,4% have no interest at all). Regarding master degree´s, 66% have done one (41% of these masters are related to the specialty, 8,5% related to hospital management, 3,5% linked to statistics, 2,2% to bioethics and 11,5% include other areas of interest). 64% of the anaesthetists have published at least one article (46,9% have published between 1-5 articles, 9,5% between 5-10 articles and 7,5% more than 10 articles). When asking about yearly abstract submission to congresses as first author, 25, 4% present one abstract, 13,3% between 2-3 abstract and 3,6% present more than 4 articles per year.
In 2017, the Spanish Ministry of Education estimated 2781 new PhD in medicine. Unfortunately, the percentage of PhD done by anaesthesiologists was not specified. Therefore, it was impossible to compare the numbers of different medical specialities. The results of the survey shown that only 17% of the anaesthesiologists have a PhD. On the contrary, there are more anaesthesiologists interested in carrying out a master´s degree. Regarding the publication of articles, more than half of the respondents have published at least once. However, it was not asked if they appeared as the first author. Finally, analysing the data in relation to the presentation of posters/communications as the first author, 58% of the respondents acknowledge that they do not present posters/communications yearly.
Conclusions: It seems that few anaesthesiologists have done the PhD and their interest is more focused in master´s degrees. Although a significant percentage of anaesthesiologist publish, the number of articles remains low. Also, the figures for posters/communications stand low. We asked ourselves if the interest in research should be encouraged.

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