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The European Anaesthesiology Congress

Abstracts Programme

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Abstracts

EUROANAESTHESIA 2022

The European Anaesthesiology Congress

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Best Abstract Prize Competition (BAPC)

BAPC-01
Changes in platelets morphology and functions in massive trauma patients: prospective cohort observational study

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Background and goal of study: Acute traumatic coagulopathy (ATC) typically occurs immediately after massive trauma. The mechanisms of ATC are complex and include endothelial glycocalyx impairment, consumption of fibrinogen, hyperfibrinolysis and platelet dysfunction. The aim of this study was to find out the impact of platelet morphology and functions changes on trauma patients outcomes. The study hypothesis was that there is no outcomes differences due to presence of platelet morphological and function changes in severe trauma.
Materials and methods: We examined 46 patients 19 - 55 years old with massive trauma. 44 patients were included in study results analysis. The morphological changes with calculation of bipolar forms of platelets and their aggregation, induced by ADP and adrenaline, were obtained on 1st, 3rd, 5th and then every 5 days of treatment. The primary outcome was the duration of stay in ICU, the secondary outcomes were complications: presence of minor bleeding, which was not linked to the coagulation factors deficit. Statistical Package for the Social Sciences was used and the results were presented using median [IQR], adjusted hazard ratio (HR).
Results and discussion: It was found that among patients with the presence of bipolar forms of platelets below 5% there were no acute minor bleeding after clotting factors deficit correction and duration of stay in ICU was 13.5 [9.8; 17.6] days, while among patients with the presence of bipolar forms of platelets above 5% there were 35% of patients who had minor acute haemorrhage in first 5 days after trauma and duration of stay in ICU was 18.5 [15.7; 27.6] days. We found out the normal level of platelets aggregation induced by ADP, however, with absence of its second wave, and normal level of platelets aggregation induced by adrenaline with no changes of its curves in patients during all study stages. High level of bipolar forms of platelets was associated with lower daily probability of discharging from ICU (adjusted HR 1.23, 95%CI 1.12-1.65, per 10% decrease).
Conclusion(s): Presence of bipolar forms of platelets might have links to increasing the incidence of minor bleeding, prolonged duration of stay in ICU and impact clinical outcomes in massive trauma patients.

BAPC-02
A prospective study on complications of paediatric midline catheters

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Background and goal of study: Midline catheters (MC) are peripheral intravenous (iv) catheters where the catheter tip does not reach the central veins. In order to reduce the risk of catheter-related thrombotic and infectious complications, MCs could be an alternative to central venous catheters for short-term peripheral iv therapy in children. However, data on the use of MCs in the paediatric population is scarce and to better understand the role for paediatric MCs there is a need for high-quality prospective data. We aimed to describe the dwell-time and complications associated with paediatric MCs. The incidence of MC-related venous thromboembolism (VTE) was chosen as the primary outcome of the study.
Materials and methods: We conducted an observational, prospective study at a tertiary multi-disciplinary paediatric hospital. 100 patients <18 years who received a midline catheter were included in the study. Patients were followed for thrombotic, infectious and mechanical complications. After MC removal, screening Doppler ultrasonography was performed to detect asymptomatic VTE.
Results and discussion: The median patient age was 5.7 years (IQR 1.8-8.9). The majority of MCs was inserted in arm veins, most commonly in the basilic vein (56%). The median catheter dwell time was 6 (4-8) days.

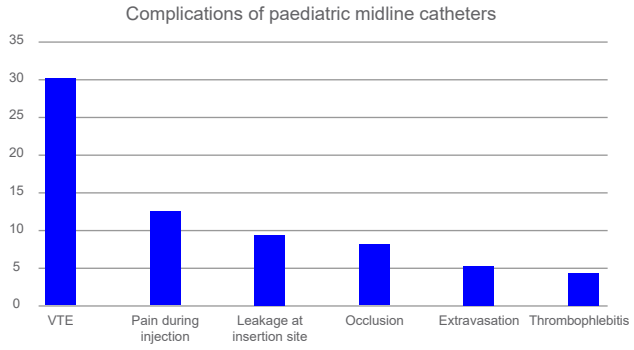

Figure 1. Number of complications in 100 paediatric midline catheters. 69 complications occurred in 51 midline catheters. VTE, venous thromboembolism.

Thirty (30%) catheters were diagnosed with MC-related VTE. VTE was significantly more common with saphenous vein catheters compared to arm vein catheters (p=0.03). Four patients with MC-related VTE needed anticoagulation therapy. Overall, the MC was electively

removed in 70 (70%) cases. Thirty (30%) catheters were removed unintentionally or due to complications (Fig 1), but only 22 of these cases needed additional iv access to complete the intended therapy. No MC-related bloodstream infection occurred.

Conclusion: In children, MC-related thrombotic and mechanical complications are common, but only few of VTEs are severe enough to warrant anticoagulation therapy. Systemic infectious complications are rare. The dwell time for paediatric MCs is shorter than in the adult population, but 78% of patients with MC did not need additional venous access to complete short-term iv therapy.

BAPC-03
Maintenance over time of the effect produced by esmolol on the structure of coronary arteries

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Background and Goal of Study: Coronary arteries' remodeling is closely related to arterial hypertension morbi-mortality. Several antihypertensive drugs have shown positive effects after chronic use. We proved earlier that short term treatment with esmolol (48h) produces regression of the vascular remodeling (1). However, it is not known yet if this regression is maintained over time once the treatment is stopped.

Materials and Methods: Once approved by the Ethic Committee on Animal Investigation (CEEA), we selected spontaneously hypertensive (SHR) male adult rats (14 months old) and randomly divided them into two groups: those who received 300mcg/kg/min iv esmolol for 48h (SHR-E) and those who received iv saline as placebo (SHR). After treatment, each group was randomly divided into three subgroups: those studied just after 48h of treatment (SHR-48h y SHR-E-48h), after 7 days of stopping the treatment (SHR-7d y SHR-E-7d) and after a full month (SHR-1m y SHR-E-1m). We studied the structure (geometry and composition) of left anterior descending artery using confocal microscopy T-Student of repeated measures was applied, considering $p<0,05$ as statistically significant.

Results and Discussion: Coronary artery external diameter, wall thickness and cross-sectional area from SHR-E-48h were decreased compared to SHR-48h ($p<0,05$). This difference was maintained in SHR-E-7d and SHR-E-1m ($p < 0.05$). Middle layer thickness and number of smooth muscle cells in SHR-E-48h were decreased ($p<0,05$), without statistical differences in celular density. These effects persisted in SHR-E-7d and SHR-E-1m.

Conclusion: 48h treatment with esmolol produces an early regression of coronary artery remodeling that persists a month after finishing the treatment.

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.

Acknowledgements: This study was financed by a grant from FIS 16/02069 and Fondos FEDER.

BAPC-04
Beyond postoperative analgesia: PENG block for speed positioning in spinal anesthesia - a case report

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Background: The PEri-capsular Nerve Group (PENG) block provides satisfactory postoperative analgesia for hip fracture correction and preserves quadricipital motricity postoperatively [1].

Recently it has been proposed that PENG block could be used for positioning patients to receive neuraxial anesthesia, but the time between blockade and positioning was 30 minutes [2].

Such a long period in the operating room could be a limitation for its use. We report the case of a patient adequately positioned for spinal anesthesia after three minutes of receiving the PENG block.

Case report: 87-year-old male, ASA PS III (myocardial infarction in 2009, CKD-stage 3a, SAH, dyslipidemia), undergoing elective surgery due to proximal diaphyseal femoral fracture. Rest NPRS was 0/10 while dynamic NPRS was 7/10. The procedure was performed under sedation with fentanyl, propofol and dexmedetomidine, followed by PENG and lateral cutaneous nerve blocks guided by ultrasound with injections of bupivacaine 0.5% with 1:200,000 epinephrine 20mL and 5mL, respectively.

After 3 minutes, the patient referred dynamic NPRS 0/10 while put in sitting position for spinal anesthesia, receiving isobaric bupivacaine 0,5% 10mg. Anesthesia and surgical procedure occurred without complications. The patient remained pain-free from the immediate postoperative period up till discharge, 36h after the procedure. He reported well control pain using dipyrone.

Discussion: In this report, we demonstrate how changes in the local anesthetic concentration of PENG block could dramatically reduce the latency of blockade. Although lower concentrations of bupivacaine could be useful for patient positioning [2], the time required for proper mobility may be an impeditive of its use. PENG block may be an adequate technique for quick positioning of patients with proximal femoral fractures, besides providing postoperative analgesia with preservation of motricity [3].

References:
1. Reg Anesth Pain Med. 2018 Nov;43(8):859-863.
2. Indian J Anaesth. 2021 Aug; 65(8): 572-578.
3. Braz J Anesthesiol. 2019 Nov;69(6):639-639.

Learning points: The PENG block could be effective for positioning the patient for neuraxial anesthesia while providing adequate postoperative analgesia for the correction of proximal diaphyseal femoral fracture.

BAPC-05

Pain with movement after hepatic resection: a randomized trial of epidural patient controlled analgesia versus intravenous patient controlled analgesia

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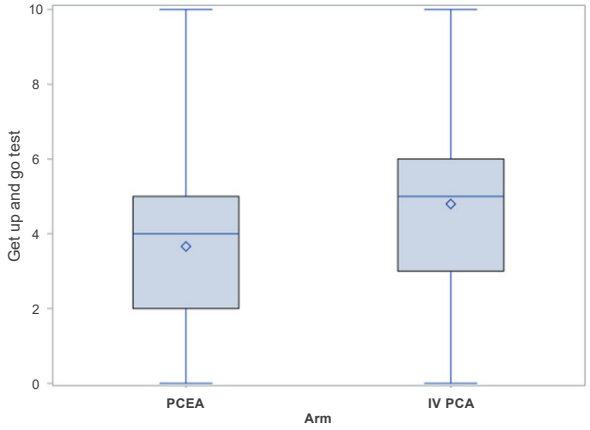
Background: Strategies to alleviate post-operative pain are a critical element of recovery. Our aim was to evaluate whether patient controlled epidural analgesia (PCEA) improves post-operative pain and outcomes after open elective partial hepatectomy (PH).
Methods: This was a prospective, non-blinded, randomized comparison of PCEA vs intravenous patient-controlled analgesia (IVPCA) for postoperative pain after elective open PH. Sample size was calculated to provide an 80% power to detect a 2-point difference in pain scores. The primary endpoint was pain with ambulation on post-operative day 2. Secondary endpoints included pain at rest, morbidity, time to bowel function and length of stay.
Results: Between 2015 and 2020, 231 patients (115 IVPCA and 116 PCEA) were randomized. Demographics and clinical characteristics were similar. The incidence of epidural failure was 3.4% with no epidural related complications. Patients in the PCEA arm had lower pain scores with ambulation on post-operative day 2 (median 4.0 vs 5.0, p<0.01) with no difference in pain at rest (Figure 1). Modeled over time, PCEA patients had consistently scores 0.4 points lower than IV PCA patients (p=.006).There was no difference in overall morbidity (IVPCA 40.0% vs PCEA 32.7%,p=0.28), however, there was a higher incidence of high-grade complications in the IV PCA arm (29.6% vs 18.1%,p=0.046). There was no difference in time to ambulation, oral intake, flatus or length of stay.



Conclusion: PCEA is safe, provides a small improvement in pain control and is associated with a lower rate of high-grade complications. PCEA should be considered in all patients undergoing elective open PH.

BAPC-06

Cerebral autoregulation improves during step-wise increases in blood pressure during anaesthesia

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Background and Goal of Study: The classical concept of cerebral autoregulation (CA) is that cerebral blood flow (CBF) remains constant by adapting cerebrovascular tone to fluctuations in mean arterial pressure (MAP) between 60 and 150 mmHg.[1]
However, this is not an on-off mechanism, and previous work has suggested that vasomotor tone is proportionally related to CA function.[2] During propofol-based anaesthesia, there is cerebrovascular vasoconstriction, and (static) CA remains intact. Sevoflurane-based anaesthesia induces cerebral vasodilation and attenuates CA dose dependently.[3]
In this study, cerebrovascular tone was manipulated in the autoregulatory range by increasing MAP step-wise using phenylephrine. We hypothesised that increasing cerebrovascular tone would improve dynamic CA, even in the autoregulatory range.
Materials and Methods: MAP and mean middle cerebral artery blood velocity ($MCAV_{mean}$) were measured in ASA I and II patients, anaesthetised with either propofol (n=26) or sevoflurane (n=28), during 10 mmHg step-wise increments of MAP between 60 and 100 mmHg. Static CA was determined by plotting two-minute averaged $MCAV_{mean}$ versus MAP. Dynamic CA was determined using transfer function analysis and expressed as the phase lead (°) between MAP and $MCAV_{mean}$ oscillations, created with positive pressure ventilation with a frequency of 6 min^{-1}.
Results and Discussion: Achieved MAP levels per step-wise increments were comparable between anaesthesia regiments (63±3, 72±2, 80±2, 90±2, 100±3 mmHg, and 61±4, 71±2, 80±2, 89±2, 98±4 mmHg for propofol and sevoflurane, respectively). $MCAV_{mean}$ increased more during step-wise MAP increments for sevoflurane compared to propofol (p≤0.001).Dynamic CA improved during propofol (0.73°·$mmHg^{-1}$ (95%CI = 0.51- 0.95, p≤0.001)) and less pronounced during sevoflurane-based anaesthesia (0.21°·$mmHg^{-1}$ (95%CI=0.01 – 0.42, p=0.04).

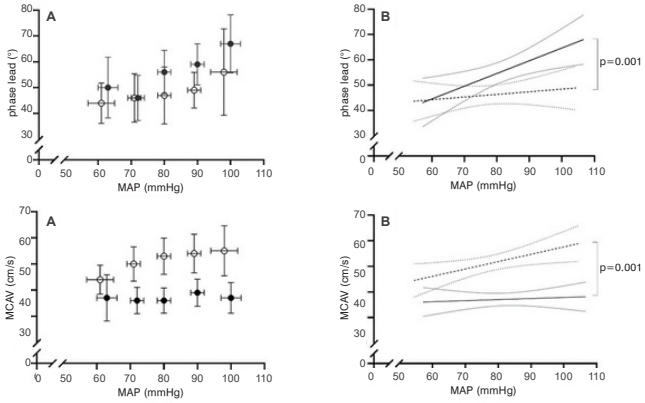

Figure. *Closed circles/solid lines, propofol; open circle/dashed lines, sevoflurane.*

Conclusions: During general anaesthesia, dynamic CA is dependent on MAP, also within the autoregulatory range. This phenomenon was more pronounced during propofol than during sevoflurane.

General Anaesthesiology

01AP01-01
The comparison of remimazolam with propofol in core body temperature in patients undergoing robotic-assisted or laparoscopic radical prostatectomy

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Background and goal of study: Different types of anesthetic agents may variably affect thermoregulatory mechanisms such as redistribution of body heat, cutaneous heat loss, or inhibition of thermoregulatory vasoconstriction. Therefore, we compared remimazolam with propofol in terms of core body temperature in patients undergoing robotic-assisted and laparoscopic radical prostatectomy.
Materials and methods: Ninety patients were randomly allocated to the propofol-remifentanil (PR) group or the remimazolam-remifentanil (RR) group. The PR group (n = 45) received effect-site concentrations of 6.0 μg/ml of propofol and 4 ng/ml of remifentanil, followed by 0.9 mg/kg of 1% rocuronium and maintenance with effect-site concentrations of 2-4 μg/ml of propofol and 3 ng/ml of remifentanil. The RR group (n = 45) received remimazolam 6 mg/kg/h by continuous intravenous infusion and the effect-site concentration of 4 ng/ml of remifentanil, followed by 0.9 mg/kg of 1% rocuronium, remimazolam 1-3 mg/kg/h, and remifentanil 3 ng/ml. The primary outcome was core body temperature, and secondary outcomes included vasoconstriction threshold (°C) and time to onset of vasoconstriction (min).
Results and discussion: Core body temperature in the RR group was significantly higher at 60, 80, 100, 120, 140, 160, and 180 min after induction than in the PR group ($P < 0.01$). Vasoconstriction threshold was significantly higher in the RR group (35.2 ± 0.4 °C) than in the PR group (34.8 ± 0.3°C) ($P < 0.01$). The time to onset of vasoconstriction was significantly less in the RR group (150.5 ± 10.2 min) than in the PR group (158.5 ± 8.4 min) ($P < 0.01$).
Conclusion(s): Remimazolam reduced the vasoconstriction threshold to a lesser extent than propofol and had a faster onset of vasoconstriction, resulting in superior thermoregulatory control.

01AP01-02
Desired remimazolam infusion rate can be determined based on patient's age, gender, height, weight and estimated remimazolam effective site concentration

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Background and goal of study: Remimazolam (RZL), is very useful anesthetic. Its recommended maintenance dose is 1.0 mg/kg/h and reduced to 0.6 mg/kg/h in senile patients. We estimated RZL effective site concentration and determine RZL infusion rate (IR_R)to achieve adequate anesthetic depth in a patient.
Materials and methods: After obtaining IRB approval and patients' informed consent, 413 patients undergoing scheduled orthopedic surgery were enrolled in this study. RZL induction dose was 0.3 mg/kg and maintenance doses were 1 mg/kg/h in patients under 60 years old, randomly 1 or 0.6 mg/kg/h in patients between 60 and 75 years old and 0.6 mg/kg/h in patients over 75 years old. General anesthesia was maintained with RZL and 0.1 μg/kg/min of remifentanil and peripheral nerve blocks. Spectral Edge Frequency 95% (SEF) was recorded every 2 seconds with a Root[R] monitor and a SedLine[R] sensor (Masimo, Irvine, CA, USA) during RZL infusion. RZL effective site concentration at the end of RZL infusion (Ce) was calculated with Runge - Kutta method.[1] Parameters were based on published data.[2] A multiple linear regression was calculated to predict SEF at the end of RZL infusion based on age, gender and Ce.
Results and discussion: Results are shown in tables and graph.

group	M/F	age (y.o.)	Height (cm)	TBW (kg)	BMI (kg/m²)
All cases	213 / 302	64.8 ± 17.3 [11 – 98]	159.8 ± 10.0 [135 – 189]	61.8 ± 14.4 [28 – 128]	24.0 ± 4.3 [13.9 – 38.4]
1.0U60	86 / 81	45.0 ± 13.0 [11 – 59]	164.7 ± 9.6 [135 – 184]	68.0 ± 15.9 [32 – 128]	24.9 ± 4.9 [16.4 – 38.4]
1.0O60	50 / 71	69.1 ± 4.8 [60 – 86]	158.9 ± 8.7 [142 – 180]	60.7 ± 11.6 [38 – 90]	23.9 ± 3.5 [16.0 – 34.2]
0.6U75	33 / 47	67.4 ± 8.1 [16 – 74]	159.2 ± 10.0 [142 – 189]	61.9 ± 15.0 [34 – 103]	24.3 ± 4.5 [14.7 – 38.0]
0.6O75	44 / 103	82.2 ± 5.2 [75 – 98]	155.3 ± 8.9 [138 – 180]	55.5 ± 11.2 [28 – 88]	22.9 ± 3.9 [13.9 – 37.6]

1.0U60: patients under 60 y.o. and RZL infusion at 1.0 mg/kg/h, 1.0O60: patients over 60 and under 75 y.o. and RZL infusion at 1.0 mg/kg/h, 0.6U75: patients over 60 and under 75 y.o. and RZL infusion at 0.6 mg/kg/h, 0.6O75: patients over 75 y.o. and RZL infusion at 0.6 mg/kg/h, TBW: total body weight, BMI: body mass index

Table 1. Demographic data (mean ± S.D. [range])

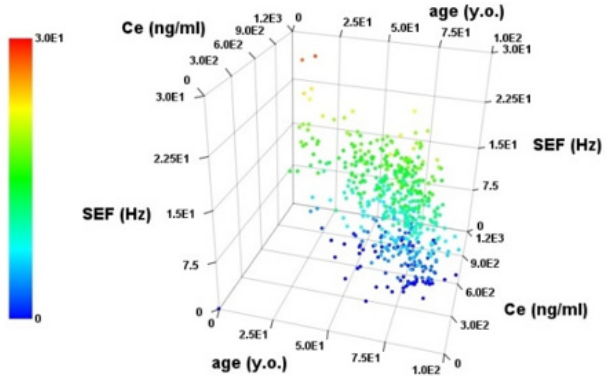
group	Duration of Anesthesia (minute)	Duration of Surgery (minute)	Duration of Remimazolam (minute)	Ce at the end of Remimazolam Infusion (ng/ml)	SEF at the end of Remimazolam Infusion (Hz)
All cases	110 ± 51 [34 – 362]	66 ± 45 [1 – 312]	83 ± 49 [9 – 323]	686 ± 173 [295 – 1165]	10.9 ± 5.1 [1.2 – 28.1]
1.0U60	102 ± 46 [35 – 260]	59 ± 39 [10 – 197]	78 ± 45 [10 – 234]	805 ± 127 [442 – 1165]	12.8 ± 4.9 [1.2 – 28.1]
1.0O60	112 ± 53 [38 – 283]	69 ± 46 [1 – 227]	84 ± 51 [18 – 245]	821 ± 95 [564 – 1125]	10.5 ± 5.0 [1.2 – 22.1]
0.6U75	110 ± 48 [35 – 269]	67 ± 43 [8 – 207]	81 ± 45 [9 – 234]	516 ± 68 [295 – 721]	10.6 ± 4.8 [1.2 – 21.2]
0.6O75	118 ± 55 [34 – 362]	72 ± 50 [7 – 312]	90 ± 52 [16 – 323]	533 ± 81 [339 – 903]	9.2 ± 4.7 [1.3 – 20.0]

1.0U60: patients under 60 y.o. and RZL infusion at 1.0 mg/kg/h, 1.0O60: patients over 60 and under 75 y.o. and RZL infusion at 1.0 mg/kg/h, 0.6U75: patients over 60 and under 75 y.o. and RZL infusion at 0.6 mg/kg/h, 0.6O75: patients over 75 y.o. and RZL infusion at 0.6 mg/kg/h

Table 2. Results (mean ± S.D. [range])

	estimated regression coefficient	S.E.	t-value	p	Vif
age (y.o.)	-0.1143252127	0.015696930	-7.28328480	0.0000	1.550713
gender	0.0091586071	0.621242044	0.01474241	0.9882	1.970836
hight (cm)	-0.0334957497	0.036981038	-0.90575471	0.3655	2.856793
weight (kg)	-0.0163763504	0.021331040	-0.76772397	0.4430	1.910720
Ce (μg/ml)	0.0004360589	0.001550366	0.28126201	0.7786	1.497538
intercept	24.3390390531	5.916432231	4.11380340	0.0000	-

Table 3. Results of multiple linear regression



A significant regression equation was found $F(3, 409) = 24.38$, $p = 0.0000$ with an R^2 of 0.1455. Predicted SEF is equal to (-0.117817×age) + (0.927311×gender) + (-0.00007×Ce) + 18.12024 where gender is coded as 0 = male, 1 = female.
Variance inflation factors of age, gender, and Ce are 1.4451, 1.0619

and 1.4183 in turn. SEF around 10 Hz means adequate anesthesia. With our equation, Ce = -15264.9×SEF - 1798.466×age + 14505.7×gender + 276604, patient's age, gender and wanted SEF give necessary Ce at that moment. IR_R which gives desired Ce is the infusion rate which gives wanted anesthesia depth.

Conclusion: IR_R to achieve desired SEF is the infusion rate which gives Ce calculated with Ce = -15264.9×SEF + 1798.466×age + 14505.7×gender + 279904 (male = 0, female = 1).

References:

1. Nakamura R: Excel PkPd, https//:home.hiroshima-u.ac.jp/r_nacamura/
2. Eisenried A: Anesthesiology. 2020; 132: 652 - 666

01AP01-03
How to maintain remimazolam anesthesia

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Background and goal of study: Remimazolam is a new anesthetic agent, which became available for clinical use in Japan in August 2020. Due to pharmacodynamic properties, we had to find a way to establish an appropriate maintenance concentration for each patient. For propofol, we previously reported that we could predict the maintenance concentration (Ce-Maint) by the effect-site concentration at loss of response to verbal command (Ce-LOR). Then we investigated whether we could predict Ce_Maint from Ce_LOR for remimazolam.

Materials and methods: After obtained IRB approval, we retrospectively investigated the relationship between Ce-LOR and Ce-Maint in 82 patients who scheduled elective thoracic surgery. Besides the standard monitors, we used BIS monitor to gather raw EEG data as well as EEG derived parameters. We had all infusion records of remimazolam and Ce-LOR was routinely recorded. Remimazolam was infused 1.5 mg/kg/hr at first and increased by 0.5 mg/kg/hr every 5 minutes until EEG showed deep anesthetic patterns. Rocuronium 0.6 mg/kg was administered just after loss of resoponse. During the increase of remimazolam concentration, we estimated Ce_Maint.

Concentration of remimazolam was then set to estimated value and 3-4 mcg/kg of fentanyl was administered. After that patients were intubated. During surgery, anesthesia was maintained continuous infusion of remimazolam and epidural anesthesia (0.25% levobupibacaine intermittent bolus). Concentration of remimazolam was adjusted by referring raw EEG.

We didn't adopt BIS values because there were less accurate during anesthesia by benzodiazepines. The EEG was considered appropriate when the spindle was dominant or when there was little fast wave component and little baseline sway (delta component). Ce_Maint was determined as the average Ce during surgery. Pk parameters were those obtained from the data of the Japanese clinical trial of remimazolam (by Doi M, et al. JJCA 2014).

Results and discussion: Eleven patients who did not awaken after surgery below the Ce-LOR were antagonized by flumazenil and were excluded from the study. The age of the remaining 86 patients was 68.2 ± 11.9 (M/F=48/38), and we obtained the equation: Ce-Maint = 0.95*Ce-LOR + 0.27. The correlation coefficient was 0.76, indicating a good correlation; the Ce-LOR was 0.33 ± 0.11 μg/mL and the Ce-Maint was 0.59 ± 0.14 μg/mL.

Conclusion(s): In remimazolam anesthesia, Ce-LOR is also an indicator to estimate the maintenance concentration.

01AP01-05
Assessment of antinociceptive efficacy of dexmedetomidine in multimodal anesthesia during laparoscopic renal surgery

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Background and goal of study: Dexmedetomidine (Dex)is a highly selective agonist of α2-adrenoceptors. It is a valuable supplement to the multimodal approach in anesthesia, has anti-inflammatory and renoprotective effects, which is especially useful in patients with renal disease.

The aim of our study was to assess the antinociceptive efficacy of Dex in a context of multimodal anesthesia during laparoscopic renal surgery (LRS).

Materials and methods: 80 patients who underwent LRS under three types of general anesthesia were included. All patients underwent surgery under general anesthesia with tracheal intubation. Induction: intravenous propofol 2 mg/kg, fentanyl 1.5-2 μg/kg, atracurium 0.6 mg/kg. Anesthesia maintenance: sevoflurane (MAC - 1.44±0.25 vol.%). In group 1 (control group of 26 patients) analgesia was provided with fentanyl 3.89±2.1 μg/kg/h. In group 2 (25 patients), multimodal low-opioid general anesthesia (MLOGA) was used with fentanyl 1.76±1.2 μg/kg/h and intravenous lidocaine 1.5 mg/kg/h and subanesthetic doses of ketamine. MLOGA with fentanyl 2.38±1.01 μg/kg/h combined with dexmedetomidine 0.7 μg/kg/h was used in group 3 (29 patients). The efficacy of antinociceptive protection was assessed by the dynamics of changes in the levels of stress hormones, hemodynamic parameters, and blood glucose concentrations.

Results: The total average doses of fentanyl used during the entire period of anesthesia were: 369.23±16.42 μg in group 1, 216.0±9.45 μg in group 2, and 272.41±10,98 μg in group 3 ($p < 0.001$).

A comparison of the dynamics of cortisol concentration in blood plasma before surgery and in the early postoperative (p/o) period was done. In group 1, the average cortisol before surgery was 371.0±32.32 nmol/l, after surgery - 562.72±45.37 nmol/l ($p < 0.01$). In group 2, 531.08±44.5 nmol/l and 831.33±48.03 nmol/l ($p < 0.01$) respectively. In group 3, 393.51±25.0 nmol/l and 436.37±34.92 nmol/l ($p > 0.05$) respectively. Cortisol levels increase in group 1 was 51.67%, in group 2 - 56.53%, and in group 3 - 10.89%. Blood glucose levels in the postoperative period in all groups did not exceed 6.16±1.23 mmol/l ($p > 0.05$).

Hemodynamic parameters and BIS, which was maintained within 44±6.4%, indicated the adequacy of anesthesia and analgesia in all study groups.

In group 1 in the p/o period 8 patients out of 26 required additional analgesia with opioids (the level of pain on the VAS scale exceeded 4 points). In group 2 and group 3, none of the patients required opioid analgesia. The next day after surgery, all patients were mobilized (sitting in bed, walking). Markers of renal function were also within normal range in all patients.

Conclusion(s): The use of dexmedetomidine in multimodal general anesthesia for laparoscopic renal surgery provides the greatest antinociceptive protection and reduces the stress response to surgery.

01AP01-06
Do cross-food allergies to propofol really exist?

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Background: Propofol is a short and rapid acting intravenous anesthetic that is used extensively for the induction and maintenance of a general anesthesia. Its formulation consists of a lipid emulsion containing soybean and phosphatin oil and egg lectin. That is why the package leaflet indicates its administration is contraindicated in those patients allergic to soy, eggs and peanuts. The aim of our study is to determine whether patients with proven food allergy to soy, egg and peanuts are also allergic to propofol.
Materials and Methods: Patients of all ages allergic to soy, egg or peanuts who agree to undergo skin testing for propofol allergies were included. They first undergo skin testing for food allergies to the egg, peanuts and soy. If the result was negative the candidates were excluded. If the result was positive, the propofol skin test was done.
Results and Discussion: 64 patients with confirmed food allergy underwent the propofol skin test. Of all of them, only 1 was positive to the propofol skin allergy test (1.6%). The patient was allergic to both peanuts and soy. These results reinforce the idea that there is no justification for avoiding propofol in these subjects. It is known that the egg and soybean oil components that make up propofol are highly purified and refined. In fact, the remaining proteins are so small that they do not have the capacity to produce an allergic reaction. If we review the most recent literature, several studies have been published that support the theory that the probability of allergic reaction to propofol in patients allergic to the above mentioned foods is the same as in the rest of the population.
Conclusions: Propofol can be safely administered in patients allergic to soy, egg or peanuts. We recommend only caution or avoidance of propofol in those patients with a history of anaphylaxis after ingestion of the above-mentioned foods.
References:
1. Asserhøj LL, Mosbech H, Krøigaard M, et al. No evidence for contraindications to the use of propofol in adults allergic to egg, soy or peanut. *Br J Anaesth* 2016; 116: 77 - 82.
2. Martinez S, Lasa EM, Joral A, Infante S, et al. Recommendations for the Use of Propofol in Egg-Allergic Patients. *J Investig Allergol Clin Immunol*. 2019; 29: 72 – 74.
3. Molina-Infante J, Arias A, Vara-Brenes D, et al. Propofol administration is safe in adult eosinophilic esophagitis patients sensitized to egg, soy or peanut. *Allergy.* 2014; 69: 388 – 94.

01AP01-07
A prospective, randomized, double blind, comparative study of ramosetron 0.3mg v/s combination of ondansetron 4 mg and dexamethasone 8mg for prevention of postoperative nausea and vomiting in patients undergoing elective middle ear surgery

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Background and Goal of Study: To compare the effectiveness of combination of Ramosetron 0.3mg v/s Ondansetron 4mg plus Dexamethasone 8mg in prevention of post operative nausea and vomiting, in patients undergoing elective middle ear surgeries under general anaesthesia.
Materials and Methods: The study was done in a tertiary teaching hospital in Bangalore,India in the year 2014-2016
174 patients aged between 18-65 years with ASA class I and II, posted for elective middle ear surgeries under general anaesthesia were selected for the present study. The study population was randomly assigned to two groups with eighty seven patients in each group. Patients were randomly allocated to receive a combination of dexamethasone 8 mg andondansetron 4 mg considered as group DO or ramosetron 0.3 mg (near the end of surgery) considered as group R by a computer-generated randomization.Primary efficacy variables assessed were the incidence of nausea, retching and vomiting in the first 48h after the surgery.
Results and Discussion: The comparison table shows that the incidence of vomiting in group DO and group R during first 24 hour postoperative period. During 0-2 hours and 2-24hours the p value was 0.7805 and 0.5891 respectively which were statistically insignificant.It also shows that the incidence of nausea during 0-2 hour interval ,2-24 hour interval and 24-48 hours,the p value was 0.6544 and 0.5235 and 0.3694 respectively which was found to be statistically insignificant.
Conclusion(s): Ramosetron 0.3mg is effective in preventing postoperative nausea and vomiting in elective middle ear surgeries
The need for rescue antiemetics in early as well as delayed postoperative period (within 48 hours) is reduced with Ramosetron 0.3mg. Ramosetron 0.3mg is equally effective and comparable to combination of Dexamethasone 8mg and Ondansetron 4mg for prevention of early and late PONV in patients undergoing elective middle ear surgeries
References:
Thomas R and Jones N. Prospective, randomized, double blind comparative study of dexamethasone, ondansetron and ondansetron plus dexamethasone as prophylactic anti- emetic therapy in patients undergoing day case gynecological surgery.Br J Anaesth.2001;87:588-92.
Sameer Desai, M.C.B, Santhosh and Rashmi Annigeri. Comparison of antiemetic effect of Ramosetron v/s Combination of Dexamethasone and Ondansetron in middle ear surgeries. A double blinded randomized clinical study. Saudi J Anaesth 2013;7;258-8.

01AP01-08
Effects of sevoflurane and propofol on heat shock protein 70 expression in cancer cells

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Background and goal of study: Growing evidence emerges on the distinctive effects of inhalational and intravenous anesthesia on the risk of cancer-free survival. Mechanisms underlying the occurrence of this difference include direct interaction of the anesthetic molecules with specific ligands in cancer cells, immune alterations due to exposure to the anesthetic drugs, and exacerbation of concomitant diseases under various perioperative conditions. The aim of the present study is evaluation of the effects of propofol (intravenous anesthesia) and sevoflurane (inhalation anesthesia) on the level of heat shock protein 70 (HSP70), the key factor of cell defense.
Materials and methods: Three cell lines: human lung adenocarcinoma A549, human colorectal carcinoma DLD1, and murine colorectal carcinoma CT26 were exposed to propofol (2,5 and 5 μg/ml) or sevoflurane (2,2 and 4,4 vol. %) during 4 hours. Chemotherapeutic drugs, such as Doxorubicin (1 and 5 μL) and 5-fluorouracil (5 and 50 μg/ml), were added to cell culture medium after the exposition to the anesthetics. After 18 hours, the level of HSP70 expression was evaluated using the Western blot analysis.
Results and discussion: Relative HSP70 concentrations in A549, DLD1 and CT26 cell lysates after the exposure of cells to propofol in different concentrations are presented in Table 1. Gel electrophoresis of HSP70 from A549, DLD1 and CT26 cell lysates after the exposure of cells to propofol is presented in Figure 1. Sevoflurane did not lead to any significant changes in HSP70 synthesis.

Cell line	Propofol 2,5 μg/ml	Propofol 5 μg/ml
A549	5,3 ± 0,2	7,6 ± 1,1
DLD1	3,3 ± 0,4	4,5 ± 0,6
CT26	2,0 ± 0,2	3,1 ± 0,4

Table 1. Relative HSP70 concentrations in A549, DLD1 and CT26 cell lysates after the exposure of cells to propofol in different concentrations; the concentration of HSP70 in the unexposed sample of each cell line is taken for 1,0.

Conclusion: Exposure to propofol is associated with a significantly higher level of HSP70 expression. This effect is dose-dependent and observed in all the studied cell lines.

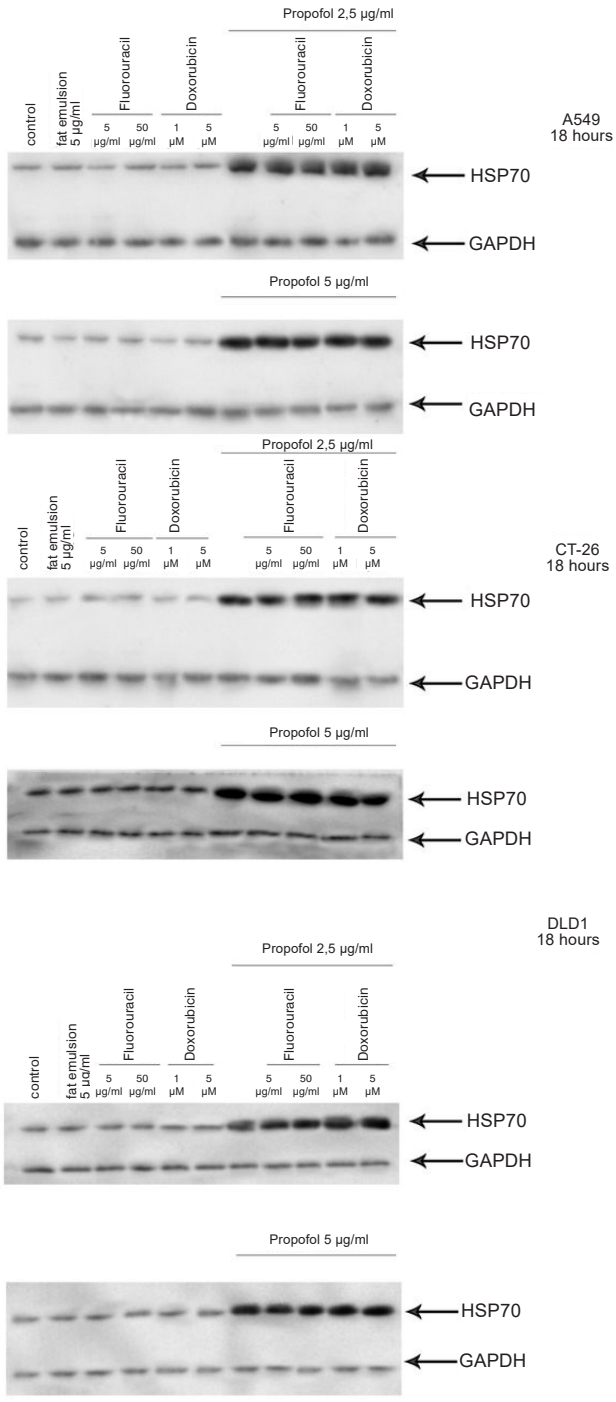

Figure 1.

01AP01-09
Efficacy of remimazolam for induction and maintenance of general anaesthesia in comparison to propofol: post-hoc integrated analysis of four clinical trials

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Background and Goal of Study: Remimazolam is an ultra-short acting, fast onset/ fast offset benzodiazepine for intravenous use in procedural sedation, general anaesthesia (GA) and sedation in intensive care unit. The aim of this work was to evaluate the efficacy of remimazolam versus propofol for induction and maintenance of GA.
Materials and Methods: This post hoc analysis was performed on the integrated data from four randomized, propofol controlled, clinical trials. Two of these trials enrolled patients undergoing mixed elective surgeries and two patients undergoing elective cardiac surgery. For GA induction, two remimazolam doses were evaluated, low (6mg/kg/h and 6mg/min) and high (12mg/kg/h). For GA maintenance, all remimazolam patients were dosed in the same range and were therefore pooled into a single group and compared to propofol patients.
Results and Discussion: Remimazolam was non-inferior to propofol ($p<0.0001$) as per efficacy definition: successful conduct of the surgical intervention without the need for rescue sedative medication. 557/562 (99.1%) of remimazolam and 188/189 (99.5%) of propofol patients reached the efficacy endpoint. Both remimazolam induction doses (low and high) induced loss of consciousness (LoC) in 100% of patients and led to successful intubation in >99% of patients (99.5% remimazolam low and 99.4% remimazolam high vs 100% propofol, $p <0.0001$ for non-inferiority). The time to LoC was longer with low versus high remimazolam induction dose (median of 120s vs 85s) but similar to propofol (median of 120s). To characterize recovery from GA, the time needed from stop of remimazolam or propofol administration to:
1) extubation,
2) eye opening and/or response to verbal command and,
3) orientation, was calculated.
Patients receiving remimazolam took between 13 min (median time to eye opening) and 23 min (median time to orientation) to recover from anesthesia. This was overall 2.5-4 minutes longer as compared to patients receiving propofol. These differences were smaller in patients who were older and of higher ASA status as well as when lower remimazolam doses were used during the last hour of surgery, suggesting that tapering of remimazolam dose towards the end of procedure could facilitate faster recovery.
Conclusion(s): Remimazolam is non-inferior to propofol in its ability to induce and maintain GA. Recovery from GA is slightly longer after remimazolam as compared to propofol, however the difference is not considered clinically relevant.

01AP01-10
Haemodynamic superiority of remimazolam compared to propofol across controlled trials for general anaesthesia

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Background and Goal of Study: Remimazolam is a new benzodiazepine for use during procedural sedation and general anaesthesia (GA). Hypotensive events during anaesthesia and post-operatively, are associated with myocardial and renal injury. An integrated analysis was performed to compare the incidence of hypotensive events in patients who received remimazolam with those who received propofol during GA.
Materials and Methods: Four controlled studies were performed comparing remimazolam with propofol for induction and maintenance of GA.
Data relating to blood pressure and vasopressor use was pooled across the four studies and comparisons made between remimazolam and propofol for hypotensive events.
Results and Discussion: When the MAP (mean arterial pressure) of remimazolam was compared with propofol using the reverse adjusted AUC (RAAUC) method, the RAAUC for MAP < 65 mmHg was significantly greater in the propofol group than the remimazolam group across different phases of anaesthesia (Table 1).

Group [N]	Extended Induction* Mean RAAUC±SD z-test vs propofol	Surgical Intervention Mean RAAUC±SD z-test vs propofol	Recovery Mean RAAUC±SD z-test vs propofol
Propofol [N=189]	375.5 ± 943.9	95.4 ± 209.0	69.5 ± 154.1
Remimazolam [N=561]	199.8 ± 593.6 P<0.0001	54.1 ± 138.6 p<0.0001	34.9 ± 81.9 p<0.0001

** Start of IMP to first skin incision*

Table 1. Comparison of RAAUC for MAP <65 between remimazolam and propofol

A sub-group analysis of RAAUC for MAP < 65 mmHg in ASA III/IV patients revealed a lower RAAUC in the remimazolam group than the propofol group across extended induction, surgical intervention and recovery (259.2 Vs 462.7 {p=0.0034}, 70.5 Vs 125.2 {p=0.0109} and 48.0 Vs 97.1 {p=0.0015}).
Vasopressor use was explored to determine whether the large RAAUC in the propofol group could be due to underdosing of vasopressors. However, the converse was noted with higher vasopressor doses used within the propofol group than the remimazolam group (638±947 μg Vs 341±690 μg {p<.0001}). In ASA III/IV patients, vasopressor use was higher in the propofol group than the remimazolam group (798±802.9 μg Vs 521±709.3 μg, {p=0.0002}).
Conclusion(s): The absolute drop in MAP < 65 mmHg was more profound, and its duration significantly longer in patients who received propofol in comparison to remimazolam, despite higher vasopressor use in propofol patients. The haemodynamic benefits of remimazolam are most obvious in ASA III/IV patients who tend to be older with multiple co-morbidities.

01AP01-12
Environmental risk assessment of the new benzodiazepine anaesthetic remimazolam

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Background and goal of study: Remimazolam (RMZ) is an ultrafast acting benzodiazepine for procedural sedation and general anaesthesia. To meet a standard requirement for new drugs, an Environmental Risk Assessment was performed according to regulatory guidelines. Such assessments might be particularly useful for a new anaesthetic drug since current anaesthetic drugs have a strong negative impact on the environment.
Materials and methods: In a first set of studies, RMZ's effects on aquatic organisms were assessed by exposing algae, daphnia and fish to concentrations up to 100 mg/l for 3-28 days. Additionally, the respiration rate of activated sludge was assessed for a potential effect on microorganisms of RMZ at concentrations of up to 320 mg/L. Adsorption to sewage sludge was investigated to assess whether remimazolam would reach soil as a consequence of spreading sludge on agricultural land and affect soil organisms. For detection of a potential impact on sediment-dwelling organisms, mite larvae were exposed to RMZ up to 1g/kg sediment.
Results and discussion: Based on a worst case scenario (assuming that 1% of the EU population are exposed to a dose of 2.5g RMZ, once per year, all of which will end up in the surface water), the maximum surface water concentration was estimated at 0.0347 µg/L. In tests on the sensitivity of aquatic organisms, the lowest no-effect concentration was established in the fish early-life stage test, in which a concentration of 10 mg/L had no impact on fish exposed from pre-hatching to 28d post-hatching. No effects on aquatic microorganisms were observed up to a concentration of 180 mg/L. No effect on sediment-dwelling organisms was observed up to the highest concentration tested, i.e. 1g/kg sediment. Remimazolam is unlikely to have any effect on soil organisms.
Overall, no environmental effects were observed at concentrations up to 10,000-fold higher than the environmental exposure calculated in the worst case scenario.
Conclusion: RMZ is highly unlikely to pose a risk to the aquatic or soil environments. Moreover, no potential for secondary poisoning or bioaccumulation in fish is discernible. RMZ is unlikely to be persistent in the environment. These results suggest that environmental risks posed by remimazolam are minimal or absent. This is in contrast to other IV anaesthetics such as propofol, which bioaccumulates and is toxic to aquatic organisms (Diprivan, Material Safety Data Sheet).

01AP01-13
Effects of dobutamine on hepatic blood flow: preliminary results

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Background and goal of study: Dobutamine (DOBU) is a frequently used inotropic agent. Hepatic blood flow (HBF) is altered by adrenergic stimulation[1]. DOBU may directly affect HBF and additionally improve HBF indirectly by increasing cardiac output. Although previous studies reported improved global splanchnic blood flow, the effect on HBF is not clear. The aim of the study was to evaluate the effect of DOBU administration on HBF.
Materials and methods: After ethical committee approval and written informed consent, patients scheduled for pancreaticoduodenectomy were included. All patients received standard anaesthesia using target-controlled anaesthesia with propofol (Schnider) and remifentanil (Minto). Pulsioflex™ was used to measure, guide and record haemodynamic data. HBF was measured using ultrasound transit time (Medi-Stim AS). After baseline measurements (T1), DOBU was started at 2.5 mcg/kg/min (T2) and increased to 5 mcg/kg/min (T3). A minimum of 10 minutes were allowed between each measurement. Haemodynamic variables, indexed hepatic arterial flow (HAFi) and indexed portal vein flow (PVFi) were simultaneously measured and recorded. Linear mixed modelling was used for statistical analysis.
Results and discussion: A total of 11 patients were included. DOBU dose-dependently increased cardiac index and heart rate. The predicted increase in PVFi was 93 $ml.min^{-1}.m^{-2}$ (+/- 19 $ml.min^{-1}.m^{-2}$) at T3 ($p < 0.05$) and the predicted decrease in HAFi was 43 $ml.min^{-1}.m^{-2}$ (+/- 14 $ml.min^{-1}.m^{-2}$) at T3 ($p < 0.05$). This effect was dose-dependent and more pronounced at higher dosages of DOBU but the resulted net effect on total HBF was not statistically significant (see table 1).

	T1	T2	T3
Total $HBF_{indexed}$ ($ml.min^{-1}.m^{-2}$)	490 (145)	515 (139)	540 (129)
Total $HBF_{relative}$ (% of CI)	16.7 (4.5)	15.9 (4.1)	16.2 (4.2)
$HAF_{indexed}$ ($ml.min^{-1}.m^{-2}$)	131 (92)	111 (57)	88 (48)
$HAF_{relative}$ (% of CI)	4.4 (2.8)	3.4 (1.8)	2.7 (1.4)
PVF_{index} ($ml.min^{-1}.m^{-2}$)	358 (90)	404 (130)	452 (125)
$PVF_{relative}$ (% of CI)	12.3 (3.3)	12.4 (3.5)	13.6 (3.9)
CI ($L.min^{-1}.m^{-2}$)	2.9 (0.4)	3.3 (0.3)	3.4 (0.5)

Table 1: data are mean (SD)

Conclusion(s): DOBU in incremental dosages had an opposing effect on PVFi and HAFi. The net effect on total HBF as such, was minimal.
References: 1. Gelman S, Mushlin PS. *Anesthesiology* 2004;**100**:434–439.

01AP02-01
Is NOL index variation with surgical incision able to predict opioid consumption?

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Background and goal of study: NOL-guided anesthesia results in reduced pain and a lower risk of over or underuse of opioids and associated complications. Given that pain perception is variable and individual, the aim of the present study was to assess if the sole variation of the NOL index (DNOL) after a standardized surgical incision, correlates with the opioid consumption during and after surgery? With other words, could the DNOL be used as an individually specific predictive marker for the need for analgesia?
Materials and methods: After IRB approval, written informed consent was obtained from 30 female ASA 1-2 patients scheduled for laparoscopic gynecological surgery).
Anesthesia was standardized. Propofol TCI was guided to obtain a constant BIS value between 40-60 and remifentanil (Minto model) infusion was started at Ce of 4 ng/ml. Intubation was facilitated by using rocuronium bromide (0.9 mg/kg).
Remifentanil infusion was adjusted according to NOL values, by increments or decrements of 0.5 ng/ml. The difference between the baseline NOL index before and right after incision was calculated and defined as DNOL.
After surgery, the patients were awakened and transported to the PACU, where they received aPCA morphine pump. The remifentanil consumption during GA and the morphine consumption in the first 24 hours were recorded. Total consumption of propofol and remifentanil was then indexed to weight and duration of surgery.
Results and discussion: From the initial 30 patients 3 were excluded from the study because of problems with data collection (2) and hemmorhage (1).
The DNOL value at the begin of the surgery was compared by linear correlation test to the remifentanil and postoperative morphine consumption (indexed). There was neither a significant correlation between the D NOL and remifentanil consumption (Pearson r :0.2628, p : 0.4093, r^2:0.06904), nor between the DNOL and 24 hour morphine consumption (Pearson r: 0.03710, r^2:0,001377, p : 0.989).
Conclusion(s): Despite the fact that the NOL seems to be useful for optimizing opioid consumption during general anesthesia, its initial increase after surgical incision is not predictive for individual analgesic titration during and after general anesthesia, at least not in this particular population.

01AP02-02
Opioid free anaesthesia in oncologic gynaecological surgery. Is there any benefit? Retrospective observational study

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Background and goal of study: Opioid Free Anesthesia (OFA) proved influence on immunologic, inflammatory response, and metastatic progression. We hypothesized an influence on postoperative recovery and disease progression of patients undergoing Major Gynecological Oncologic Surgery (MGOS).
Materials and methods: After Local Ethics Committee approval, consecutive consenting patients scheduled for MGOS were included between February 2019 and January 2020 in this observational retrospective study.
We Compared OFA to standard technique used in our institution and assessed its effect on Postoperative SIRS (Systemic Inflammatory Response), hospital stay, postoperative complications in the following 2 months, cancer progression and mortality 6 months and 12 months after surgery. OFA protocol consisted of a Total IntraVenous Anaesthesia of Propofol, a Dexmedetomidine infusion of 0,8-1,0 mcg/kg/h, together with 0,2-0,3 mg/kg ketamine and lidocaine 1,5 mg/kg in the first hour of surgery. The standard anaesthetic protocol included opioids (Fentanyl 2mcg/kg at induction, and remifentanyl infusion 0,1-0,2 mcg/kg/min) and volatile agents (sevoflurane or desflurane). Patients in both groups received a regional block when possible, dexamethasone 8 mg at induction and paracetamol 1g plus dexketoprofen 50mg at the end of surgery. Continuous variables were compared using unpaired t-test (or Mann–Whitney U test) and categorical variables by Chi-square test. Statistical significance was set at $p < 0.05$.
Results and discussion: 132 patients were included, with no significant demographic differences between groups. In the control group, 11 (16,6%) patients presented surgery-related infection within the next 60 days compared to 2 (3%) patients in OFA group (P=0.016). Surgical site and urinary tract Infection were the most common. No significant differences were found for postoperative SIRS (C- Reactive Protein (P=0.116)), total hospitalization time (Control: 4.9+ 6.0 days; OFA: 5.4+5.7 days, P=0.145), disease progression at 6 months (Control: 19.7%; OFA: 16.7%, P=0.822) and 12 months (Control:28.8%; OFA: 28.8%, P=1) and mortality at 12 months between groups (Control: 4.5%; OFA:4.5%, P=1).
Conclusion(s): Patients receiving OFA for MGOS may develop less postoperative infections than others undergoing anesthesia including opioids. No effect was observed for hospital stay, disease progression after 6 and 12 months and 1 year mortality.

01AP02-03
Advantage of intravenous fentanyl use for extubation induced cough prevention after thyroid surgery. A randomized controlled trial

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Background and goal of study: During tracheal extubation endotracheal tube can cause coughing, agitation and changes in the hemodynamic parameters. Extubation induced cough after thyroid surgery increases risk of postoperative bleeding which is a life threatening complication. The Difficult Airway Society recommends use of remifentanil prior to extubation for smooth and safe extubation [1]. The goal of study was to evaluate the benefits of intravenous fentanyl for prevention of extubation - induced cough during thyroid surgery.
Materials and methods: Study was performed in Hospital of Lithuanian University of Health Sciences Kaunas Clinics Anaesthesiology department. ASA class I - III patients who were scheduled for elective thyroid surgery and met inclusion criteria were chosen for the study. Patients were randomly divided into two groups: A and B. Group A patients received 0,05 mg fentanyl intravenously up to 30 minutes before tracheal extubation, standard practice was performed on group B. Data describing demographics, hemodynamic parameters before and after extubation, agitation level, cough during extubation, and fentanyl administration characteristics was collected. Both groups were compared. χ2, Mann–Whitney and Student–t tests were used for comparison of data. p value <0,05 was considered statistically significant.
Results and discussion: 92 patients were randomized - group A (n = 41 (44,6%)) and group B (n = 51 (55,4%)). Sex, age, ASA class did not differ between the groups. To determine the occurrence of cough during the extubation data of 84 patients was analyzed: group A n=38 patients, group B n=46 patients. Cough occurred for 8 (21,1%) patients in group A, and for 21 (45,7%) in B group.
Comparing two groups by cough occurance during extubation, statistically significant more frequent cough was observed in group B compared to group A (p=0,02). There were no statistically significant differences between groups while comparing haemodynamic parameters and agitation levels (p>0,05).
Comparison of fentanyl administration between groups resulted in a statistically significant shorter (p< 0,001) time from the last fentanyl dose to extubation in group A (22,5 ± 6,3 min) than to group B (49,1 ± 16,9 min). There was no statistically significant difference between total fentanyl doses (p = 0,167) and duration of surgery between the groups (p = 0,621).
Conclusion: An intravenous dose of 0,05 mg fentanyl 30 minutes before extubation statistically significantly reduced the incidence of cough during extubation**.**
References: 1. Mitchell, V., Dravid, R., Patel, A., Swampillai, C. and Higgs, A. (2012), Difficult Airway Society Guidelines for the management of tracheal extubation. Anaesthesia, 67: 318-340.

01AP02-04
Personalized scheme of opioid administration during coronary artery stenting

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Background and goal of study: Opioids remain the key drugs used for nociception control. Both the sensitivity to drugs and the occurrence of side effects depend on individual characteristics, pharmacogenetically determined metabolism, sex, functions of the patient's body systems, drug interaction, and many other reasons.
The aim – to study an opportunity for a new personalized scheme of fentanyl administration for coronary artery stenting.
Materials and methods: Ninety patients with ischemic heart disease who underwent planned stenting of the coronary arteries were studied. The patients who underwent surgery were evenly divided into three study groups, depending on the model of the intraoperative analgesic sedation and the approaches to anesthesia.
The first comparison group consisted of patients who received slow intravenous administration of diazepam and fentanyl solutions. The second comparison group consisted of patients with balanced administration of fentanyl and propofol solutions to provide analgosedation at the level of conscious anesthesia. The study group consisted of patients with a personalized approach to the administration of opiates, which consists of assessing the response to a bolus of 1,5 μg /kg fentanyl on a Ramsey scale.
Thus, in the positive test to maintain analgesia was administered 0.5 μg / kg for 1 h, in the weakly positive test - 1.5 μg / kg in 1 h, and in the negative - 2.5 μg / kg in 1 h. Analgesic sedation at the level of conscious anesthesia (III by Ramsey) was maintained by propofol infusion.
Results and discussion: A usage of a personalized scheme of fentanyl administration for stenting of the coronary arteries, compared to the standard sedation using a combination of diazepam and fentanyl, was accompanied by better indicators of intraoperative blood saturation with oxygen and carbon dioxide, lower blood pressure after surgery, lower level of stress markers, as well as a lower frequency of detecting episodes of perioperative pain of various origins.
Conclusion(s): A method of personalized anesthesia was elaborated, based on an individual scheme of fentanyl administration («fentanyl test») during coronary artery stenting. Its usage is safe (due to the optimal parameters of gas exchange and hemodynamic and fewer side effects, such as nausea and residual sedation) and effective (due to the lower level of stress markers and less frequent complaints of pain of various origins) than when the routine technique was used.

01AP02-05
Remifentanil versus myorelaxant for association with hypnotic during rapid sequence intubation: a non inferiority simple blind randomized controlled trial in 1150 patients

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Background and Goal of Study: Myorelaxant agents are recommended to achieve muscle relaxation and facilitate tracheal intubation (TI) during rapid sequence induction in patients at risk of pulmonary aspiration of gastric contents. However, opioids are frequently used in this setting. Whether remifentanil is non-inferior to myorelaxant for the association with hypnotic during rapid-sequence intubation of adults at risk of inhalation remains controversial.
Materials and Methods: In a multicenter, randomized, open-label, noninferiority trial, conducted in fifteen French anesthesia units, we randomly assigned 1150 adults at risk of inhalation and undergoing TI to receive myorelaxant (1 $mg.kg^{-1}$ succinylcholine or 1 $mg.kg^{-1}$ rocuronium) or remifentanil (bolus of 3 to 4μg/kg) immediately after the injection of a hypnotic. The primary outcome was TI without major complications. The prespecified noninferiority margin was 7.0 percentage points. The primary outcome was assessed in all randomized patients (intention-to-treat (ITT) population) and in all patients with known primary outcome who received their assigned treatment and (per-protocol (PP) population). In the case of noninferiority demonstration, a superiority test was planned *a priori*. Secondary endpoints were hemodynamics and respiratory parameters within the first 10 min after anesthesia induction, quality of TI and the mains complications occurring in the recovery room or at day seven.
Results and Discussion: Between October 2019 and April 2021, 1150 patients were randomly assigned to myorelaxants (n=575) or remifentanil (n=575), and 1130 were kept in the PP population.
Baseline characteristics were similar in the two groups. In the ITT population, TI without major complication occurred in 408 (71.6%) participants in the myorelaxant group and 374 (66.1%) participants in the remifentanil group (between-group difference adjusted for randomization strata and center, -6.12%, 95%CI -11.67 to -0.57), demonstrating the inferiority of remifentanil. In the PP population, 403 (71.3%) patients in the myorelaxant group and 374 (66.2%) patients with remifentanil had TI without major complication (adjusted between-group difference -5.76%, 95%CI -11.32 to -0.19), demonstrating the inferiority of remifentanil.
Conclusions: Remifentanil was inferior to myorelaxant for TI without major complications in adults at risk of inhalation of gastric content. The place of remifentanil for anesthetic induction remains to be defined.

01AP02-06
Relationship between level of hypnosis and hemodinamics parameters in patients under general anesthesia with target-controlled infusion of remifentanil and propofol

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Background and Goal of Study: Currently, target-controlled infusion (TCI) technology is becoming a routine part of the anesthesia technique for the practitioner. With our study we wanted to analyze for the first time in our hospital the relationship between hemodynamic behavior and the level of hypnosis in anesthetic management with remifentanil and propofol by TCI in patients undergoing major abdominal surgery.
Materials and Methods: After approval by the ethics committee, a prospective observational cohort study was performed between June and September 2021. Forty patients scheduled for major abdominal surgery who met the inclusion criteria were selected. Invasive monitoring was performed according to the complexity of the intervention with the HemoSphere advance monitor platform from Edwards lifescience. For induction and maintenance, the Minto model was used for remifentanil and Schnider (effect mode) for propofol using B.Braun Infusomat Space pumps, and rocuronium was used as a muscle relaxant. Statistical differences were assessed by comparison of means by Student's T test. The level of hypnosis was also monitored using the Bispectral Index (BIS). Response time to verbal commands, autonomic breathing, recovery of orientation and postoperative complications were assessed.
Results and Discussion: The induction dose of remifentanil used was 2.61 ± 0.30 ng/ml and for propofol 3.55 ± 0.40 mcg/ml. The maintenance doses of remifentanil of 1.53 ± 0.50 ng/ml and the dose of propofol was 2.83 ± 0.60 mcg/ml in both cases lower than those used with conventional TIVA (p=0.001).The anesthetic time was 96.25 ± 2 minutes. In 90.8% of the cases the BIS remained between 40-60. Recovery data was faster compared to our experience with conventional TIVA; response time to verbal commands was 2.10 ±1.1 minutes and extubation time was 7.11 ± 2.00 minutes. Discharge time from anesthetic recovery to the ward was 26.23 ±3.21 minutes. No cases of intraoperative awakening or other postoperative complications derived from anesthesia were reported, nor secondary findings due to the use of drugs.
Conclusion(s): This study suggest that the use of TCI systems allows achieving greater hemodynamic stability by using the appropriate doses during surgery with an optimal anesthesia recovery profile compared to conventional TIVA, reduces the doses of propofol and remifentanil and therefore the costs. It also reduces recovery time without associated complications.

01AP02-07
Does remifentanil-based anaesthesia reduce muscle relaxant usage in laparoscopic bariatric surgery?

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Background and Goal of Study: Opioid-free anaesthesia is gaining in popularity, but there may be disadvantages. One benefit of short-acting high-dose opioids is to totally suppress respiratory drive, which in theory should reduce the need for neuromuscular blocking drugs (NMBD).
We tested this hypothesis by evaluating a large dataset of patients undergoing bariatric surgery.
Materials and Methods: Anaesthesia charts were reviewed and data extracted for patients who underwent uncomplicated primary laparoscopic gastric bypass (RYGB) using Rocuronium. We compared NMBD doses between those that did, and did not receive a Remifentanil-based technique. Statistical analysis was using a Mann-Whitney test, significance at $P < 0.05$ (*)
Results and Discussion: Over the period 2019-20, 392 patients underwent primary bariatric surgery under our care. Full data for this analysis was available for 233 patients. Females represented 78% of the group; the median BMI was 47 (IQR 43-52); median age was 49 (IQR 39-56).
Results are shown in the table below.

	TBW (kg)	LBM (kg)	Group Size (% Female)	Total Roc (mg)	Total Roc (mg/kg_LBM)
Remifentanil	132.5	62.4	123(82%)	86	1.37
No Remifentanil	141.7	66.5	110(73%)	86	1.29
P Value	0.042 *	0.043 *	0.11 ns	ns	0.036 *

TBW: Total Body Weight LBM: Lean Body Mass
Table.

Conclusion: We were unable to demonstrate a reduction in Rocuronium dose with Remifentanil maintenance.
This study has some limitations. The dataset is small, but has shown an increasing use of Remifentanil/Propofol TIVA in recent years (presumably driven by environmental concerns). It also shows an imbalance in the proportion of female patients between groups (ns). But if the hypothesis was correct, both of these would be expected to lead to a reduction in NMBD requirement; this analysis shows the opposite.
Prior literature has suggested that Remifentanil is insufficient without NMBD to optimise surgical conditions in bariatric surgery.[1] Our results extend beyond this and certainly do not support the hypothesis that Remifentanil maintenance reduces NMBD requirements.
References:
1. Mulier, J P & Dillemans, B. Deep neuromuscular blockade versus remifentanil or sevoflurane to augment measurable laparoscopic workspace during bariatric surgery analysed by a randomised controlled trial. Journal of Clinical Anesthesia and Pain Medicine, 2018 2(1)

01AP02-08
The effect of anaesthetics propofol and sevoflurane in combination with remifentanil on the expression of endothelial adhesion molecules after TNF-α stimulation

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Background and Goal of Study: The vascular endothelium is known to modulate the inflammatory response during major surgery. Since proinflammatory cytokines and endothelial adhesion molecule expression are correlated with endothelial dysfunction, the aim was to study the effect of anaesthetics on endothelial adhesion molecule expression and inflammatory cytokine response in TNF-α exposed human umbilical vein endothelial cells (HUVECs).
Materials and Methods: HUVECs were stimulated with TNF-α (10 ng/mL) for 4 hours to simulate a major surgical stressor. As anaesthetic agents, Propofol (2, 5, and 10 μg/mL), Sevoflurane (0.3, 1.0, and 2.0 MAC) and as an opiate Remifentanil (2, 5, and 10 ng/mL) were used in three clinically relevant concentrations. In addition, the effect of Propofol or Sevoflurane in combination with Remifentanil were studied. mRNA levels of endothelial adhesion molecules E-selectin, VCAM-1, ICAM-1, and inflammatory cytokines IL-6 and IL-8 were studied by RT-qPCR, protein levels were studied by Western blot or ELISA.
Results and Discussion: Propofol or Remifentanil did not affect adhesion molecules or inflammatory cytokine expression in TNF-α stimulated HUVEC compared to control (Figure 1). In contrast, Sevoflurane strongly diminished mRNA and protein expression of E-selectin, VCAM-1, ICAM-1, IL-6, and IL-8 in TNF-α stimulated HUVEC (Figure 1). Addition of Remifentanil to Sevoflurane did not change mRNA or protein expression of adhesion molecules or inflammatory cytokines in TNF-α stimulated HUVEC compared to Sevoflurane alone.
Conclusion(s): Sevoflurane inhibited the endothelial response to TNF-α, where Propofol or Remifentanil, did not. The choice of anaesthetics may influence the inflammatory response by endothelial cells during major surgery

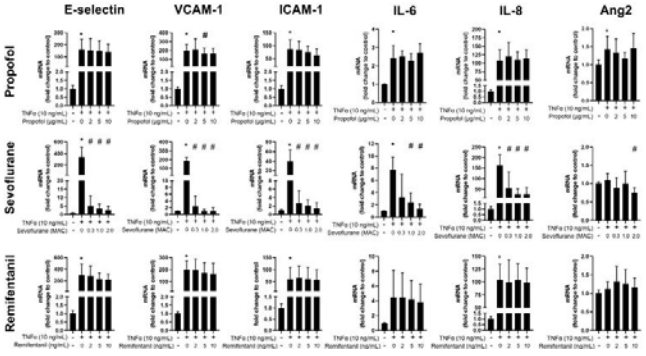

Figure 1. Effects of Propofol, Sevoflurane, and Remifentanil exposure on adhesion molecule expression and mRNA levels of inflammatory cytokines (IL-6, IL-8, and Ang2) in TNFα-stimulated HUVEC

01AP02-09
Influence of intraoperative nociception during orthopaedic joint surgery under supplementary regional anaesthesia on postoperative pain experience and postoperative opioid consumption

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Background and goal of study: Intraoperative measurement of nociception for optimising anaesthesia management has been technically possible for years[1], but has not yet become established as a standard procedure. Of interest is whether increased nociception levels under general anaesthesia have an influence on the postoperative outcome in terms of higher pain levels or increased need for analgesics and if this could be avoided as a consequence.
Materials and methods: In 45 patients undergoing knee or hip surgery under general anaesthesia with preoperative nerve block (single shot), the intraoperative analgesia level was examined using a nociception (NOL) monitor from Medasense. The anaesthesia regime was according to hospital standards. All patients received a questionnaire regarding their pain (24 and 48 h after surgery).
We analyzed NOL values within 60s after skin incision, the median NOL throughout surgery, as
well as NOL and HR at the end of surgery. It was investigated whether corresponding changes in NOL levels during anaesthesia and specifically defined stimuli such as intubation and skin incision correlate with opioid consumption (analysed by linear regression models) and postoperative pain.
The results of the postoperatively measured Numerical Rating Scale (NRS) was grouped into low vs. severe pain (NRS≤3 vs. >3). The difference between groups was compared by use of Independent-Samples Mann–Whitney U Test. The value of the NOL score to predict severe pain (NRS>3) was evaluated using receiver-operating curves.
Results and discussion: Patients with NRS>3 in movement at the first postoperative day showed an increase in NOL at skin incision while this was not the case in patients with NRS ≤3 (119% vs. -12.3% NOL change, p=0.005). This effect may indicate insufficient regional anaesthesia and was less pronounced on the second postoperative day. There was no association between NOL changes and NRS scores at rest, nor were there significant differences in opioid consumption.
Conclusion(s): NOL may be used to evaluate the effectiveness of peripheral nerve blocks both for intraoperative and postoperative analgesia in joint replacement surgery.
References: 1. Meijer FS et al.: Does nociception monitor-guided anesthesia affect opioid consumption? A systematic review of randomized controlled trials. J Clin Monit Comput. 2020 Aug;34(4):629-641.

01AP02-11
Synthetic opioid class Nitazenes cause profound and long lasting respiratory depression

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Background and goal of study: The ongoing opioid epidemic increased during COVID-19 pandemic and the emergence of novel synthetic "designer" opioids is complicating situation. One group of synthetic opioids that has gained attention due to its recreational use and association with several overdose deaths are the nitazene opioids (2-benzylbenzimidazole opioids), what lead Drug Enforcement Agency to add isonitazene on the list of controlled substances. Further studies have shown the high potency of the metabolite N-desethyl-isotonitazene, which was similar in potency of isotonitazene itself.
The objective of this study was to compare the pharmacokinetics with regards to respiratory depression between N-desethyl-isotonitazene and fentanyl in vivo rabbit model.
Materials and methods: The study was approved by the local Animal Care Committee and conformed to NIH standards. Adult New Zealand White rabbits (3-4kg) were anesthetized, tracheotomized, ventilated, decerebrated and vagotomized. Phrenic nerve activity was recorded from the c5 rootlet. Phrenic neural activity, respiratory rate, arterial blood pressure, and airway carbon dioxide concentration were recorded. We determined the magnitude and time course of respiratory rate depression from 1mcg/kg N-desethyl-isotonitazene and fentanyl and subsequently the dose required to achieve apnea. Data were collected using LabChart (ADInstrumentes, Australia) and exported to SigmaPlot 11 (Systat Software, USA) for data processing, data plotting and statistical analysis. We determined the respiratory rate using the phrenic neurogram. We removed artefacts, normalized respiratory rate to control frequency and plotted to determined the best fitting curve for each plot. Plots were averaged for each dose and displayed as mean±standard error.
Results and discussion: Fentanyl (1mcg/kg) depressed respiratory rate by 25±5% (n=3) while N-desethyl-isotonitazene caused a 38±2% depression (n=6). Recovery to baseline was 46±8 minutes for fentanyl and 150±15 minutes for N-desethyl-isotonitazene.*N*-Desethylisotonitazene required less than half (4mcg/kg) the concentration of fentanyl (8mcg/kg) needed to cause complete apnea, and time to recover to baseline respiratory rate was longer 201±33 and 64±7 minutes respectively.
Conclusion(s): Nitazenes are potent mu-opioid receptor agonists that cause profound and long lasting respiratory depression.
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01AP02-12
Target-controlled infusion of propofol effect-site concentration for sedation in patients undergoing spinal anaesthesia

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Background and goal of study: It is increasingly common for patients to request sedation for any anesthetic procedure, including spinal anesthesia. Sedation improves patient satisfaction by calming anxiety during the procedure. Target-controlled infusions (TCI) allow anesthesiologists to target constant blood concentrations and respond promptly to signs of adverse events from anesthetic depth. The aim of this study was to evaluate the efficacy, safety and patient satisfaction of propofol TCI for sedation, performed for the first time in our hospital.
Materials and methods: Thirty patients scheduled for urological and trauma surgery received spinal anesthesia with 0.5% hyperbaric bupivacaine 0.5%. After confirmation of the level of sensory blockade, we initiated propofol TCI at 1 mcg/ml at the effect site using the Schnider model and assessed sedation levels using the Alertness/Sedation Scale (OAA/S) and bispectral index (BIS). Routine monitoring included noninvasive blood pressure, heart rate, capnography, electrocardiography, and arterial oxyhemoglobin saturation. Supplemental oxygen was administered by nasal cannula. Patient satisfaction was measured using a visual analog scale (VAS) and a simple questionnaire. Statistical differences were assessed by comparison of means by Student's t-test.
Results and discussion: Propofol maintenance dose was 1.0 mcg/ml ±0.4. BIS values were maintained at 88 ±2. 100% of patients maintained spontaneous breathing during the procedure. No incidents were recorded. Patients showed in the questionnaire a high level of satisfaction with their sedation experience.
Conclusion(s): We applied for the first time in our hospital propofol TCI at the effect site in patients undergoing spinal anesthesia. Propofol TCI correlated significantly with the OAA/S scale and the BIS being useful tools for the evaluation of sedation during spinal anesthesia, the target concentration of propofol was 1.0 mcg/mL for moderate sedation achieving adequate comfort during surgery, with no evidence of complications or adverse effects.

01AP03-01
Effect ofpatient end-tidal carbon dioxide levels on cerebral regional oxygen saturationand inflammatory cytokine concentrationsin elderly patients undergoing laparoscopic radical gastrectomy

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Background: Carbon dioxide levels can affect inflammation and cerebral regional oxygen saturation (rSO_2), a pathophysiological indicator of early postoperative cognitive dysfunction (POCD).
Objective: To compare rSO_2 and postoperative inflammation according to patient end-tidal carbon dioxide ($P_{ET}CO_2$) levels in elderly patients undergoing laparoscopic radical gastrectomy.
Methods: Ninety patients were randomly divided into three groups according to treatment condition:group L (low $P_{ET}CO_2$, 36–40 mmHg), group M (medium $P_{ET}CO_2$, 41–45 mmHg) and group H (high $P_{ET}CO_2$, 46–50 mmHg). Eighty-four patients (age: 60–80 years) scheduled to undergo radical laparoscopic gastrectomy were included in the final analysis.
The indicated $P_{ET}CO_2$ was maintained for patients in each group.
The intraoperative rSO_2 was recorded at timepoints ranging from arrival at the operating room to post-extubation (T0–T6). The Montreal Cognitive Assessment Test (MoCA) and changes in serum concentrations of inflammatory cytokines were measured at 1 h and 1 and 7 d after surgery.
Results: The rSO_2 at T3 (1 h post-skin incision)–T5 (completion of skin sutures) was significantly higher in group H than in group L. The incidence of POCD was significantly lower in group H than in group L (21.4% versus 50%, $P < 0.05$) at 1 d after surgery. At 7 d after surgery, the concentrations of inflammatory cytokines, including interleukin (IL)-6, S100β and neuron-specific enolase (NSE), were significantly higher in group L than in group H.
Conclusion: Our findings suggest that a higher $P_{ET}CO_2$ increases rSO_2, reduces the incidence of POCD and may reduce the inflammation of elderly patients after radical laparoscopic gastrectomy.
Acknowledgements: Grants covering the research: We gratefully acknowledge the financial support of the Education Research Project of Fujian Province (No. JAT170243) and Youth Fund of Fujian Provincial Health Commission (No. 2019-2-19 and 2019-1-47) and the Scientific Research Starting Foundation of Fujian Medical University (No.2018QH1080).

01AP03-02
Anesthetic and perioperative management in a patient with Bernard Soulier syndrome undergoing total abdominal hysterectomy

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Background: Bernard Soulier Syndrome is an autosomal recessive disorder, characterized by prolonged bleeding time and abnormal platelet aggregation. The platelet defect is due to lack of key surface glycoprotein (Gp) Ib-IX-V complex.

Case report: A 50 year old, ASA physical status II, 52 kg female underwent total abdominal hysterectomy. She was diagnosed with Bernard soulier syndrome 3 years back with symptoms of nasal bleed and severe menorrhagia. On admission, her hematological investigations were as following HB:9.8g/dl, Platelet count 90,000/ μl, BT -06 minutes and normal PT, APTT and INR. On preoperative preparation, Platelet - 8 units, packed red cells -2 units, Desmopressin acetate (DDAVP) and Tranexamic Acid were arranged.

Preoperatively, Four units of platelet were transfused in operation theatre prior to induction. IV hydrocortisone 100 mg administered prior to induction. Patient was premedicated with IV midazolam 1.0mg and fentanyl 2 μg/kg. Patient was given iv Propofol 2 mg/kg and Vecuronium 0.1 mg/kg IV to aid tracheal intubation. Gentle laryngoscopy was done and trachea was intubated with cuffed endotracheal tube no.7.5 and maintained via isoflurane 1- 1.5% in 40% O2 in N_2O.

During the 3 hour surgical repair, HLA matched platelets -6 units, fresh whole blood – 3 units and 2 Lt. crystalloids were given in addition to tranexamic acid (25 mg/kg) and desmopressin (0.3 μg/kg). Platelet count on 1st , 2nd ,4th postoperative day were: 76000/μl ,61000/μl, 80000/μl.

Discussion: Transfusion of allogenic platelets is the only available treatment with proven effects for patients diagnosed with Bernard Soulier Syndrome[1]. Tranexamic acid can be used prophylactically as well as in perioperative/postoperative period along with platelets. General anesthesia is superior to regional anesthesia[2]. Hypothermia and hemodilution should be avoided.

References:

1. Mhawech P, Saleem A: Inherited giant platelet disorders. Classification and literature review. *Am J Clin Pathol*2000; 113:176 –90.
2. Prabu P, Parapia LA. Bernard-Soulier syndrome in pregnancy. Clin Lab Haem. 2006; 28:198–201.

Learning points: Perioperative and anesthetic management of patients diagnosed with Bernard Soulier Syndrome should include platelet transfusion, EACA and Tranexamic acid. Agents affecting platelets including halothane and sevoflurane should be avoided. Potential benefits of desmopressin and corticosteroids may be considered. A combined systemic & topical approach to minimize bleeding may be used.

01AP03-03
The use of near-infrared spectroscopy for the measurement of abdominal wall tissue oxygenation during pneumoperitoneum in laparoscopic cholecystectomy

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Background and goal of study: Near-infrared spectroscopy (NIRS) has been developed to monitor cerebral oxygenation. Various studies have investigated its utility in measuring somatic tissue oxygenation and in non-cardiac surgeries. The aim of this study was to determine the effect of pneumoperitoneum on the abdominal wall.

Materials and methods: This prospective study included 70 patients who had elective laparoscopic cholecystectomy. A regional oximetry sensor was placed on the anterior abdominal wall in all patients. Primary outcome measure included preoperative regional tissue saturation (rSO_2) values.

For secondary outcome measure, we recorded VAS scores and tramadol usage at postoperative hours 2, 6, 12 and 24, intra-operative end-tidal CO_2 values, peripheral oxygen saturation (spo2), and abdominal subcutaneous fat tissue thickness.

Results and discussion: The initial rSO_2 value (T1: 75.6 ± 6.64) was significantly higher than those measured at the predetermined time intervals during pneumoperitoneum (T4: 73.4 ± 6.3,T5: 68 ± 8.9, T6: 68 ± 8.9,T7: 66.6 ± 9.4,T8: 65.81 ± 10.2,T9: 65.6 ± 8.8) ($p<0.05$) (Figure 1).

The mean change in rSO_2 between preoperative measurements (T1) and midpneumoperitoneum measurements (T8) was -12.9 ± 11%. This change was found to be negatively correlated with postoperative VAS scores and 24-hour tramadol consumption amounts (Table 1).

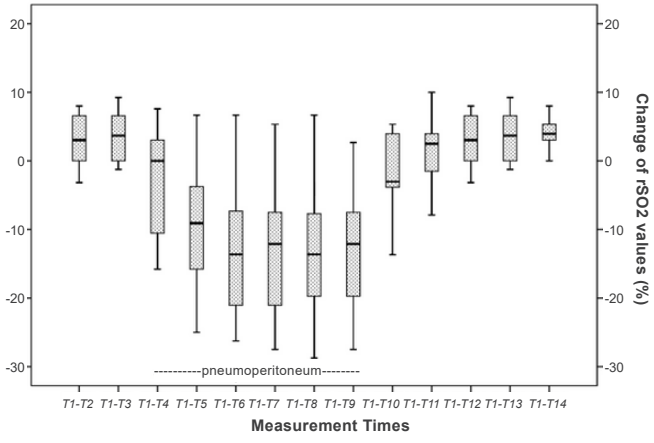

Figure1: rSO2 percentage changes

Change Of Percent T1-T8 %		VAS 2nd hour	VAS 6thhour	VAS 12th hour	VAS 24th Hour	Tramadol consumption (mg) 24th hour
-12,9 ±11		4.4±1.8	3.4±1.1	3.7±1.5	3.6±1.3	128.54±74.7
	*Correlation Coefficient	-0,49	-0,385	-0,266	-0,307	-0,794
	p-Value	**<0.001**	**<0,001**	**<0,026**	**<0,01**	**<0.001**

VAS :Visual Analogue Scale,* Pearson's correlation test

Table 1: Correlation between postoperative VAS scores, 24-hour tramadol consumption amounts and mean change rSO_2 measurements (between T1-T8).

Conclusion(s): The results of the present study show that changes in abdominal wall tissue oxygenation during pneumoperitoneum can be measured with NIRS.

01AP03-07
Bilateral superficial cervical plexus block for thyroid surgery for opioid addict

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Background: Thyroid surgery is moderately painful, but is increasingly being considered as a day-case procedure. Bilateral superficial cervical plexus block (BSCPB) provides an adjuvant technique to facilitate this approach especially for opioid addicts and patients with risk for general anesthesia.
Case report: A 46-year-old patient with opioid-heroin dependence was schedule to hospital admition with history of substitution therapy buprenorfin/naloxon 16 mgper day since 2009. He had suspicious thyroid carcinoma and he was scheduled for operation. A non-opioid anesthesia was planned with bilateral superficial cervical block. All the drugs, including naltrexone were continued till the day of surgery.
Strict orders were given to avoid all opioid analgesics till day of surgery. Before starting the block, he was given Ketonal® and Novalgetol® intravenously. The block anesthesia procedure with lidocaine 2% 20 ml on the left and 20 ml on the right in approach 2/3 behind t sternokleidomasteoid muscle in the middle quadrant of 10 ml and 5 ml in the cranial and caudal direction. Then the introduction is approached with the inhalation anesthetic Sevoran® (Sevofluran), with a dose of Atracurium of 40 mg (0.5 mg / kg), ventilation with 100% oxygen over a mask for 3 min followed by oral endotracheal intubation, placed on Sevoflurane 2.2%, a mixture of oxygen and air (45% to 55%).
Discussion: If patients are addicted to opiates and are on an elective program, it is necessary to process the patient's electrolyte and protein status in detail,detailed psychiatric examination, titrate drugs preoperatively. The best choice of anesthesia is regional anesthesia if it is feasible and depending on the type of surgery. Patients should be instructed to take their usual oral dose opioid on the morning of surgery.
References:
https://www.unodc.org/res/wdr2021/field/WDR21_Booklet_1.pdf
1. Vadivelu N, Mitra S, Kaye AD, Urman RD. Perioperative analgesia and challenges in the drug-addicted and drug-dependent patient. *Best Pract Res Clin Anaesthesiol*. 2014;28(1):91-101. https://doi.org/10.1016/j.bpa.2014.02.003.
https://www.nysora.com/techniques/head-and-neck-blocks/cervical/cervical-plexus-block/
Analgesic efficacy of bilateral superficial cervical plexus block administered before thyroid surgery under general anaesthesia.
G. Andrieu, H. Amrouni, E. Robin, B. Carnaille, J. M. Wattier, F. Pattou, B. Vallet, G. Lebuffe *BJA: British Journal of Anaesthesia*, Volume 99, Issue 4.

01AP03-08
Perioperative anesthetic management for *ex-vivo* vena cava and liver resection and autotransplantation

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Background: Leiomyosarcoma of inferior vena cava (IVC) is a rare neoplasm affecting approximately 1/100,000 people. Curative therapeutic approach involves challenging operations, such as vena cava and multivisceral resection, with vascular reconstruction.
Case report: A 60 year old female patient was diagnosed with sarcoma of the IVC. Pre-anesthetic evaluation revealed a ASA status III patient, with hypertension and obesity. Imagiologic investigation showed a large retro-hepatic tumor, extending from the diafragm to the renal veins. She was proposed for ex-vivo IVC and liver resection and autotransplantation.
Anesthetic monitoring included invasive radial arterial pressure monitoring, PiCCO® system and central venous pressure monitoring. All invasive monitoring devices were ultrasound guided. Transesophageal ecocardiography was used throughout the procedure both for cardiac output evaluation and determination of surgical margins. Patient normothermia was maintained with the use of a heated water matress, forced-air warming blanket and intravenous fluid heating. The cardiovascular perfusionist was present, in case it was necessary to start extracorporeal circulation.
A midline and full tranverse abdominal incision was made, as well as a midline sternotomy. The liver and IVC were removed. Ex-vivo resection of liver tumoral invasion was achieved under hypothermic oxygenated machine perfusion (HOPE). A vascular graft was used to replace the IVC during the anhepatic phase. Once the liver resection and IVC graft were completed the autotransplantation process began.
A massive hemorrage (MH) ocurred during the hepatic vascular anastomosis requiring transfusion of large volumes of blood components and inotropic support. Transfusion was guided with thromboelastometry. A total of 24 units of packed red cells, 10 units of fresh frozen plasma, 4 units of pooled platelets were transfused. Additionally, fibrinogen and prothrombin complex concentrates were administered. The difficulty in bleeding control at the end of surgery led to the decision to perform an hemostatic abdominal packing.
After 16 hours of surgery the patient was admitted to the intensive care unit with ventilatory and inotropic support. Post-operative course was complicated by multiple organ disfunction and the patient died on post-operative day 3.
Learning points: MH associated coagulopathy can be especially challenging in a surgery that includes an anhepatic phase and reperfusion of ischemic liver.

01AP03-09
Clinical outcome in patient with COVID -19 infection with low opioid multimodal anesthesia and Bilateral erector spine block for spine fusion surgery

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Background: Surgical fixation of spine is accompanied by severe pain, peri- and postoperatively. Applying high doses of opioids for pain treatment is also associated with number of side effects.Bilateral erector spine block (ESP) as part of multimodal anesthesia provides good analgesia and good haemodynamic stability.This speeds up the patients' recovery and shortens the length of hospital stay, which is especially important in COVID positive patients.
Case report: A 46-year-old patient,covid 19 positive,was injured in a landslide and had multifragmentary and compressive fracture of L5 vertebra.The induction in general anesthesia included Midasolam 2 mg,Fentanyl 2 mcg/kg,Propofol 2 mg/kg,Rocuronium 0.6 mg/kg,Ketamine 0.5 mg/kg, Lidocaine 2% 1mg/kg and Sevoflurane 2%.The patient was intubated and placed in prone position.One level above the injury, at level of L4, bilateral ESP block was applied and 2x20 ml Bupivacaine 0.25 + Dexamethasone 2x4 mg was applied.During the operation, the patient received continuously Magensium 1,5 g i Methamisole 2,5 g.The operation lasted 200 minutes and there was no need for additional doses of Fentanyl.The patient was haemodynamically stable,without respiratory complications was extubated after surgery.
Postoperative analgesia was: continuous i.v. Ketamine 0.1 mg/kg/h, Paracetamol 1.0gr/8h, Methamizole 2,5g/12h,Magensium 1,5g/24h,Dexamethasone 8 mg/24h.The pain was monitored postoperatively for 72 hours with VAS score which was from 2 to maximum 4 and no postoperative opioids were given.There was no PONV, no respiratory complications and the patient had normal sleep.
Discussion: Multimodal approach of pain treatment significantly reduces the need for opioids during and after surgery. Many clinical studies proved that multimodal analgesia is best for pain treatment in spinal surgery.[1]
Bilateral ESP promotes reduced opioid use during operation and good postoperative analgesia.[2]
References:
1. Kurd MF,Kreitz T,Schroeder G,VaccaroAR.The Role of Multimodal Analgesia in Spine Surgery.JAmAcadOrthopSurg.2017Apr;25(4):260-268.
2. Finnerty, D.T.,Buggy,D.J.Efficacy of the erector spinae plane (ESP)block for quality of recovery in posterior thoraco-lumbar spinal decompression surgery: study protocol for a randomised controlled trial.*Trials***22,**150(2021).
Learning points: Multimodal anesthesia with ESP block provides less side effects and complications, which is especially important in patients with multiple comorbidities and Covid-19 infection.

01AP03-10
New qEEG base prediction model for POCD during anesthesia: a prospective observational, cohort study

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Background and goal of study: Postoperative cognitive dysfunction (POCD) defined as a prolonged decline in cognitive function after surgery. It is a common complication in elderly patients undergoing major surgery. The goal of the study was to establish a deep learning model for prediction of POCD using qEEG monitoring in patients undergoing general anesthesia during surgery.
Materials and methods: This prospective, multi center, observational , cohort study included patients aged 65 and above undergoing surgery under general anesthesia for a minimum duration of 30 minutes. Following obtained informed consent each one of the participants were requested to fill out a preoperative cognitive assessment using the MOCA validated questionnaire.In the perioperative period patients were connected to an EEG monitor. Real-time qEEG data was recorded in the perioperative period. Study participants were requested to answer the MOCA questionnaire for a follow up period of up to six months. A predication model property of Neuroindex & co was built using 8 EEG features. The model was developed using 50% of the data and tested on the rest 50% of unseen data. POCD was defined as a 1SD (2.98 points) decrease in MoCA score between preoperative and postoperative cognitive assessment.
Results and discussion: Initially 104 participants were enrolled, from three different medical centers. Sixteen patients were excluded from the analysis due to missing data. Number of patients were diagnosed with POCD = 15 (17%). Mean MoCA score of intact patients : Preoperative- 20.3 (SD ± 3.6); Post-21 (SD ± 4.3). Mean MoCAscore in patients with POCD = Pre: 20.2 (SD ± 3.7); Post: 15 (SD ± 3.1). The model achieved an accuracy of 0.9242 with a sensitivity of 0.92 andspecificityof 0.66.
Conclusion(s): The collected study data indicates that the employed study model has a high predication value for POCD in elderly patients undergoing general anesthesia. This modality may be beneficial for future cognitive monitoring in the perioperative setting.
Acknowledgements: We would like to thank Dr. Shai Shemesh, Dr. Sadi Wadeea, Dr. Dror Levine, Dr. Dana Baron Shahaf for that contrubations with data collection and research collaboration.

01AP04-01
Effect of microcirculation restoration outside the topical anesthesia application area during traumatic surgical operations

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Background and Goal of Study: Bupivacaine administration decreases the Pi index which was recorded with the help of pulse oximeter transducer fixed on the upper limb finger during epidural anesthesia [1-3]. To study microcirculation restoration outside the topical anesthesia application area during prolonged epidural anesthesia administration in the course of surgical operations.
Materials and Methods: There was conducted a longitudinal prospective study of 4 patients who had undergone surgical operations with combined anesthesia. During perioperative period the PI was measured using pulse oximeter (OXIMETER, China). Skin microcirculation was studied by means of laser doppler flowmetry (LDF) with the help of portable laser blood microcirculation analyzer (LAZMA PF, Russia). There were a perfusion index (PI) and amplitude-frequency rate.
Results and Discussion: The patients were similar in age, gender, anthropometric measurements, ASA, surgical intervention extent. Before the administration of thoracic prolonged anesthesia the Pi index was 7,45±1,17. At the height of epidural anesthesia the Pi index decreased to 5,11±0,87, upon termination of anesthesia it did not change ramaining 5,90±0,65. Perfusion index dynamics researched with the help of LDF also reflected this index decrease from 26,2 tpu to 21,6 tpu at the same stages. After combined anesthesia administration the perfusion index increased to 29 tpu. The figure shows a diagram of patient microcirculation level during the surgery (red curve).

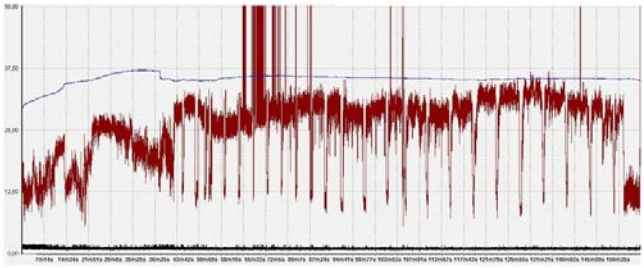

Fig. 1. Skin microcirculation parameter change in the perioperative period: perfusion index (red curve), temperature (blue curve), motion detector (black curve).

Conclusion(s): According to pulse oximetry and laser doppler flowmentry data combined anesthesia during traumatic surgical operations causes skin microcirculation decrease at its height but after the completion of surgery and anasthesia application there takes place restoration with mild increase of microperfusion.

01AP04-04
Spontaneous intracranial hypotension successfully treated with thoracic epidural blood patch: a case report

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Background: Spontaneous Intracranial Hypotension (SIH) is a highly disabling disorder which is believed to be secondary to cerebrospinal fluid (CSF) leakage and/or low CSF pressure. Orthostatic headache is the hallmark symptom. Brain MRI remains the most sensitive imaging test in detecting signs of SIH, which can be normal in about 19% of these patients.
Only a minority of cases respond to conservative measures while lumbar Epidural Blood Patch (EBP) is considered the main treatment for refractory SIH.
Case Report: A 58-year-old female with a previous history of SIH 8 years ago with spontaneous resolution, presented again with generalized headache associated with right eye lacrymation. The pain was aggravated by Valsalva maneuver and relieved by lying down and after caffeine administration.
Neurological examination and laboratory tests were normal. Brain MRI findings were suggestive of intracranial hypotension without dural enhancement following contrast administration. Subsequently, CT ventriculography and myelography with intrathecal contrast were performed which revealed an epidural contrast collection at T2-T3 level extending on the ventral surface of the thecal sac up to T9. The collection could be related to a T2-T3 disc protrusion and a T6-T7 disc herniation. In the absence of response to conservative treatment, the patient was referred for an EBP.
A thoracic EBP was performed in sitting position under aseptic conditions. An 18-gauge Touhy needle was inserted at the T7-T8 level. Epidural space was located at 4 cm using loss-of-resistance to normal saline technique. A total of 12 ml of autologous blood was injected without incidence. The patient was immediately positioned supine for 20 minutes and reported significant clinical improvement within hours. After one-month follow-up, SIH symptoms disappeared.
Discussion: Large-volume lumbar EPB have been widely performed for refractory SIH to treat CSF leaks in the upper segments of the spinal dura which may increase the risk of spinal compression leading to back pain and radiculopathy. Imaging plays a key role in assessing CSF leaks providing the possibility to perform thoracic-targeted EBPs when visualized. Thoracic EBP allows to reduce the amount of injected blood compared to lumbar approach and improves the probability of covering the sites of leaks.
Learning points: Thoracic EBP is a safe technique and may provide a better risk/benefit approach in the management of refractory SIH.

01AP04-05
Inadvertent perioperative hypothermia – a clinical audit's preliminary data collection in an oncology centre

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Background and Goal of Study: Perioperative hypothermia is defined as a core temperature <36ºC. It is a common complication related to anaesthesia and has measurable impact on the outcome of surgical patients, increasing infection rate, bleeding and, possibly, mortality.[1]
Despite being considered a standard for basic anaesthetic monitoring, body temperature monitoring and warming measures are still not consistently performed in our oncology centre's operating theatres. An audit was planned to assess our current status in temperature control management.
Materials and Methods: The audit was held from May to December, 2021, and it included elective inpatient surgeries in adult population. Temperature was measured upon arrival at the operating theatre, pre-anaesthetic induction, 30 minutes and 1 hour after induction and every hour thereafter until the end of the surgery. It was then measured when entering and leaving Post-Anesthesia Care Unit (PACU). Warming measures used were also recorded pre, intra and post-operatively. Events at the PACU, such as shivering and feeling cold, were registered.
Results and Discussion: Data was collected from a universe of 181 patients; the vast majority were submitted to a general anaesthesia (87%), 65% being ASA II patients. Pre-operatively, 22% of the observed patients were already hypothermic, but only 2% were warmed before induction of anesthesia with a forced warm-air device. Intra-operatively, temperature was monitored in 90,6% of the patients. 92% of patients had at least one warming method, although in 23% of them, it was simply warm sheets. 61% of patients were hypothermic when entering the PACU, where only 61% of patients were actively warmed with a forced warm-air device. 42% still left the PACU hypothermic. There was an incidence of 12,7% for shivering and 26% of patients reported feeling cold.
Conclusion: Despite being basic anaesthetic monitoring, temperature is still not routinely considered in all perioperative periods in our Oncology Centre. Patients arriving at the operating theatre are not routinely pre-warmed, nor are all patients conveniently monitored or warmed during surgery, making hypothermia exceedingly common. The available resources are not effectively used. The results of this audit will foster a protocol focusing on hypothermia prevention in surgery in adults.
References:
1. C. Riley and J. Andrzejowski, Inadvertent perioperative hypothermia, BJA Education, 2018, 18(8): 227-233.

01AP04-06
In contrast to spectral measures permutation entropy does not show a biphasic pattern during induction of anaesthesia

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Background and Goal of Study: During anaesthetic-induced loss of responsiveness (LOR) a "paradoxical excitation" of β-frequencies in the electroencephalogram (EEG) can be observed. Thus, spectral parameters, which are often used in commercial anaesthesia monitoring devices, may falsely increase and show a biphasic course during the LOR transition. Non-linear parameters such as permutation entropy (PeEn) may analyse additional EEG information and hence appropriately reflect the change in cognitive state during the transition.
Comparing which parameters correctly track the depth of anaesthesia is important for the design of monitoring algorithms but may also give valuable insight regarding the signal characteristics during state transitions.
Materials and Methods: EEG from 45 patients who received propofol during anaesthesia induction was extracted and analysed around LOR. We calculated different parameters (Figure) and compared their behaviour over the time course of the recording. Friedmans's Test followed by Tukey's Honest Significance Test was performed to evaluate the parameter performance during the transition.

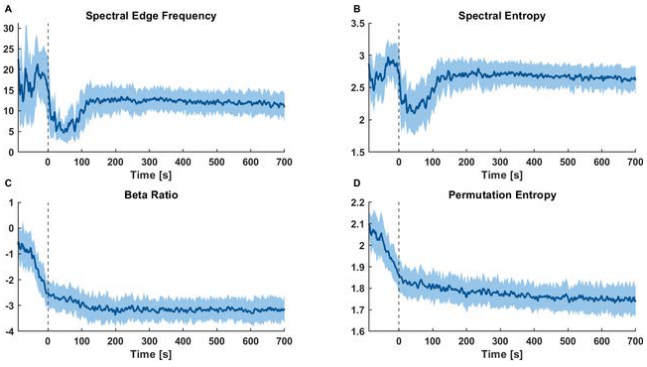

Figure: Group-level time course of parameters across time. Continuous decrease for PeEn and Beta Ratio, while all other parameters increase around the time of LOR (dashed line). Blue shading represents the mean absolute deviation across all patients. N = 45.

Results and Discussion: Within our patient collective we were able to see "paradoxical excitation" during LOR. Spectral edge frequency and spectral entropy showed an increase during LOR, indicating a (paradoxically) higher level of consciousness. PeEn and beta ratio in contrast showed decreasing values, correctly indicating the state transition into anaesthesia. PeEn and Beta Ratio seem to be suitable parameters to monitor the state transition during anaesthesia induction. The decreasing PeEn values may suggest a reduction of signal complexity and information content, which may very well describe the clinical situation at LOR.
Conclusion: PeEn in particular may present a single parameter which is capable of tracking anaesthesia without being affected by "paradoxical excitation".

01AP04-07
The effect of general anaesthesia on energy expenditure: a prospective observational study using indirect calorimetry in patients having non-cardiac surgery

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Background and goal of study: Intraoperative haemodynamic management aims at optimising organ perfusion pressure and blood flow – assuming that this ensures that oxygen delivery meets cellular metabolic needs. Cellular metabolic needs are reflected by energy expenditure. A better understanding of energy expenditure under general anaesthesia could help tailoring perioperative haemodynamic management to actual demands. We thus sought to assess the effect of general anaesthesia on energy expenditure using indirect calorimetry in patients having non-cardiac surgery.
Our primary hypothesis was that energy expenditure under general anaesthesia is lower than preoperative awake resting energy expenditure.
Materials and methods: This prospective, observational study was conducted in the Department of Anesthesiology, Center of Anesthesiology and Intensive Care Medicine, University Medical Center Hamburg-Eppendorf (Hamburg, Germany) between September 2019 and March 2020. We analysed sixty patients having elective non-cardiac surgery.
We measured energy expenditure using indirect calorimetry and compared energy expenditure under general anaesthesia at surgical incision with preoperative awake resting energy expenditure using a Wilcoxon signed-rank test for paired measurements. A P value less than 0.05 was considered statistically significant.

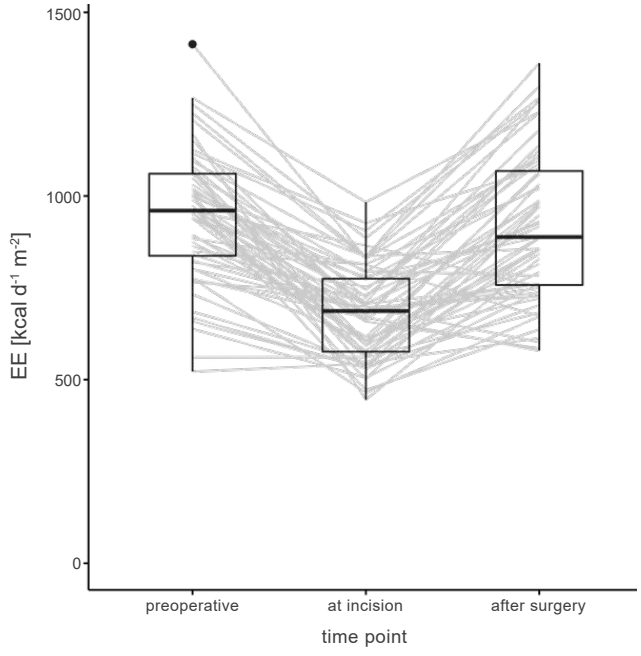

Figure 1.

Results and discussion: Median (interquartile range) preoperative awake resting energy expenditure was 960 (837 to 1061) kcal d^{-1} m^{-2}. Median energy expenditure under general anaesthesia was 687 (576 to 775) kcal d^{-1} m^{-2} – and thus 264 (151 to 377) kcal d^{-1} m^{-2} or 26% (18% to 36%) lower than preoperative awake resting energy expenditure ($p<0.001$) (Figure 1). We thus confirmed our hypothesis that energy expenditure under general anaesthesia is lower than preoperative awake resting energy expenditure.
Conclusion: Energy expenditure under general anaesthesia is about one quarter lower than preoperative awake resting energy expenditure in patients having non-cardiac surgery. It remains to be determined whether energy expenditure can help tailoring perioperative haemodynamic management to actual demands.

01AP04-08
Timing of intramedullary femoral nailing in patients with concomitant head injury: impact on morbidity and mortality

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Background: Although early fracture fixation is associated with reduced hospital length of stay, morbidity, and mortality in patients with isolated fractures, little is known about outcomes in patients with concomitant head injury. This cohort of patients is susceptible to secondary brain injury during periods of hypotension and hypoxia; such conditions may occur intra-operatively and during the induction of anaesthesia.
Methods: Retrospective analysis of patients in England and Wales included within the Trauma Audit and Research Network database between 2006-2021. Patients were included if aged ≥18 years, presenting with a significant head injury (Abbreviated Injury Score≥3) and concomitant femoral shaft fracture, and undergoing intramedullary nail fixation of the femoral fracture. Exclusion criteria included patients with missing outcome data, those who did not undergo surgical fixation or who underwent external fixation prior to intramedullary nailing, and those who underwent a neurosurgical procedure at any time during admission. Patients were grouped by time to fixation: early (≤24 hours) and late (>24 hours).
Multivariate regression analyses were used to assess the relationship between timing of fixation and in-hospital mortality, in-hospital complications, poor outcome at hospital discharge (Glasgow Outcome Score ≤3), admission to the intensive care unit (ICU), post-operative length of hospital and ICU stay, and number of days intubated.
Results: A total of 1065 patients were included: 597 (56%) underwent early fixation, and 468 (44%) late fixation. Median time to fracture fixation across all patients was 28 hours (interquartile range 26-42). Patients undergoing early fixation were more likely to require admission to ICU (odds ratio 1.87 [95% confidence interval 1.32-2.65], $p<0.001$), however there was no difference in length of ICU stay ($p=0.18$), need for intubation ($p=0.10$), or number of days intubated ($p=0.13$) between groups. There was also no difference in post-operative length of hospital stay ($p=0.19$), in-hospital mortality ($p=0.36$), any in-hospital complication, or neurological outcome at discharge ($p=0.69$).
Conclusion: In patients with concomitant femoral shaft fracture and head injury, intramedullary nailing within the first 24 hours is associated with a greater need for ICU admission. More studies, however, are required to understand the intra-operative course of these patients, and how this relates to outcomes and admission to ICU.

01AP04-09
The effect of ongoing beta-blockers administration on analgesic requirements in the immediate perioperative period

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Background and Goal of Study: Perioperative use of beta blocking agents has been associated with diminished pain and opioid consumption and earlier extubation, but data are conflicting. We aimed to test the hypothesis that among adults having total knee/hip arthroplasty, chronic use of beta blocking agents is associated with lower intraoperative and postoperative opioid consumption, and lower postoperative pain scores.
Materials and Methods: Adults having elective total knee/hip arthroplasty between 01/06/2018 and 31/12/2018 were recruited to this prospective observational study. Intraoperative opioid administration was limited to fentanyl, that was titrated and adjusted according to the Analgesia Nociception Index (ANI), which estimates nociception according to noninvasive monitoring of heart rate variability. Regional anesthesia was not used. All other anesthetic variables were controlled by protocol. Intra- and postoperative opioid consumption and pain scores were compared between patients with and without chronic use of beta blockers.
Results and Discussion: Data of 41 patients were included (mean (SD) age 71 (+/-6.5) years, 58% females), of which 12 used beta blocking agents. No differences were found between groups on baseline variables. Intraoperative opioid consumption was not different between the groups, with a mean (SD) fentanyl dose of 1.5 (1.0) and 1.6 (1.1) mcg/Kg/hour in the beta blockers and the control groups, respectively (p=0.76). Postoperative opioid consumption, pain scores, and patient-controlled analgesia use were also similar.
Conclusion(s): In this pilot study, chronic use of beta blocking agents among adults having total hip or knee arthroplasty was not associated with decreased intra- or postoperative opioid.

01AP04-10
A monocentric, first in human, safety study of whole-body hyperthermia treatment in advanced cancer patients or stage IV metastatic pancreatic adenocarcinoma patients: implications on haemodynamic parameters

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Background: Research shows that mild hyperthermia (40-44°C) may increase the efficacy of chemoradiation therapy in pancreatic carcinoma.
This study investigated whole-body hyperthermia (WBH) of 41.5°C by using the HyperTherm, a device which uses convection to exchange heat between an electrical element and the human body. The primary objective was to assess the safety of multiple sessions of WBH. The secondary objective was to assess the effect of WBH on tumour growth.
Materials and Methods: Normal cardiac function was confirmed preoperatively. Together with standard of care monitoring, the effects on haemodynamic parameters were determined with Hemopshere™ with Flotrac™ (Edwards Lifesciences) and a Swan-Ganz catheter. In this way, mean arterial pressure (MAP), systemic vascular resistance (SVR), Cardiac Output/Index (CO/CI), oxygen consumption (VO2) and delivery (DO2), central venous (CVP) and pulmonary artery pressure (PAP) can be measured. Fluid challenges were applied with stroke volume variation (SVV) guidance. 3 patients were included.
Results and Discussion: No life-threatening events were reported. Every patient needed a low dose of noradrenaline after induction of general anaesthesia.
During*warming-up phase,*the rise in body temperature was accompanied by a gradual increase of CO, CI and heartrate. MAP was preserved with minimal adjustments in the dose of noradrenaline. SVR stayed within normal range, as well as CVP and PAP.
On *plateau phase*, 1 patient experienced an episode of systolic bloodpressure up to 198 mmHg. Most likely, depth of anaesthesia was inadequate enough for this moment in treatment. A decrease of SVR was noted. In the following 2 patients, the depth of anaesthesia was gradually adjusted during the warming up phase, which led to a more efficient warming up of the patient and hemodynamic stability during plateau phase. CO, CI and HR reached a plateau, MAP was preserved with minimal adjustments in the dose of noradrenaline and no hypertensive episode occured. SVR changes were minimal. The duration of plateau phase had no impact on haemodynamics. CVP and PAP remained within normal range for the 3 patients.
When *cooling down*, normalisation of CO, CI and HR occurred.
VO_2/DO_2 shows a delivery–independent VO_2 in all patients.
Conclusion: Pre-liminary results show that WBH can be safely applied to patients with normal cardiac function. Further research is necessary to fully evaluate the influence of WBH on haemodynamic parameters.

01AP04-11
Effects of regulatory macrophages (Mreg) on senescence parameters of in-vitro cultured human endothelial cells

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Background and goal of study: Cardiovascular disease in aging is associated with inflammation and vascular endothelial cell senescence. As macrophages play a central role during tissue inflammation we hypothesize that secretory products of regulatory Macrophages (Mreg) could also influence senescence of in-vitro cultured human endothelial cells.
Materials and methods: The study was approved by the local ethics committee of the University Medical Center Schleswig-Holstein, Kiel, Germany (D519/18 and D518/13). All procedures were in accordance with the Helsinki Declaration.
Young (passage<10) and aged (passage≥10) human umbilical vein endothelial cells (HUVEC) were grown for 10 days with or without the addition of cell culture supernatants (SN) from monocyte derived human Mreg.
The following senescence associated parameters were analyzed:
(i) cell morphology,
(ii) cell size,
(iii) cell volume,
(iv) expression/activity of ß-galactosidase (ß-gal), CD105 and reactive oxygen species (ROS).
Results and discussion: While young HUVEC revealed a typical endothelial phenotype consisting of a cobblestone like cellular monolayer, aged cells showed an elongated and spindle shaped appearance. Incubating young HUVEC with Mreg SN resulted in a phenotypic appearance similar to the one observed in aged HUVEC cultures (Figure).

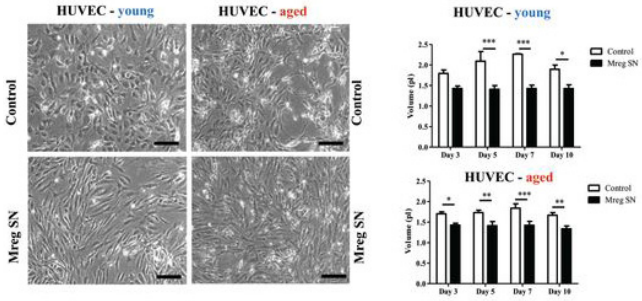

Figure. Morphology (left) and cell volume (right) of HUVEC grown in-vitro for 10 days. Scale bars represent 50µm.
** P<0.05; ** P<0.01; *** P<0.001*

Cell size as well as cell volume was significantly reduced after the addition of Mreg SN to cultures of young as well as aged HUVEC (P<0.05). Mreg SN did neither influence CD105 expression, ß-gal activity and ROS activity in young HUVEC nor activities of ß-gal and ROS in aged HUVEC.
However, the number of CD105 positive cells was significantly increased by Mreg SN in aged HUVEC (P<0.05).

Conclusions: Secretory products of Mreg exert differential effects on young and aged human endothelial cells cultured in-vitro. Whether the observed differences are of relevance for endothelial senescence and cardiovascular disease in aging remains elusive and needs further investigation.
Acknowledgments: The authors like to thank Kerstin Parczany, Kerstin Marx and Christopher Schnoor for excellent technical assistance and support.

01AP04-12
Cyclic heating and cooling of an anesthetic reflector considerably improves its efficiency

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Background: In view of global warming, reducing consumption of volatile anesthetics (VAs) seems eminent. This can be achieved by rebreathing from a circle system, but also by anesthetic reflection[1]: The Sedaconda-ACD-S (ACD, Sedana Medical, Danderyd, Sweden), connected between ventilator and the patient, retains ~80% of exhaled isoflurane during expiration and releases it back to the patient during the next inspiration[2], thereby reducing consumption compared to low flow anesthesia[3].
We tested whether consumption could be further reduced by warming the reflector during inspiration and cooling during expiration.

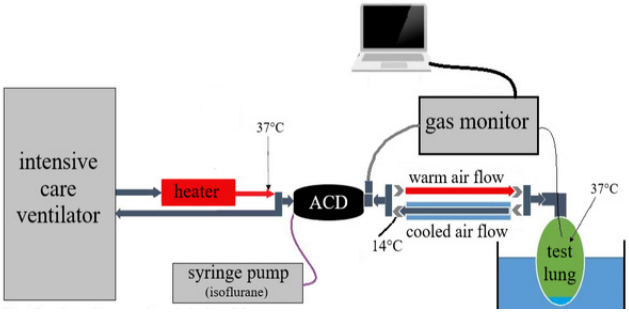

Figure 1. Experimental set-up under optimized conditions.

Methods: The isoflurane concentration C_{ISO} was measured inside the test lung after equilibration over 5 min and averaged, repeated three times on different days. Settings: 500 ml tidal volume, 10 bpm, 21% O_2, Isoflurane infusion rates (IR): 0.5, 1.0, 2.0 and 5.0 mL/h. Under "optimized conditions", the ACD was exposed to 37°C dry air during inspiration and to 14°C cold air during expiration. C_{ISO} was compared with T-tests for each IR.
Results: Cyclic heating and cooling the ACD considerably increased the achieved C_{ISO} for all IR studied (Fig. 2, all P<0.001). Interpolation of data showed that for achieving 0.4 (0.6) Vol% isoflurane, IR can be reduced by 44% (42%).
Conclusion: Cyclic heating and cooling considerably increases the efficiency of the anesthetic reflector and reduces consumption of VAs by almost half in a test lung model. With a miniaturized set up for cooling, this method carries a potential for further saving VAs in clinical practice in the OR as well as for inhaled sedation in the ICU.
Literature: 1 Bomberg JCMC 2018; **2** Kermad Expert Rev Med Dev 2021; **3** Kermad A&A 2021

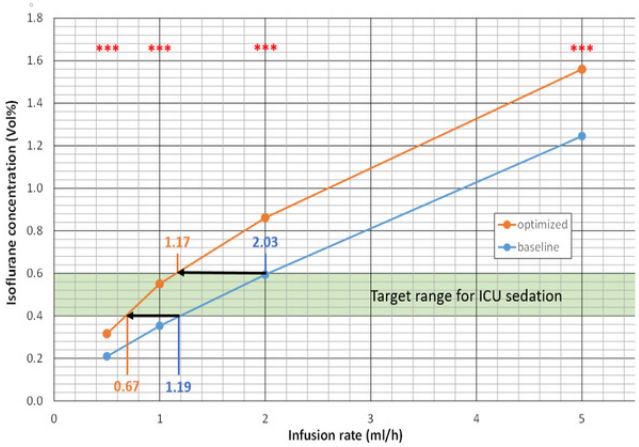

*Figure 2. Under optimized conditions (cyclic heating and cooling the reflector), infusion rates can be reduced considerably (black arrows), ***P<0.001*

01AP05-01
Negative pressure pulmonary oedema after general anaesthesia – raising awareness for a life threatening condition

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Background: Negative pressure pulmonary oedema (NPPO) is a rare form of life threatening noncardiogenic pulmonary oedema that develops when a large negative intrathoracic pressure is generated against a closed upper airway. Presentation usually features an upper airway obstruction, acute respiratory symptoms and hypoxaemia. This is generally complemented by a chest radiograph (CXR) showing alveolo-interstitial oedema.
We are reporting a case of a NPPO in a young healthy man submitted to laparoscopic appendectomy.
Case report: A 29-year-old male, ASA I, was admitted for an urgent laparoscopic appendectomy, under balance general anesthesia (GA) with endotracheal intubation. Induction and maintenance of GA was uneventful. During anaesthesia recovery, after neuromuscular blockade was reversed, the patient briefly got agitated and bit the tracheal tube. After a safe extubation, he rapidly showed cyanosis and SPO2 decreased to 82%. Positive pressure mask ventilation with 100% FiO2 temporarily raised his SPO2 but shortly after, he showed pink frothy secretions, tachypnoea and SpO2 decreased to 85%. Pulmonary auscultation revealed diffuse crackles bilaterally. CXR revealed diffuse alveolo-interstitial infiltrates.
During his 24h ICU stay, he underwent non-invasive ventilation (7 cmH2O CPAP, 50% FiO2), showing remarkable improvement. He was discharged on the fifth postoperative day clinically well.
Discussion: NPPO is a rare condition with a reported incidence of as low as 0.05%–0.1% (1), with the most common clinical presentation being airway obstruction on emergence from GA.
Risk factors are obesity, obstructive sleep apnoea and upper airway infection. Some reports propose a correlation with urgent surgery, inhaled anaesthesia maintenance and being a young healthy man. (1)
Diagnosis usually requires identification of an upper airway obstruction, followed by its usual clinical presentation, hypoxaemia and a CXR supporting it.(2)
Relieving airway obstruction is a primary step. Treatment options include oxygen, positive pressure ventilation and in very severe cases extracorporeal membrane oxygenation therapy.(3)
References:
1. Anesth Pain Med.2012; 7(1):34-37
2. Anesthesiology.2010; 113 (1): 200-2007
3. BMJ Case Rep.2020;**13**:e234651
Learning points: Negative pressure pulmonary oedema is a rare form of life threatening noncardiogenic pulmonary oedema.
The differential diagnosis of NPPO is vast and treatment requires a rapid intervention in order to prevent morbimortality.

01AP05-03
General or regional anaesthesia for microvascular flap surgery: comparison of surgical site infection rate

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Background and goal of study: Microvascular flap surgery is an effective method for difficult reconstructions of major defects. There is an ongoing debate about the preferred method of anaesthesia for microvascular surgery. Evidence suggests that regional anaesthesia (RA) reduces the risk of surgical site infection. RA reduces infection risk by increasing tissue oxygenation and providing postoperative analgesia which blunts the autonomic stress response [1].
We aim to evaluate the differences in the rate of surgical site infection between patients RA and general anaesthesia (GA) for microvascular flap surgery.
Materials and methods: This retrospective cohort study includes 57 adult patients undergoing elective microvascular flap surgery. The study was conducted with the approval of the Ethics Committee of Riga Stradins University. All patients underwent surgery of lower or upper extremities and all were eligible for RA. The method of anaesthesia was selected by the anaesthesia team according to individual risk factors and patient preference.
Patients were divided into two groups – RA group (N=27) and GA group (N=30). Data on surgical site infection, flap thrombosis as well as duration of intensive care stay and hospitalization was obtained.
Results and discussion: Both groups had no differences in gender or age distribution and ASA score. The odds of surgical site infection were 8.62 times larger in GA group when compared to RA group (CI 95% 1.01-73.5; p=0.046) although these results are likely overestimated due to possible confounding factors.
RA and GA groups had no significant differences in the rate of flap thrombosis. GA group had a mean intensive care stay duration of 4.3 days (01.04-7.55) while RA group had a lower mean intensive care stay duration of 0.26 days (0.06-0.58; p<0.001) which might be partially explained by residual effects of GA. GA group had a mean hospitalization duration of 24.1 days (13.92-35.55) while RA group had a lower mean hospitalization duration of 14.5 days (9.57-20.11; p=0.04).
Conclusions: Our findings indicate that a meticulously administered RA might be preferred when surgically feasible as it decreases infection risk and shortens the duration of ICU stay and hospitalization. Larger studies are needed to propose clear recommendations on the preferred type of anaesthesia for microvascular flap surgery.

References:
1. Sessler DI. Neuraxial anesthesia and surgical site infection. Anesthesiology. 2010 Aug;113(2):265-7.

01AP05-04
The relationship between personal characteristic, fear, responsiveness and subjective sense of surgical recollection with emotional distress following surgery

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Background and Goal of Study: Surgery is a stressful event that evokes anxiety, fear, emotional distress, and sometimes even post-traumatic stress disorder symptoms. Accidental awareness during general anesthesia (AAGA) is an anesthetic complication usually defined by recall and occurring in 1 to 2 per 1,000 patients. Covert awareness, or awareness without recall, is identified by responsiveness during the Isolated forearm technique (IFT).
We examined the association between emotional distress following surgery and personal characteristics, covert awareness, recall, and fear. We explored frontal EEG markers of awareness
Materials and Methods: Fifty patients undergoing elective surgery completed demographic, dissociation and mastery questionnaires before surgery. IFT (inflation of a cuffed arm tourniquet before neuromuscular blocking agent administration and evaluation of motor responses to verbal commands after intubation) was used to assess covert awareness during surgery.
We used Brice questionnaire to assess recall, and PTSD and stress questionnaires a month later. Frontal EEG was recorded from 38 patients. EEG waveforms were analyzed using principal component analysis and clustering methods
Results and Discussion: A marginally significant association was found between fear of anesthesia and awareness. IFT responsiveness was correlated with subjective sense of surgical recollection (any positive Brice result including dreams) and this was correlated with PTSD symptoms and stress. Structural equation modeling analyses demonstrated that fear of anesthesia was associated with awareness, awareness was associated with recall, and recall with PTSD symptoms.
However, personal trait could not predict awareness or the ability of later coping with stress. Analysis of the frontal EEG recordings allowed identification of the anesthetic status (awake/anesthetized) with an accuracy of 95%, sensitivity of 97% and specificity of 93%. Frontal alfa (8-12 Hz) and gamma (30-60 Hz) waves were correlated with general anesthesia
Conclusion(s): Fear of anesthesia and levels of awareness were related to formation of subjective sense of surgical recollection, which in turn were associated with PTSD symptoms. Dissociation and mastery traits played a limited role under these circumstances. Advanced EEG analysis show a promise as a tool to identify awareness, but further research and more data are needed.

01AP05-05
The right drug in the wrong place: effects of accidental intrathecal tranexamic acid

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Background: Tranexamic acid (TXA) is an antifibrinolytic drug widely used to reduce blood loss in major surgeries and trauma patients, thus reducing morbimortality. Clinical indications for TXA have expanded and include many "*off-label*" uses but further knowledge is needed for optimal dose, timing and method of administration[1].
Evidence on safety and efficacy of topical TXA compared to intravenous (IV) is still not robust, although it may reduce known systemic side-effects such as seizures.[2]
Case report: We report a case of a 75-year-old female patient, ASA III, that underwent lumbar spine surgery. General anesthesia was induced with hemodynamic stability throughout. During surgery 2 incidental dural tears were sutured, and before wound closure 1g of topical TXA was used for hemostatic control. In the post-anesthesia care unit patient reported perianal burning, severe lower back pain and later, painful lower limbs myoclonus. Patient was reinterventioned with no significant findings but at the end of anesthesia painful myoclonus persisted despite IV clonazepam. She was reintubated and sedated, being transferred to the Intensive Care Unit for further care.
Other underlying causes were ruled out and in the next day no myoclonus were detected with lower sedation. Patient's clinical condition improved and a few days later she was discharged with no neurological sequelae during follow-up.
Discussion: TXA has potential proconvulsant properties by reducing inhibitory neurotransmission of GABA-A and glycine receptors with increased neuronal excitability. TXA broad use led to an increased incidence of seizures and some risk factors have been identified such as higher doses, female gender and prior neurological or cardiovascular disorders. Little is known about intrathecal TXA effect but inadvertent spinal administration has been reported with clinical presentation of severe back pain, myoclonus, seizures and ventricular arrhythmias with no sequelae in patients who survived.
This case increases awareness for safety regards of TXA use and the importance of an early recognition of potentially fatal complications due to accidental intrathecal penetration of TXA, since no reports regard this event. Further studies are required to define the indications for IV or topical TXA in order to provide a safer use of TXA.
References:
1. Goobie SM.Tranexamic acid: Still far to go.BJA.2017.
2. Lecker I, et al.Tranexamic acid-associated seizures: Causes and treatment. Annals of Neurology.2016.

01AP05-06
Anaesthetic management of a patient with congenital insensitivity to pain with anhidrosis: a case report

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Background: Congenital Insensitivity to Pain with Anhidrosis (CIPA) is very rare and results from a NRTK 1 genemutation[1]. It is characterised by a lack of sensitivity to pain, inability to regulate body temperature, growth and mental retardation and inadvertent self-harm[1]. There is scarce evidence regarding the anaesthetic approach of these patients.

Case Report: We report a case of a 16-year-old male with CIPA who was diagnosed with septic arthritis of the radiocarpal joint and was proposed to surgical drainage. He had articular deformities and previous surgeries, without reported complications. We opted for a balanced general anaesthesia and applied ASA standard monitorization and bispectral index score monitoring. Temperature was continuously monitored. For the induction we used 50mcg of fentanyl and 160mg of propofol to avoid airway reactivity and we applied a second-generation laryngeal mask. For maintenance we used sevoflurane. At the time of surgical incision and throughout the procedure there was no increase in heart rate, blood pressure, no decrease in oxygen saturation with ventilatory stability and no episodes of hyperthermia. There was no need for other analgesic drugs.

Discussion: General anaesthesia is the most common option, but there are reports of regional anaesthesia with proper sedation[1]. CIPA, although rare, remains a challenge for anaesthesiologists. These patients are repeatedly submitted to surgeries and are at increased risk of perioperative complications due to autonomic nervous system abnormalities, especially bradycardia[2].

Intraoperatively hyperthermia, regurgitation and aspiration are also more frequent[2]. CIPA patients lack pain sensation, but may have tactile hyperesthesia, which may produce unpleasant sensations during surgical manipulation, rendering it impossible to be submitted to surgery without sedation/anaesthesia[3].

Reports even suggest that these patients should be submitted to a longer period of sedation in the post operative period to augment the surgery success – given the lack of notion of the range of motion adequate to recover.

References:

1. Agri 2019 Nov; 31(4):202-205
2. Anesth Analg. 2015 Nov; 121(5): 1316–1320
3. Anesth Analg. 2007 Jun;104(6):1561-2

Learning points: Even though it seems viable to submit patients with CIPA to surgery without any kind of sedation/analgesia, evidence points to the opposite scenario. Though rare, anaesthesiologists should be aware of this condition and the possible complications.

01AP05-07
To assess preoperative six minute walk test as a predictor of quality of recovery after major non-cardiac surgery

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Background: Cardiopulmonary exercise test (CPET) is gold standard for assessment exercise capacity and risk prediction perioperatively but it is expensive and not easily available. Six minute walk test(6MWT) is a simple, inexpensive & clinically acceptable measure of functional capacity which correlates well with CPET variables. We hypothesized that preoperative 6MWT can be a feasible and better predictor of quality of recovery (QoR) after major non cardiac surgery.

Materials and Methods: This Observational study was conducted following ethics committee approval. Sample size of 80 was derived by tests of association using bivariate correlations, between preoperative 6MWT and other variables QoR and METs score.[1,2] ASA grade 2 and 3 patients (>40 years) undergoing elective major surgery were included. Prognostic value of preoperative 6MWT to predict QoR and prognostic value of preoperative MET scores as a predictor of QoR and correlation of 6MWT and MET with QoR was assessed. Preoperative 6MWT was performed and 6 min walk distance (6MWD) and METS was noted. QoR-15 scores after 24 hours and 30 days (telephonically) was recorded. Statistical analysis was done using Chi-square test and Spearman/Pearson correlation.

Results and Discussion: Mean 6MWD was 427.94 ± 45.42m (minimum 300 m and maximum 560m). The mean QoR-15 Score after 24hrs was 96.06 ± 12.00 (minimum score of 45 and maximum score of 120 and after one month was 137.31 ± 13.4(minimum score of 100 and maximum of 150). There was a strong correlation between 6MWD and QoR-15 score after 24 hours and 30 days of surgery $p < 0.001$ (QoR - 15 after 24 hours) & $p < 0.001$(QoR-15 after 30 days), which implies more the distance covered in 6 minute period better was the quality of recovery. 6MWD and METs score had moderate correlation (R value of 0.793 and p value less than 0.001). 6MWD is a better predictor of functional capacity than METs score because METs score are very subjective and unstructured.

Conclusion: 6MWT is an accurate and objective assessment method which assesses functional capacity of person and predicts the perioperative risks and predict postoperative outcome.

References:

1.Sinclair RC, Batterham AM, et al. Validity of the 6 min walk test in prediction of the anaerobic threshold before major non-cardiac surgery. Br J Anaesth 2011;108(1):30-5.
2.Shulman MA, Cuthbertson BH et al. Using the 6-minute walk test to predict disability-free survival after major surgery. Br J Anaesth 2019;122(1):111-9

01AP05-08
Group-based trajectory analysis of acute pain after spine surgery and risk factors for rebound pain

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Background and Goal of Study: Although intravenous patient-controlled analgesia (IVPCA) is commonly used for postoperative pain control following complex spine surgery, moderate to severe rebound pain is sometimes noted after the discontinuation of the PCA. The current study aimed to investigate the variations in acute pain trajectories over time in patients receiving IVPCA for pain control after spine surgery and explore factors associated with the patterns of postoperative pain trajectories.
Materials and Methods: This retrospective study was conducted in a tertiary medical center after the approval of our institutional review board and we collected data from patients undergoing spine surgery with postoperative IVPCA between 2016 and 2018. Maximal pain intensity assessed with a numeric rating scale (NRS) from 0 to 10 was recorded daily by nurses in charge during the first postoperative week. Patient characteristics and surgical features were also collected. Group-based trajectory analysis was performed to categorize the variations in pain scores over time and determine the risk factors associated with a rebound pain trajectory. The influences of a rebound pain trajectory on the amount of IVPCA morphine consumption and length of hospital stay (LOS) after surgery were also evaluated.
Results and Discussion: A total of 547 patients with 3761 pain scores was included in the analyses and two postoperative pain trajectory groups were identified: group 1 with mild pain trajectory (87.39%) and group 2 with rebound pain trajectory (12.61%). Risk factors of the rebound pain trajectory included age ≤ 65 (odds ratio, OR: 1.89; 95% confidence interval, CI: 1.12 – 3.20), female (OR: 2.28; 95% CI: 1.24 – 4.19), and NRS ≥ 4 on the postoperative day 0 (OR: 3.44; 95% CI: 1.65 – 7.15).Patients in the group 2 also tended to consume more IVPCA morphine ($p < 0.001$) and had longer LOS ($p < 0.001$) than those in the group 1, controlling for the effects of other selected predictors of IVPCA consumption and LOS.
Conclusion(s): There were notable proportions of patients with a rebound pain trajectory after the discontinuation of IVPCA for pain control following spine surgery. Older age, female and moderate to severe pain noted after surgery were risk factors and more aggressive pain management strategies like early initiation of multimodal analgesia should be considered in these high-risk patients to improve pain control quality and reduce the incidence of rebound pain.

01AP05-09
The relationship of Surgical Pleth Index values observed at the end of the surgery with Postoperative Pain Score

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Background and Goal of Study: In this prospective observational study, we investigated role of Surgical Pleth Index (SPI) observed at the end of elective cranial surgery in determining acute moderate-to-severe pain in the postoperative period.
Materials and Methods: After Ethics approval and patient consent, 60 elective cranial surgical patients, age of 18-65 years and ASAI-III were included in the study. Following midazolam, fentanyl and propofol induction, anesthesia was maintained with propofol and remifentanil infusion. Demographic data, intraop propofol, remifentanil consumption, postop opioid consumption and SPI values observed five minutes before State Entropy>60 at the end of the surgery were recorded and postoperative pain was evaluated every 5 min for 30 min in PACU. Patients were divided into two groups: High NRS Group (NRS≥5), Low NRS Group (NRS<5).
Results and Discussion: Statistical analysis performed on 52 patients revealed that there was a correlation between the highest SPI value recorded for five minutes before SE>60 and the highest NRS score observed during the postoperative 30 minutes (r=0,480, p<0,001) with statistical difference in SPI scores between Low and High NRS groups. The predictability of the highest SPI value measured in the postoperative period that the NRS score of the patient would be ≥ 5 at least once, that is, whether the NRS score would be high or not, was evaluated with the ROC curve (AUC=0.796 [%95CI:0.675-0.918]) (Fig.1). When the cut-off value was accepted as 75,5, the specificity of the SPI value in predicting postoperative acute pain was 72%, and the sensitivity was 71%.

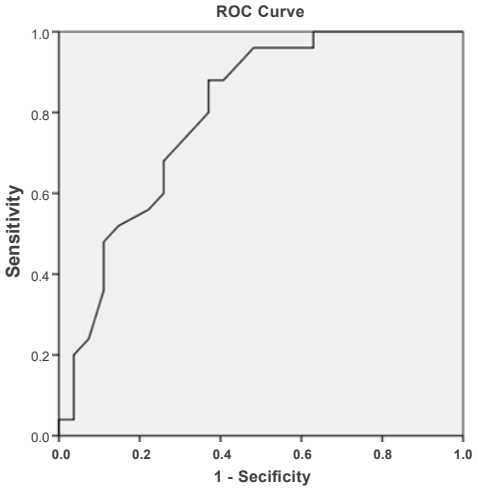

Figure 1. ROC curve of predictive capacity of SPI for NRS ≥5

Conclusion: In this study,SPI valuesafter craniotomy operations have shown to predict postoperative moderate-to-severe acute pain. Non-invasive SPI monitoring can be useful in predicting increased opioid use.

01AP05-10
Major depressive disorder (MDD), antidepressants and uncontrolled hypertension: a report of intraoperative autonomic dysregulation along with a literature review

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Background: MDD represents the leading cause of mental disability worldwide. The autonomic dysfunction caused by the disease and its medical treatment has not been adequately addressed. Our case aims to underline the relationship between MDD and the autonomic system during major procedures.
Case report: We present the case of a female patient, being treated for MDD with venlafaxine, lamotrigine, lithium, mirtazapine, lorazepam, scheduled for a Whipple's procedure. Following the start of the operation, unexplained tachycardia and an hypertensive spike, resistant to aggressive intravenous treatment with opioids, glygeryl nitrate and clonidine appeared. Blood pressure values reached as high as 220/120 mmHg. Hypertension was successfully managed only with phentolamine.
Discussion: Hypertensive crisis under adequate anesthesia, analgesia and muscle relaxation,resistant to first line intraoperative hypotensive agents could imply an occult pheochromocytoma. However, patient's history and preoperative computed tomography of the abdomen as well as histological examination of the tumor did not support such a diagnosis. Serotoninergic syndrome could also be the case based on patient's medication history, but hyperpyrexia was absent. Our patient's treatment with quetiapine could be correlated with the appearance of malignant neuroleptic syndrome. Nevertheless, our patient had neither hyperthermia nor muscle rigidity which are necessary criteria for such a diagnosis to be made.
Our suggestion was that of an autonomic dysregulation, due to the underlying MDD, which favored sympathetic activation, along with an exacerbated catecholamine circulation due to SNRI's and operational stress, all of which led to the refractory hypertensive episode. The fact that the only antihypertensive that controlled the crisis was phentolamine (a known non selective a – adrenergic antagonist that halts sympathetic over-reactivity), strengthens the hypothesis of a catecholamine excess on the patient.

Author, Year	Finding
Barton et al, 2007	A subset of patients with MDD present extraordinarily high sympathetic activity
Koschke et al, 2009	shift of autonomic balance toward sympathetic predominance, decrease in parasympathetic parameters and baroreflex sensitivity, autonomic dysfunction, is exacerbated by SNRI and to a lesser degree by SSRI treatment
Meng et al, 2012	Depression as an independent risk factor of hypertension
Scalco et al 2005	increased prevalence of hypertension in depressed patients, possible underlying mechanism is av hyperreactivity of the sympathetic nervous system, the use of antidepressive agents can interfere with blood pressure control of patients with hypertension
Light et al 2009	the use of certain antidepressants is associated with hypertension
Alvares et al , 2016	Reductions in HRV (heart rate variability) across psychiatric disorders
Abosi et al, 2019	antipsychotics, mood stabilizers, and some antidepressants, have been independently associated with increases in blood pressure through inhibition of norepinephrine reuptake

Learning points: Our case highlights a hidden dysregulation in MDD treated with SNRI's which can be unmasked intraoperatively. Anesthesiologists need to be aware of a possible latent autonomic dysfunction in such patients, that during stressful events, like major surgery, can be expressed as a resistant hypertensive crisis.

01AP06-01
Postoperative hyponatremia in orthopedic surgical patients: a retrospective study to define causes, outcomes, and prevalence

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Background and Goal of Study: Hyponatremia is the most common electrolyte abnormality encountered in the hospital leading to poorer outcomes and increased economic burden, especially among orthopedic surgery patients and cancer patients. The purpose of our analysis is to:
1. Determine the prevalence of hyponatremia among cancer patients undergoing orthopedic procedures, and;
2. Evaluate the risk factors and outcomes associated with hyponatremia in this patient population
Materials and Methods: This retrospective cohort analysis included all adult patients who underwent surgery with a minimum of two hours of anesthesia time and with post-surgical sodium labs at an academic cancer center in 2019 (N = 24,137). Out of these, 1445 patients underwent orthopedic surgery. We examined development of post-surgical hyponatremia with age, sex, race, BMI, admission service, ASA score, Elixhauser comorbidity index, drug intake, GFR, glucose concentration, length of surgery, and post-operative complications. Univariate and multivariate logistic regression models were used to access associations with secondary outcomes: 30-day all-cause mortality and length of stay (LOS) adjusted for our included risk factors. A sub analysis of hip vs. knee procedures within orthopedic surgery was also conducted.
Results and Discussion: Post-operative hyponatremia was noted in 217 out of the 1445 orthopedic patients (15%) and in 3061 out of the 22692 other surgical services patients (13.5%). Post-operative hyponatremia was associated with higher 30-day mortality ($P < 0.001$). The adjusted odds ratio for orthopedic patients compared to all other surgical services was 1.85 [95% CI, 1.28 – 2.66]. Post-operative hyponatremia was also associated with longer hospital LOS [7.0 (4.0 – 13.0) vs. 3.0 (2.0 – 7.0); $P < 0.001$] Multivariate analysis on LOS showed a 27% increase in hyponatremic patients in this cohort. There was no difference in LOS between knee and hip procedures.
Important risk factors for developing post-operative hyponatremia included age, sex, BMI, Race, ASA score, drug use, and presence of comorbidities. Postoperative complication were more common in the hyponatremic group.
Conclusion: Post-operative hyponatremia, especially in orthopedic surgical patients, is associated with longer hospital stay and higher mortality.
There was a higher prevalence of developing post-operative hyponatremia in hip procedures compared to knee.

01AP06-02
Postoperative residual neuromuscular block in PACU – observational prospective study

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Background and Goal: Intraoperative administration of neuromuscular blocking (NMB) agents is extremely frequent. There are several complications exceedingly relevant for patients' outcomes, as is the residual neuromuscular block (rNMB). Our main goal was to evaluate the incidence of rNMB in patients arriving at the post-anesthesia care unit (PACU). Our secondary outcomes were reversal timing, agent, monitoring and the incidence of immediate respiratory complications.
Methods: Observational prospective unicentric study – Inclusion criteria: >18Y, elective oncological surgery and NMB; rNMB screened by 3 TOF counts 15' apart, using TOF-Watch (40mA). Additional perioperative data were collected. Exclusion criteria: neuromuscular disease, upper limbs paralysis, or TOFr count unavailable. Statistical analysis: descriptive and inferential (independent t-test, Mann-Whitney, Chi-square and Fisher tests; chi-square residual analysis); *$p<0.05$.
Results: 365 patients initially included; 132 excluded (31 due to invalid TOFr count, 2 without NMB agents, 2 for missing data, 97 due to variation ≥20% between TOFr counts). 231 patients were analyzed. Rocuronium was the NMB agent in 100%. Pharmacological reversal occurred in 98.7% (n=228). 98.7% of which, with Sugammadex (Neostigmine n=3) giving 1 vial in 90,7% (n=204). 23.4% (n=54) patients had rNMB, with no statistically significant differences regarding their age, sex, or ASA classification but a significantly lower BMI*. Patients with daily medication that could potentiate NMB showed more rNMB*. 14.7% (n=35) patients had NMB monitoring, although no differences were found regarding rNMB. In 96% of unmonitored patients, sugammadex dose/kg was <4mg/kg, although no association between sugammadex dose/kg and rNMB was found. A higher total dose of NMB, but not boluses number or reversal timing/agent, was associated with a higher incidence of rNMB*. Only 2 patients were submitted to additional reversal of NMB in the PACU. No immediate adverse respiratory events were recorded.
Conclusion: We found a high incidence of rNMB in our institution, with a high NMB dosing probably contributing to it. Although we had no immediate adverse respiratory events recorded, rNMB is also associated with long-term respiratory complications. Given that, this topic must be revisited, and emphasis should be given to the monitoring, BNM usage, and its reversal with a correct dosing regimen. These measures could improve safety and reduce overall costs.

01AP06-03
Comparison of the TOFscan and the TetraGraph during recovery of neuromuscular block: a pilot study

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Background and Goal of Study: Quantitative monitoring of neuromuscular block is recommended following administration of a neuromuscular blocking agent (NMBA) to monitor depth of neuromuscular block during surgery and to document complete recovery from neuromuscular block at tracheal extubation.The TetraGraph is a new portable monitor based on electromyography, whereas the TOFscanis based on acceleromyography. The aim of this study was to assess the agreement between train-of-four ratios (TOFratio) and train-of-four counts (TOFcount) obtained with both monitors during recovery from rocuronium-induced block.
Materials and Methods: After approval from the ethics committee, twenty patients, scheduled for general anaesthesia received 0.6 mg/kg rocuronium IV. TOFscan and TetraGraph electrode arrays were applied to opposite arms along the ulnar nerve. TOFratio and TOFcount were then measured at the adductor pollicis muscle every 15 s with TOFscan and every 20 s with TetraGraph. Paired t-tests compared train-of-four ratios obtained with both monitors, and time to recovery to TOF count from 1/4 to 4/4 with both monitors. The results are expressed as mean± SD.
Materials and Methods: Results and Discussion:Time to reappearance of the first response after TOF stimulation was slower with TetraGraph (6.1 min, 95% CI: 0.2 – 12.1, $p < 0.05$).When the TOF ratio attained 93.3±3.0% with the TOFscan, the average TetraGraph TOF ratio was 54.7±23.3% ($p< 0.0001$). Significantly faster recovery of the TOF when using the TOFscan was also found for values of TOF ratio ranging from 10% to 100%.
Conclusion(s): Consistent with previous reports (1), our study demonstrates a significant overestimation of the TOF ratio recovery time at the adductor pollicis during rocuronium-induced neuromuscular block when using acceleromyography compared with electromyography. These small but clinically significant differences must be considered for safe extubation and detection of residual paralysis.
References:
1. Nemes R et al. Ipsilateral and simultaneous comparison of responses from acceleromyography- and electromyography-based neuromuscular monitors. Anesthesiology 2021; 135:597-611.

01AP06-04
Liver failure associated with prone positioning in elective spinal surgery

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Background: Intraoperative prone position for long periods of time has been related to serious complications, as a consequence of a decrease in the cardiac index or direct compression of different or-

gans. Increased pressure on anterior abdominal structures such as the liver can cause ischemia and liver failure, resulting in prolonged hospitalization, permanent disability, or death.

Case Report: A 60-year-old woman, with hypertension and obesity, underwent elective arthrodesis surgery from T4 to S1 due to scoliosis. The patient was in a prone position during the surgical procedure, with a horizontal cushion under the thorax at shoulder height and two under the iliac crests.

During the 12-hour intervention, the patient was hemodynamically unstable, requiring vasoactive drugs, red blood cell transfusion and reperfusion with crystalloids and colloids. Postoperative liver profile revealed: lactate 3.9 mmol/L, AST 8323 U/L, ALT 9729 U/L, ALP 324 U/L, LDH 21,800 U/L, platelets 95.0 10e3/uL , prothrombin activity 36% and prothrombin time 17.4s, diagnosing hepatic cytolysis secondary to hypoperfusion. During the following days, the analytical results worsened, with anemia and progressive thrombocytopenia despite transfusions, acute renal failure, septic shock, abdominal compartment syndrome and persistent hemodynamic instability. An abdominal CT scan showed free perihepatic fluid, sigmoid perforation, and necrotic-hemorrhagic pancreatitis, probably related to organ hypoperfusion due to hemodynamic shock. The patient underwent decompressive laparotomy, necrosectomy, and sigmoidectomy. The patient died 24 hours after the intervention of multiorgan failure.

Discussion: The prone position can lead to prolonged hypotension as a result of mechanical obstruction of ventricular filling, raising central venous pressure, causing hepatic congestion and hypoperfusion due to low output. These conditions lead to a situation of hypoxia and hepatocellular necrosis that is accompanied by a marked increase in ALT and AST levels.

References: DePasse JM, Palumbo MA, Haque M, Eberson CP, Daniels AH. Complications associated with prone positioning in elective spinal surgery. World J Orthop. 2015;6(3):351-359.

Learning points: Chest and abdominal compression must be limited to ensure venous return and preserve intra-abdominal organs and major vessels. We recommend checking the compression points regularly during the intervention to avoid possible ischemic complications.

01AP06-06
Intraoperative serum lactate is not associated with postoperative complications after cytoreductive surgery plus hyperthermic intraperitoneal chemotherapy

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Background and goal of study: Serum lactate has been extensively used as a biomarker for prediction of mortality and morbidity in cohorts of undifferentiated patients, including patients undergoing cytoreductive surgery (CRS) plus hyperthermic intraperitoneal chemotherapy (HIPEC). [1] However, the clinical value of hyperlactatemia during abdominal hyperthermic perfusion is unclear and has been subject to debate. The assessment of soaring serum lactate levels during HIPEC is a burdensome task as a result of the wide range of causes that hyperlactatemia might account for, especially those non related to hypoxia-hypoperfusion such a cellular toxicity or mitochondrial dysfunction induced by heat stress. We assessed the relation between intraoperative lactate at different times of surgery in patients undergoing CRS plus HIPEC and their postoperative outcome.

Materials and methods: We conducted a retrospective review of all adults who underwent CRS plus HIPEC within an enhanced recovery after surgery (ERAS) pathway from April 2014 to December 2020. Data was obtained from the Encare database. We performed a multivariate analysis using a linear regression model to assess the association between intraoperative lactate at different times of the surgery (basal, pre-hyperthermia, post-hyperthermia) and the development of postoperative complications in terms of comprehensive complication index (CCI).

Results and discussion: A total of 41 patients were included. Basal serum lactate, pre-hyperthermia lactate and post-hyperthermia lactate were not found to be associated with CCI. In a multivariate regression analysis including length of surgery, Charlson score and post-hyperthermia lacate, a significant association was only found with Charlson Score (β 5,2; $p<0,05$). We found a statistically significant association between basal serum lactate and post-hyperthermia lactate (β 1,2; $p<0,05$) and pre-hyperthermia lactate and post-hyperthermia lactate (β 0,65; $p<0,05$). The difference between peak intraoperative lactate and basal lactate (Δlactate) was not associated with an increased CCI.

Conclusion(s): Our findings suggest that absolute values of serum lactate regardless of the time of surgery (basal, pre-hyperthermia or post-hyperthermia) are not associated with an increase in postoperative complications when assessed by CCI.

References: [1] Tonello M, Barina A, Turchet F, et al. Updates Surg. 2021

01AP06-07
Pressure-support ventilation and biomarkers for inflammation and lung injury after robotic surgery

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Background and Goal of Study: It is uncertain whether Pressure support ventilation reduces ventilation-induced pulmonary inflammation and injury during laparoscopic surgery. We hypothesized that use of moderate NMB with Pressure support ventilation Pro (PSVpro) during laparoscopic robotic abdominal surgery does not increase the levels of SP-D, TNF-α, IL-6 and IL-8.

The aim of the study is to compare intra-operative PSVpro with conventional protective lung ventilation during robotic radical prostatectomy with respect to levels of biomarkers for inflammation and lung injury.

Materials and methods: The study included 35 patients scheduled for elective robotic radical prostatectomy under general anesthesia. All patients were randomized into two groups.

Group 1 — moderate NMB and pressure support ventilation — PSVpro (N = 19 people), group 2 — intensive NMB and pressure control ventilation– volume guaranteed — PCV-VG (N = 16 people).

After induction of anesthesia and 1 hour after end of surgery blood was investigated for changes in serum levels of preselected biomarkers for inflammation (TNF-α, IL-6 and IL-8) and lung injury (surfactant protein-D).

Results: The level of serum IL-6, IL-8, SP-D, TNF-a did not differ between the groups (all $P < 0.05$, Mann–Whitney*U* -test).
Conclusions: The use of moderate NMB with PSVpro does not affect changes in pulmonary levels of biomarkers for inflammation and lung injury in patients undergoing elective robotic abdominal surgery.

01AP06-08
Acute phase reactants as early markers of infectious complications after cytoreductive surgery with HIPEC

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Background: Cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (HIPEC) is a treatment option for patients with peritoneal carcinomatosis. A clearly survival benefit has been proved with this technique, however it is associated with high morbidity rates.
Infections are a frequent type of postoperative complication in this type of surgery. Beside clinical signs, early diagnosis of infection relies on laboratory-based biomarkers, including acute phase reactants such as white blood cell count, C-protein reactive and procalcitonine.
As this kind of surgery involves an intense systemic inflammatory response, it is difficult to discriminate whether the acute phase reactants elevation results from an infectious complication or from the inflammatory response itself. There are very few studies that address this issue and we cannot yet reach clear conclusions.
The aim of our study was to investigate the efficacy of acute phase reactants parameters (C-protein reactive, procalcitonin, fibrinogen and white blood cell count) for early prediction of infectious complications.
Material and methods: We conducted an observational retrospective study involving patients diagnosed with peritoneal carcinomatosis who underwent cytoreductive surgery with HIPEC from January 2018 to December 2020 in our hospital. The primary endpoint investigated was the rate of surgical site infection in the postoperative period. Acute phase parameters were determined in a blood sample taken in the first five days after surgery. Receiver operating characteristic (ROC) curve analysis was performed, and the respective areas under the curve (AUC) were calculated to evaluate the predictive value of these parameters in the diagnosis of septic complications.
Results: We recorded 31 patients in our preliminar results. Surgical site infection was observed in 6 of them (19%). Only procalcitonin levels in postoperative day 3 were significantly higher in patients who had surgical site infection. Using ROC analysis, the best AUC of the procalcitonin levels was on postoperative day 3 (0.733). A procalcitonin cutoff level at 0.45 ng/ml showed 50% sensitivity and 90% specificity for predicting infectious complications.
Conclusions: Cytoreductive surgery with HIPEC is an invasive surgery, and it causes an intense systemic inflammatory response in patients. As a result of this, the value of acute phase reactants parameters to predict infectious complications is still limited.

01AP06-09
Association between CYP2D6 isoenzyme and ABCB1 gene polymorphisms with the frequency of postoperative nausea and vomiting after antiemetic prophylaxis with palonosetron or ondansetron

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Background: Despite all technological and scientific advances, postoperative nausea and vomiting (PONV) continue to be common complications in the postoperative period. Serotonergic antagonists are among the main drugs used in clinical practice for antiemetic prophylaxis[1].
Inter-individual changes in drug response, including single nucleotide genetic polymorphisms, are related to pharmacokinetic and pharmacodynamic changes in these drugs [2,3].
The objective was to evaluate the association of polymorphisms associated with PONV with antiemetic prophylaxis with ondansetron or palonosetron.
Materials and Methods: Eighty female patients aged 60 years or older, undergoing elective laparoscopic cholecystectomies were recruited and their DNA was extracted from saliva by the PCR method. We investigated the association of CYP2D6 isoenzyme and ABCB1 gene polymorphisms with PONV frequency when using palonosetron or ondansetron for prophylaxis of nausea and vomiting. Descriptive statistics were employed to describe the sample. The association between polymorphisms and NV were measured using Pearson's chi-square or Fischer test. The level of significance for all analyses was set at $P=0.05$ or less.
Results: Vomiting occurred in 22.5% and severe nausea in 57.5% of patients in the total sample. In the palonosetron group, patients with GG polymorphism (rs 16947 A/G) had more severe nausea ($P=0.043$). In the ondansetron group, patients with the AA polymorphism (rs 16947 A/G) were associated with mild nausea ($P=0.034$) and with the AA polymorphism (rs 1065852 A / G) had more vomiting ($P=0.034$).
Conclusion: We have found that the presence of polymorphism may be a determining factor in the drug choice for PONV. This highlights the impact of genetic predispositions on PONV but additional research is needed.
ClinicalTrials.gov(NCT02541019).
References:
1. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Society for Ambulatory Anesthesia. Consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg. 2014;118:(1) 85-113.
2. Klenke S (1),Frey UH.Genetic variability in postoperative nausea and vomiting: A systematic review. Eur J Anaesthesiol.2020 Nov;37(11):959-968.
3. Candiotti et al.The impact of pharmacogenomics on postoperative náusea and vomiting:do CYP2D6 allele copy number and polymorphisms affect the sucess or failure of ondansetron prophylasis? Anesthesiology.2005 102,543-549.

01AP06-10
Postoperative delirium in adult patients undergoing noncardiac surgery: data from a tertiary hospital

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Background and goal of study: Postoperative delirium (POD) is a common adverse postoperative complication characterized by acute and fluctuating alteration of mental state of reduced awareness and disturbance of attention. POD has been linked with long-term morbidity and reduced quality of life, hence ESAIC recommends screening for POD up to fifth postoperative day with validated tools.
The aim of the study was to investigate the incidence of POD in adult patients undergoing non-cardiac surgery and any predisposing risk factor.
Materials and methods: We included all adult consecutive patients who underwent noncardiac surgery during 02-11/2021 (NCT04736303). Inclusion criteria were; age >60 years old, ASA PS I-III, elective non cardiac surgery, native speakers of Greek language, eligible to leave PACU and expected hospital stay of at least 24 hours. Exclusion criteria were; refusal to participate, prior surgery or anaesthesia within 30 days, any known or suspected psychiatric of neurological disorder, severe hearing or visual impairment and any known substance dependence. The diagnosis of POD was based on the CAM and NuDESC screening tools, validated for the Greek population during the first 4 days after surgery. ASA PS, type of surgery, type of anaesthesia, surgery and anaesthesia duration were recorded. The incidence was calculated in counts and percentages, while a logistic regression produced the odds ration with their 95% confidence interval.
Results and discussion: One-hundred and twenty five patients (78 males; 62.4%) with a median age of 74.6 (±7.28) were included. The incidence of POD was 6.4%. ASA PS(OR, 15.4667; 95%CI, 1.60 – 148.71, $p<0.001$), anaesthesia duration (OR, 1.012; 95%CI, 1.01 – 1.0193, $p<0.001$) and surgery duration (OR, 1.01230; 95%CI, 1.00499 – 1.0197, $p<0.001$) were linked with higher POD incidence. Interestingly, maintenance of general anaesthesia with inhaled agents (OR, 0.0896; 95%CI, 0.0147 – 0.545, $p=0.009$) was accompanied by lower POD rates when compared to total intravenous anaesthesia mainly with propofol (OR, 4.70e-8; 95%CI, 0.0000 – Inf).
Conclusion(s): Our study revealed an incidence of POD within the lower limits based on current literature. Anaesthesia and surgery duration and ASA PS were linked with higher POD, while maintenance with inhaled agents showed a protective role when compared to total intravenous anaesthesia mainly with propofol.

01AP06-11
Fatal bone cement embolism in an oncologic patient. Any afterward measure to be considered?

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Background: Bone cement implantation syndrome (BCIS) may occur in every orthopaedic procedure involving cement use. Overall estimated incidence is 20%[1].
Most episodes aren't severe, however some patients are especially at risk. We report a fatal cement embolism case during megaprosthesis surgery, for femoral tumoral implant, focussing on future measures to implement.
Case report: A 69 yrs-old patient was scheduled for left femoral megaprosthesis C. She was diagnosed with pulmonary adenocarcinoma extensively metastatic to the bones. Thorax CT revealed bilateral segmentary pulmonary embolism, though she was asymptomatic. Echocardiography (EC) showed severe pulmonary hypertension but normal right ventricle function.
As the patient was in severe pain, previous to chemotherapy, the cancer conference decided femoral surgery. In the preoperative anaesthesiologic evaluation, it was duly noted her high risk of perioperative complications, even death. Still, surgery was performed; general anaesthesia with invasive cardiovascular monitoring was chosen.
After cement implantation and prothesis insertion, the patient experienced hypoxia and hypotension, progressing to electromechanical dissociation, refractory to advanced CPR. EC revealed severe dilatated hypocontractile right ventricle, impairing left ventricular filling; all supporting cement embolism diagnosis.
Discussion: Most of long bone metastases affect the proximal femur. As in the case reported it inflicts severe pain and poses the patient at risk of pathological fractures, being the main reason to prioritize surgery. Assessment of the perioperative risks in these patients is challenging, but of paramount importance medically and economically. Even if infrequent, a grade 3 BCISleads to ominous prognosis in a cardiac compromised patient. Different strategies have been described for reducing its incidence and enhance management[1].
A data registry of perioperative complications in these surgeries may help in decision making. Until them preoperative risk/benefit ratio must be carefully evaluated in accordance to expected survival, actual physical status, comorbidities and fixation method chosen.
References: 1. Anaesthesia 2015,70,623-26.
Learning points: An institutional BCIS prevention and treatment protocol must be available. Anaesthesiologists should be included in cancer multidisciplinary team meetings involving surgery, to improve assessment of perioperative risks considering institutional data registry.

01AP06-12
The effect of body temperature on cholinesterase activity in serum during general anesthesia and surgery

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Background and goal of study: Knowledge regarding the effect of general anesthesia and surgery on cholinesterase activity levels is scarce. Anesthesia literature addresses serum acetylcholinesterase (AChE) mainly for drug interaction that increases Suxamethonium chloride paralyzing duration in clinical practice. We aim to assess the effect of body temperature during general anesthesia (GA) and surgery on serum cholinesterase activity.
Materials and methods: This was a prospective study of 57 patients undergoing ambulatory or vascular surgery under GA, declaration of Helsinki (0342-19-TLV). Cholinesterase activity was measured before the induction of anesthesia, after 15 minutes, and at the end of surgery by calculating the capacity of AChE and butyrylcholinesterase to hydrolyze AcetylThioCholine.
Data on atherosclerotic disease, anesthesia management were analyzed.
Results and discussion: Both AChE and total cholinergic status (CS) decreased significantly after GA induction at 15 minutes and even more so by the end of surgery. The mean delta decrease in enzymatic activity, using the paired format from baseline to 15 min post-induction of anesthesia was 70.5±91 $p<0.001$; 234.7± 278.2 $p<0.001$, for AChE and CS respectively, and from baseline to end of anesthesia the mean delta was 50.3±76.9 $p<0.001$; 155.1± 191.7 $p<0.001$, respectively.
A positive correlation was found between the lowest temperature measured during anesthesia and the AChE and CS change from the baseline values ($r=0.309$, for both, $p=0.039$) This correlation remains significant even following adjustment for anesthesia length ($r=0.324$, $p=0.034$; $r=0.322$ $p=0.035$ for AChE and CS respectively).

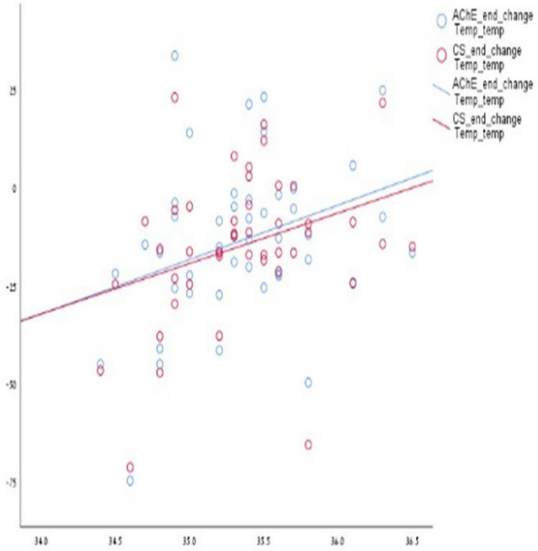

Figure. Correlation between minimal body temperature and AChE, CS levels change from the beginning (t-1) to the end of anesthesia (t-3)-
Y-axis: AChE and CS difference t1-t3
X-axis: Temperature (celsius)

Conclusion(s): We found a positive correlation between the lowest body temperature measured during anesthesia to the level of AChE and CS.

01AP07-01
Plasma biomarkers of lung inflammation and injury in obese surgical patients ventilated with low vs. high positive end-expiratory pressure - a substudy of the PROBESE randomised controlled trial

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Background: Mechanical ventilation (MV) with high positive end-expiratory pressure (PEEP) and recruitment maneuvers (RM) vs. low PEEP did not reduce postoperative pulmonary complications (PPC) in obese surgical patients (1). We investigated whether these MV strategies modulated biomarkers of lung inflammation and injury.
Methods: Patients received intraoperative tidal volume of 8 ml/kg and either PEEP=4 cmH_2O (LowPEEP), or PEEP=12 cmH_2O with RM (HighPEEP+RM). We analysed pre- and postoperative blood samples for interleukin (IL)-6, IL-8, tumor necrosis factor (TNF)-α, surfactant protein (SP)-D, Receptor for Advanced Glycation End-products (RAGE), Clara Cell protein (CC)-16, intercellular adhesion molecule (ICAM)-1, vascular cell adhesion molecule (VCAM)-1, and Mucin-1. We assessed intraoperative respiratory variables, including elastic mechanical power (MP) and MP normalised to body mass index (MP-BMI), PPC incidence, and hospital-free days on day 90 (HFD). Statistics included χ^2- and Mann-Whitney-U-test, Spearman-correlation, general linear model, and receiver-operator-characteristics (ROC).
Results: In total, 96 patients from the LowPEEP and 95 from the HighPEEP+RM group were included. Groups did not differ with respect to biomarker levels, PPC, or HFD. Patients developing PPC had higher preoperative SP-D and RAGE, as well as higher postoperative IL-6, IL-8, and SP-D, but lower Mucin-1 levels.
Preoperative PPC risk score, duration of surgery, PPC incidence, plateau pressure, MP, and MP-BMI correlated positively with different biomarkers. Postoperative IL-6 and VCAM correlated negatively with HFD. The area under ROC curve for PPC development was highest for peri-operative IL-6 difference (ΔIL-6) (0.700; $P<0.001$). For development of PPC, ROC analysis revealed a ΔIL-6 threshold of 6.2 pg/ml. Sensitivity and specificity were 0.59 and 0.75, respectively. Patients with ΔIL-6 above the threshold had significantly higher age and PPC risk scores, longer duration of anaesthesia and surgery, less HFD, lower BMI, and higher MP-BMI.
Conclusions: In this cohort of surgical obese patients, inflammatory and lung injury biomarkers did not differ between MV with low PEEP vs. high PEEP and RM. However, patients who developed PCC had higher preoperative SP-D and RAGE, as well as postoperative IL-6, IL-8, and SP-D concentrations.
References: 1. PROBESE Collaborative Group of the PROVEnet for the Clinical Trial Network of the ESAIC. 2019. DOI: 10.1001/jama.2019.7505

01AP07-02
How well do BMI and weight predict morbidity & mortality after primary bariatric surgery?

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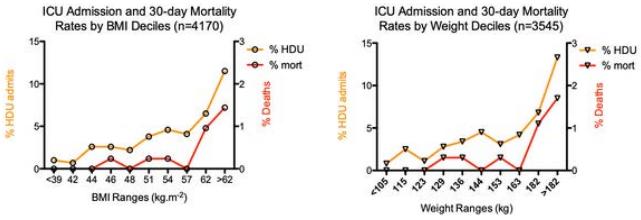
Background and goal of study: High BMI and weight are both associated with peri-operative bariatric surgical morbidity and mortality[1]. We present here an evaluation of more than 4,100 patients who underwent primary bariatric surgery in a single UK unit, using ICU admission as our surrogate of peri-operative morbidity, in order to assess whether BMI or weight is more strongly associated with complications and death.

Materials and methods: We performed a retrospective analysis of our anaesthetic database, cross-referencing to our ICU admission dataset, of patients undergoing primary bariatric procedures. Both weight and BMI are continuous variables, so the cohort was divided into ten equal-sized groups (deciles) and the correlations with ICU admission and 30-day mortality assessed.

Results and discussion: ICU admission rates and 30-day mortality are shown below. The median age of the cohort was 44 years, 78% were female. BMI was available for all patients, in slightly less than 15% an accurate weight was not available



Conclusion(s): In this extensive series of patients extending over more than fifteen years, ICU post-op admission and mortality were both confirmed to be most strongly correlated with patients in the highest 10% of BMI (>62kg/m^2) and of weight (>182kg). Neither of the two parameters assessed appeared to be superior to the other in predicting outcomes. We suspect a selection bias towards preferential admission of larger patients, so teasing apart essential admissions, for level 3 care, from semi-elective admissions, will be the subject of further analysis.

References: 1. Morgan DJ, Ho KM, Armstrong J, et al. Incidence and risk factors for intensive care unit admission after bariatric surgery: a multicenter population-based cohort study. *Br J Anaesth* 2015;**115**: 873-82.

01AP07-03
Optimization of intraoperative ventilation guided by electric impedance tomography in obese patients undergoing robot-assisted radical prostetectomy: randomized prospective study - preliminary results

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Background and Goal of Study: Robotic-assisted radical prostatectomy is performed with the use of the pneumoperitoneum and with the extreme trendelenburg position. These conditions cause important alterations in respiratory mechanics and cerebrovascular dynamics. The obese patient has reduced chest expandability and increased cardiac stress and oxygen requirements.

The primary objective of our study will be to verify a possible improvement in arterial oxygenation if the ventilation will be guided by electrical impedance tomography (EIT) rather than by peripheral saturation alone.

Materials and Methods: This prospective trial was approved by the local ethics committee. Between September 2020 and December 2021, 32 Obese patients (> 30 BMI) scheduled for robotic-assisted radical prostatectomy were enrolled. Patients were randomized into two groups of 16 patients each. In group S, only tissue oxygenation monitoring was performed using SpO2. In the S+E group, additional monitoring with electrical impedance tomography (EIT) was performed.

Gas exchanges, ventilatory, hemodynamic and tomographic parameters were recorded at the following time points: in supine post induction position (T1), 10min post pneumoperitoneum and trendeleburg position (T2), 1h after T2 (T3), in supine pre extubation position (T4)

Results and Discussion: Baseline characteristics were similar in both groups. The PaO2/FiO2 ratio was significantly higher in the S+E group at T2 (303 ± 128 vs 232 ± 39 P <0.05). Tidal volume was significantly lower in the S+E group at T2 (480 ± 52 vs 525 ± 39 P <0.05), T3 (475 ± 62 vs 530 ± 47 P <0.05) and T4 (492 ± 47 vs 551 ± 25 P <0.05).

The tidal volume / ideal weight ratio (ml/kg) was lower in the S + E group at T2 (7.23 ± 0.8 vs 7.8 ± 0.8 P <0.05), T3 (7.14 ± 0.8 vs 7.9 ± 0.8 P <0.05) and T4 (7.43 ± 0.75 vs 8.2 ± 0.7 P <0.05). Peak pressure and plateau pressure were lower in the S + E group at T4 (20.7 ± 5.7 vs 26.7 ± 5 P <0.05 and 14.9 ± 3.7 vs 19.6 ± 7.3 P <0.05).

Conclusion(s): The use of EIT has led to an intraoperative improvement in arterial oxygenation and a significant reduction in tidal volume, peak pressures and plateau pressures.

01AP07-04
A Body Shape Index (ABSI): a predictor of critical care admission after primary bariatric surgery?

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Background and Goal of Study: Cardiovascular co-morbidity in bariatric patients is strongly associated with visceral adiposity. BMI does not describe fat distribution. ABSI is an alternative index which utilises waist circumference in its formulation and has been shown to correlate better with all cause mortality in the general population.[1] This study tests the hypothesis that high ABSI correlates with peri-operative morbidity following bariatric surgery, as measured by critical care admission.

Methods: An anaesthetic database of >2500 patients undergoing primary bariatric surgery across a 9.5 year period was cross referenced with our critical care dataset to identify ICU admissions. We then divided this cohort into quartiles by ABSI. ICU admission rates for the highest quartile was compared to the rest. Fisher's exact test test was used to assess significance.

Results: ABSI data was available for 1489 patients. Median ABSI was 7.896 (amended to use metres rather than cm for simplicity; IQR 7.481- 8.283). The median BMI for this cohort was 48 with median age 46. 78.5% were female.

Within the lowest three Quartiles of ABSI, 17 of 1116 patients (1.5%) were admitted to ICU. Within the highest Quartile, 16 of 373 patients (4.3%) were admitted; a highly significant difference (P-value 0.0036).

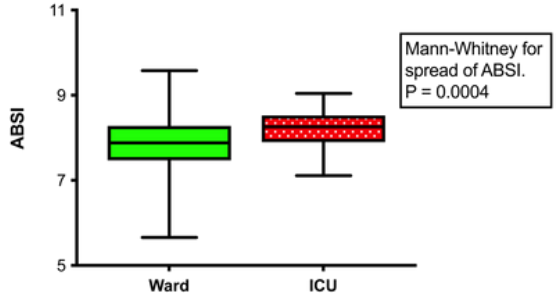

Figure. Spread of ABSI vs ICU Admission in Primary Bariatric Procedures. (N=1489; Median, IQR & Ranges)

Conclusion: Our analysis supports the overall hypothesis that high ABSI is a risk factor for peri-operative critical care admission in patients presenting for primary bariatric surgical procedures.

Further research is required to understand the predictive value of ABSI in sub-groups. Exploring by sex, there is a statistically significant difference amongst the female sub-group, but only a trend which does not reach significance amongst males; however we suspect the smaller numbers of male patients (<22% of this entire bariatric dataset) may account for this difference.

References:

1. Krakauer, N. Y., & Krakauer, J. C. (2012). A New Body Shape Index Predicts Mortality Hazard Independently of Body Mass Index. *PLoS ONE*, *7*(7), e39504.

01AP07-05
Difficult airway predictive model in patients with temporomandibular joint disorder

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Background and Goal of Study: Temporomandibular joint disorder (TMD) is a painful clinical condition involving a dysfunction of the temporomandibular joint (TMJ) and the muscles of mastication. It affects approximately 5 to 12% of the overall population. Patients with TMD tend to have a limited mouth opening and restricted jaw movements, both traditionally considered as difficult airway (DA) predictors.

The aim of our study is to establish a predictive model for DA in patients with TMD undergoing arthroscopic surgery and define the most specific predictors in this group of patients.

Material and methods: This is a prospective single center observational study in patients with arthroscopic TMJ surgery during a 3 year and 10-month period.

Data were collected from the electronic health and paper-based records. We collected demographics, patient symptoms, MRI results, airway management information, surgical and arthroscopic findings.

Data were statistically processed with the SAS 9.3 software. Statistically significant differences were those that presented a probability of error less than 5% ($p<0.05$).

Results and Discussion: We recruited 152 patients of which 90,1% were female. The median interincisal distance was 3.5 cm and 65.3% of patients had Mallampati score I-II. The upper lip bite test score of I was observed in 89.3% of the cases and only 12.5% of the patients had a Cormack-Lehane grading (CL) ≥ III. Most patients (90.2%) were intubated on the first attempt.

Statistically significant differences were observed in Mallampati ($p<0.001$), Wilkes stage ($p=0.023$), upper lip bite test ($p=0.024$), BMI ($p=0.026$), complexity of intubation alternatives used ($p=0.001$) and adhesions during arthroscopy ($p=0.059$), associated with a CL grade of ≥III.

Multivariate analysis showed that the best predictive model for CL grade is:

$$log(p/1-p) = -9.541 + 1.185 \times Mallampati + 0.676 \times WilkesStage + 2.112 \times Upper\ lip\ bite\ test$$

As shown in previous studies, Mallampati score, bite test and BMI are associated with a CL grade ≥III. The strength of our study is that the combination of classical clinical airway predicators and MRI (Wilkes stage) results for the prediction of a DA.

Conclusions: In patients with TMD, a high grade of Mallampati score, upper lip bite test and increased Wilkes stage was associated with a difficult airway. However, restricted mouth opening alone is not associated with a DA as a single factor.

Further studies are needed for the validation of this predictive model.

01AP07-06
Effects of the Left Paratracheal Esophagus Compression (LPEC) or cricoid pressure on the esophageal diameter and position: an MRI study

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Background and Goal of Study: Cricoid pressure is commonly applied during rapid sequence induction of anesthesia. Recently, the Left Paratracheal Esophagus Compression (LPEC) applied more caudally was reported to prevent gastric insufflation during facemask positive pressure ventilation more often than cricoid pressure, as assessed by ultrasound (1).
We compared the effects of both maneuvers on the diameter, and anatomical position of the esophagus.
Materials and Methods: After ethical committee approval, 17 healthy volunteers were studied. Esophageal diameter and position before (*baseline*) and after the compression maneuvers were assessed by MRI imaging (Figure 1).

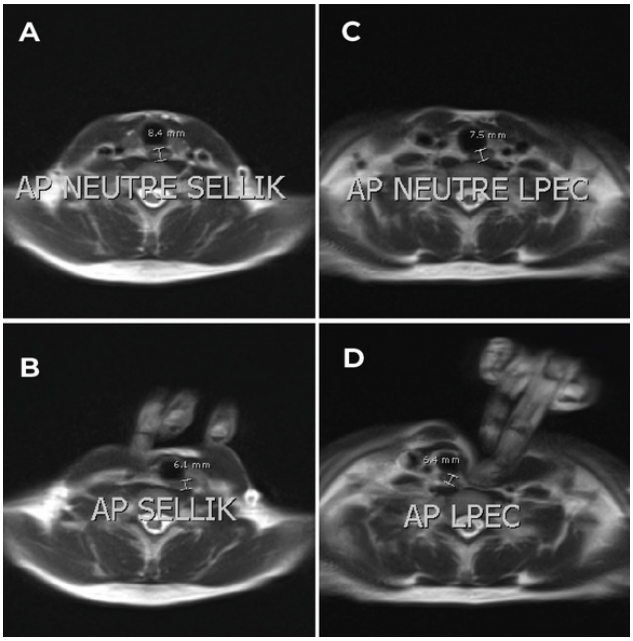

Figure 1. MRI images show: (A) the esophagus position without any compression and (B) when applying the cricoid pressure; (C) the esophagus position without any compression and (D) when applying the LPEC maneuver.

The main outcome variable was the decrease in the anteroposterior diameter of the esophagus. Using the vertebral bodies as a reference, we also assessed the displacement of the esophagus during the study maneuvers.
Results and Discussion: At baseline, the esophageal diameters were similar (8.3 ± 1.6 mm for the cricoid pressure group, and 8.5 ± 2.5mm for the LPEC group. The cricoid pressure reduced the esophageal diameter by 19 ± 13%, whereas the LPEC reduced the diameter by 37 ± 18%, p=0.018). During the cricoid pressure, the esophagus was displaced to the right in 8 volunteers, to the left in 5, and remained in the same plane in 4 volunteers.
When applying the LPEC, the esophagus was shifted to the right in 15 volunteers, while no displacement occurred in 2 volunteers.
Conclusion(s): The LPEC reduced the esophageal diameter to a greater extent than the cricoid pressure. The compression effect of the LPEC was independent from the direction of the anatomical displacement of the esophagus.
References: 1. Gautier N, Danklou J, Brichant J, Lopez A, Vandepitte C, Kuroda M, Hadzic A, Gautier P. The effect of force applied to the left paratracheal oesophagus on air entry into the gastric antrum during positive-pressure ventilation using a facemask. *Anaesthesia 2018;* 74: 22-28.

01AP07-07
Opioid free anesthesia (OFA) for major ortopedic hip surgery. Is it a useful resource in case of morbid obesity?

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Background: Morbid obesity is on the increase in patients presenting for elective total hip arthroplasty. Complication rates are higher compared to normal weight patients[1].
Nowadays major orthopaedic procedures are common, some requiring general anaesthesia. OFA is becoming an alternative intraoperative technique.
Case report: A 61 yr-old woman underwent a 4 hour ,second stage, right total hip arthroplasty for prosthetic joint infection with large acetabular defect. She had a history of morbid obesity (BMI 46), severe obstructive sleep apnoea (OSA) and obstructive chronic pulmonary disease (OCPD).
Surgery was uneventfully performed under general anaesthesia following institutional OFA protocol. Drugs used included dexmedetomidine, ketamine, magnesium sulphate, lidocaine, dexamethasone, paracetamol and dexketoprofen. Previous to successful extubation, an analgesic ultrasound guided, fascia iliaca compartment block (FIB) was done.
She didn't experience complications or needed opioid rescues in the postoperative intensive care unit.
Discussion: Morbid obesity complicates major orthopaedic hip surgery, technically and medically. Opioid sparing or OFA techniques are currently a major shift in anaesthesia practice[2]. They avoid not only opioid side effects but also contribute to withhold opioid dependence. OFA strategies uses are broadening, specifically for OSA or OCPD patients. Different protocols have been described[2]; we usedour institutional one.
Although in orthopaedic surgery neuroaxial techniques are the gold standard, sometimes a general anaesthesia is the safest option. In our case due to factors relatedto surgery as long operative time,lateral decubitus position required, and high risk of haemorrhage. Neuroaxial opioids were also precluded because high risk of secondary respiratory depression.
All things considered OFA was a suitable choice. Within a multimodal analgesic regimen an ultrasound FIB was performed, proven useful for hip surgery postoperative analgesia.

References:
1. Hanly RJ, et al. J. Arthroplasty 2016 Sep 1(9)1949-53.
2. Mauermann E, et al. Best Pract Res Clin Anaesthesiol. 2017 Dec31(4)533-45

Learning points: OFA may be considered a feasible and safe resource in morbid obese patients scheduled for major hip replacement surgery, requiring general anaesthesia. Ultrasound guided FIB, may be used within amultimodal analgesic approach.

01AP07-09
HIPEC surgery: How do we choose the analgesia protocol?

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Background and goal of study: Cytoreduction Surgery and Hyperthermic intraperitoneal chemotherapy perfusion (CRS + HIPEC) is an increasingly used technique for the treatment of oncologic peritoneal disease. This study sought to determine variables that influence the selection of the analgesia protocol.
Materials and methods: After ethical approval (234/021) a retrospective observational study that included all patients undergoing CRS+HIPEC at our institution between January 2019 and December 2020 was performed. Demographic variables, risk scores, intraoperative and postoperative variables, analgesic protocol and AE up to 30 days were collected and analyzed.
Results and discussion: 98 patients were included. Combined epidural anesthesia was performed in 75.5%. In the postoperative period these patients received Patient Controlled Epidural Analgesia (PCEA) analgesia with ropivacaine and sufentanil. The remaining received intravenous infusion of sufentanil (SUF). All were observed by an anesthesiologist daily. In 3 patients, there was malfunction of PCEA.
Patients with SUF had a higher: ASA status, P-POSSUM and preoperative coagulation disorders or were on hypocoagulation ($p<0.05$). The ECOG score was higher but the difference was not statistically significant.
5 patients rejected PCEA, in 6 technique was not successful and 4 had symptomatic peripheral neuropathy.
The 2 groups showed no difference in: hemoglobin, albumin, glomerular filtration rate, duration of anesthesia, volume of crystalloids, blood loss, blood products or vasopressor infusion.
A total of 51 adverse events were graded according to the Common Terminology Criteria for Adverse Events (CTCAE). Using multivariate logistic analysis, long operative time, a volume of crystalloids >6L and SUF were identified as predictors of AE ($p<0.05$). The use of SUF increased the risk of AE by 38%.
Our practice is in line with current Enhanced recovery after surgery (ERAS) recommendations. 70.8% of the patients in whom PCEA was not used had a contraindication for its placement or its placement was not successful. Others had pathology that could limit suspicion in the event of a complication. In only 3% SUF was used without explicit justification.
Conclusion(s): Epidural anesthesia was associated with lower risk of adverse events being our first choice of analgesia. The selection of an appropriate analgesia protocol, which is essential for better clinical outcomes, relies on adequate patient selection.

01AP08-01
The validity and tolerability of awake calibration of the TOF Watch SX® monitor: an interventional prospective multicenter study

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Background: Acceleromyography is widely used for quantitative neuromuscular monitoring. Devices should be calibrated before injection of neuromuscular blocking agents after anesthesia induction. During rapid sequence intubation there is no time for this procedure. We investigated the tolerability and validity of awake calibration compared to asleep calibration:
Methods: Thirty-four patients aged 19 to 64 years undergoing elective surgery were enrolled. On each wrist, a TOF-Watch SX® monitor was installed. On one wrist, awake calibration was performed three minutes after intravenous sufentanyl 0.2 μg kg^{-1}or fentanyl 2 μg kg^{-1} and pain rated on a numeric rating scale (NRS) from 0 to 10.
Thereafter anesthesia was induced and maintained with intravenous propofol and the other TOF-Watch SX® monitor was calibrated (reference). Continuous train of four (TOF) stimulation was started on both devices and a single intravenous dose of rocuronium (0.6 mg kg^{-1}) was administered for intubation.
The primary outcome was total recovery time (time in minutes from the injection of rocuronium to a normalized TOF ratio of 90%). Agreement between the two devices was quantified as the intraclass correlation coefficient, the mean difference between methods, and with the Bland-Altman method.
Results: The primary outcome could be analyzed in 33 patients due to a monitoring failure in one patient. Mean total recovery time with awake calibration was 51 min (standard deviation (SD) 14) and with the asleep calibration 51 min (SD 14).
There was no systematic difference (-0.37, 95% CI: -1.88; 1.14, $p = 0.624$) between awake and asleep calibration. The intraclass correlation between both measures was 0.96 (95% CI: 0.92; 0.98). The mean pain rated during the awake calibration on a 0 to 10 NRS was 3.2 (SD 1.9), range: 0 to 8.
Conclusions: Awake calibration of the TOF Watch SX is well tolerated and produces valid results because there are not differences between awake and asleep calibration. It might be used before rapid sequence induction in awake patient.
References:
1. Claudius C, Skovgaard LT, Viby-Mogensen J: Is the performance of acceleromyography improved with preload and normalization?: A comparison with mechanomyography. Anesthesiology 2009 doi:10.1097/ALN.0b013e3181a4f239
2. Bland JM, Altman DG: Statistical Methods for Assessing Agreement Between Two Methods of Clinical Measurement. Lancet 1986;

01AP08-02
Cardiac output estimation by transthoracic echocardiography and ClearSight™ after passive leg raising

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Background and goal of Study: Different methods, invasive and non-invasive, have been developed to assess intravascular circulating blood volume. Among the non-invasive ones, transthoracic echography (TTE) has been widely validated but requires a trained operator.[1] The ClearSight™ system (Edwards LiveScience Corp, Irvine, USA), provides continuous blood pressure and advanced hemodynamic parameters such as CO from a non-invasive finger cuff. The aim of this study was to assess whether the ClearSight™ was as reliable as the TTE in the measurement of cardiac output (CO) after a passive leg raising (PLR) test.
Materials and methods: After IEC approval (CE2021/78) and NCT registration (NCT04866095), adult elective surgical patients who gave written informed consent were assessed for inclusion in this prospective observational study. Exclusion criteria were: suboptimal imaging, patients with 6 or more extra systoles per minute, or presenting cardiac valve pathologies. Recruited patients underwent measurement of CO by TTE and ClearSight™ at four time points: in supine position with the upper body at 45° (T1), after PLR (T2), again in the initial position (T3) and 10 minutes later in the same position (T4). The primary outcome was the agreement of the CO measurements by TTE and by ClearSight™ analysed by the intraclass correlation coefficient and depicted in a Bland and Altman plot.[2]
Results and discussion: From 56 eligible patients, 49 were included. Intraclass correlation coefficient was low overall: 0.314 (95%IC: -0.037 – 0.561) and at the four different steps (T1: 0.293 (95%IC: -0.039 – 0.558); T2: 0.356 (95%IC: -0.023 – 0.624); T3: 0.299 (95%IC: -0.071 – 0.586); T4: 0.300 (95%IC: -0.083 – 0.596). Bland- Altman analysis shows an overestimation of 1.5 L/min by the Clear Sight™ in comparison to TTE (Fig.1).

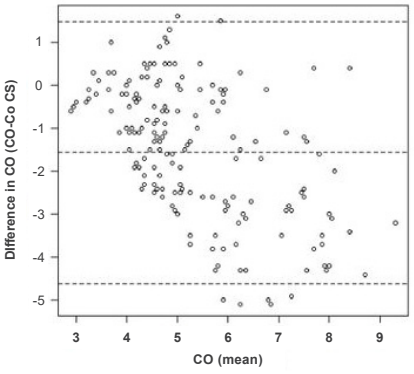

Fig. 1. Bland and Altman plot of CO pooled steps.
Interclass correlation in the four steps equals 0.314 (95%IC: -0.037 - 0.561).

Conclusion(s): Our results showed a poor correlation between Clear Sight™ and TTE. More studies are needed to evaluate the ability of the Clear Sight™ to measure CO after PLR.
References:
1. Mercado P, et al. Crit Care. 2017 Jun 9;21(1):136.
2. Bland JM, et al. Lancet. 1986 Feb 8;1(8476):307-10.

01AP08-03
CONOX monitor as a tool for intraoperative stress response management

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Objectives: Evaluate if stress hormones are attenuated when performing CONOX monitor-guided anaesthesia. Analyse if there is less hemodynamic variability and anaesthetic drugs consumption under said monitor.
Methods: Prospective, randomised, single-blind trial. ASA I-III patients were recruited from morning surgeries. The anaesthetic technique was elective.
Blind Group: Anaesthesia was guided using clinical and hemodynamic parameters; a second researcher recorded the data and alerted on harmful values in CONOX when observed.
Case Group: We used qCON and qNOX indexes to guide anaesthesia, which were recorded, as well as hemodynamic parameters (MAP and HR), at baseline (BL), postintubation (PIT), postincision (PI), intraoperative (IO) and extubation (ET) periods. Baseline cortisol, glycemia, CRP and lactate levels were tested ending the surgery and 24 hours later. Non parametric methods were used. Significance level considered 5%
Results: Both groups of 15 patients studied were comparable. Videolaparoscopic procedures: 25/30. MAP decreased in both groups at PIT, PI and IO periods without significant differences. HR decreased more in the Case group in these periods, especially after intubation (p=0.059), rising upon awakening. qCON mean values decreased at PIT, PI and IO periods similarly, remaining in a 40-60 range, rising upon awakening. qNOX mean values in both groups decreased in the same periods as qCON indexes, with Blind group values remaining close to 60 in comparison to Case group values, which remained in a 45-50 range.
The difference between them was not significant. Glycemic mean values increased in the Blind group (p=0.001), while they decreased in the Case group at the end of the surgery, without significant results. In the Case group, the mean cortisol value decreased significantly (p=0.001) at the end of the surgery and 24 hours later. In the Blind group, the decrease was not significant.
There were no significant differences between the groups. Drug consumption was higher in the Case group despite using lower doses of sevofluorane and propofol. Remifentanil use was similar in both groups.
Conclusion: Neither hemodynamic variability nor anaesthetic drug consumption differences were observed between both groups. The longer duration of Case group surgeries could have influenced this. Although there is a better stress hormonal profile in the Case group, the differences were not significant, probably due to videolaparoscopic procedures.

01AP08-04
Accuracy and precision of the non invasive TensorTip MTX for vital signs, blood content and blood gas analysis

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Background and goal of study: The TensorTip™ MTX is a non-invasive device measuring various vital signs, blood content and blood gas analysis. Studies on accuracy and precision have thus far only been conducted by the manufacturer.
The aim of our study was to investigate the accuracy and precision of the TensorTip in comparison to measurements obtained with a artery catheter.
Materials and methods: After informed consent was provided, 53 patients scheduled for elective surgery were included. Placement of the arterial catheter was part of the elective procedure. During hemodynamically stable conditions measurements where obtained and compared using Bland-Altman analysis. A bias of 5 mmHg and maximal LoA of 8mmHg was considered acceptable for Blood pressure. A percentage error greater than 20% was considered clinically undesirable in blood content and blood gas.
Results and discussion: The device malfunctioned in 9-12 of 53 patients (17-23%), resulting in 41-44 paired observations. Bland-Altman plots for mean arterial pressure, haemoglobin and carbon dioxide partial pressure are displayed in figure 1.

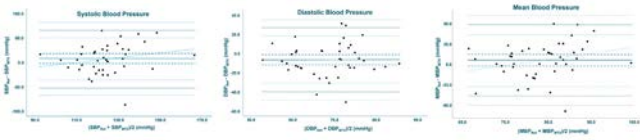

Figure 1. Bland-Altman plot for TensorTip MTX

Parameter	Bias (95%-CI)	± LoA (95%-CI)	PE (95%-CI)
MAP (mmHg)	4.2 (-1.9 to 10.4)	±40.8 (30.2 to 51.4)	48.9% (36.1 to 61.7)
SAP (mmHg)	6.6 (-2.2 to 15.4)	±56.3 (41.1 to 71.5)	45.4% (33.1 to 57.7)
DAP (mmHg)	-6.8 (-11.9 to -1.8)	±32.5 (23.7 to 41.3)	47.7% (34.9 to 60.4)
O_2 Sat (%)	-1.01 (-0.36 to -1.67)	±4.33 (3.20 to 5.46)	4.4% (3.3 to 5.6)
pCO_2 (kPa)	0.61 (0.32 to 0.89)	±1.87 (1.39 to 2.36)	36.6% (27.1 to 46.2)
pO_2 (kPa)	8.09 (5.22 to 10.97)	±19.07 (14.09 to 24.05)	110.2% (81.4 to 139.0)
Hb (mmol l^{-1})	0.57 (0.05 to 1.10)	+3.50 (2.58 to 4.41)	53.1% (39.2 to 67.0)

Precision and accuracy of the most practical values that can be measured by the TensorTip MTX. MAP, mean arterial pressure; SAP, systolic arterial pressure; DAP, diastolic arterial pressure; pCO_2, carbon dioxide partial pressure; pO_2 oxygen partial pressure; Hb, Haemoglobin; LoA, Limit of agreement; PE, percentage error.

Table 1. Numerical values from Bland-Altman analysis of MTX parameters

Accuracy, precision and percentage error are presented in table 1. All parameters were subject to proportional bias. accuracy, precision and percentage error was insufficient. In addition, the device regularly gave error messages. The screen of the device was not always accessible due to the positioning of the patient.
Conclusion(s): The TensorTip was not able to reliably measure vital parameters and blood analysis compared to values obtained with an arterial catheter. Moreover, practical drawbacks hamper the use of the device in perioperative and critical care.

01AP08-05
Implementation of gas capture system CONTRAflurane to reduce inhalation anaesthetic waste and carbon footprint of general anaesthetics

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Background and goal of study: Climate change due to the use of volatile anaesthetics (VA) has been receiving more attention. VA are fluorocarbons and potent greenhouse gases. VA are indispensable used to induce and maintain general anaesthesia for surgical procedures. Patients take up only a minimal portion and exhale 99% of the gases. Scavenging systems are used to remove these waste gases from the operating room but they still are unabated expelled into the atmosphere. In our hospital the volatile anaesthetics yearly contributes about 2.2 million CO2 equivalent.
Our goal is to reduce this environmental impact. Newly developed adsorption technique makes this possible. We performed a 4 months pilot to introduce and evaluate the use of this new technique in daily practice.
Materials and methods: CONTRAfluran gas capturing system (CGCS) has been developed to prevent exhaled gas from escaping into the atmosphere and reduce the impact to the environment by stopping direct emissions of VA The CGCS is connected to the anaesthesia workstation. The highly porous structure, with activated charcoal filter, adsorbs efficiently and retains selective anaesthetic gas components from the exhaled gas as it passes through the filter. We installed the capturing system on the anaesthesia machine after adaptions in software and hardware. The Active Gas Scavenging System is switched off.
Results and discussion: The implementation of the CONTRAfluran Gas Capturing System was easy.Its implication had a minimal workload, was safe, and had nointerference with the usual workflow. During the pilot at our hospital, it was uneventful. Anaesthetists can play a unique role in practicing more sustainable healthcare without compromising the safety of patients and quality of general anaesthesia.
By capturing the waste anaesthetic gases, we reclaimed the VA significantly and reduced their emissions to the atmosphere in a pilot setting to almost zero.
Conclusions: The pilot showed a safe and useful introduction of the CGCS system without affecting our clinical activity. By capturing waste anaesthetic gasses, we reclaimed the VA and significantly reduced their emission to the atmosphere in our hospital. In the near future, it is possible to recycle and reuse the VA.

01AP08-06
Wearable device to assess resting heart rate may predict performance of 6MWT for preoperative risk stratification

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Background and goal of study: Reliable prediction of preoperative risk is crucial before surgery. The 6-minute walking test (6MWT) has been proposed as a reliable and low-cost predictor of postoperative complications, however its execution is limited by time and cost constrains and, more recently, by reduced patient access to hospital due to Covid-19 restrictions.Wearable devices (WDs) are capable of monitoring physical activity and physiological parameters.
We hypothesize that wearing a low-cost WD could be a proxy for the execution of 6MWT and an alternative solution for preoperative risk stratification.
Materials and methods: Inclusion criteria were age > 70 years, scheduled for major noncardiac surgery, with no mobility deficit or orthopedic problems. IRB approval and informed consent were obtained. The primary outcome was to assess whether Resting Heart Rate (RHR) was correlated with 6MWT and Metabolic Equivalent of Task (MET) performance. Patients scheduled for major non cardiac surgery were requested to wear a WD for one week (±2 days) before surgery and conduct their normal life. Preoperative data, including 6MWT andMET, were collected.
Results and discussion: We included 16 patients, with a mean age of 77.14 (SD=4.95, range=70-87), mostly male (75%). Mean distance at 6MWT was 38.25 ± 104.09 (mean ± std). Median MET was 4 with an IQR of 2.25.
The weekly average of Resting Heart Rate estimated daily by the Fitbit has a fair negative correlation with the result of the 6MWT (linear regression results: r = -0.54, p = 0.031), as shown in the Figure. This shows how using a commercial, low-cost WD for one week can provide a result that is a proxy of the 6MWT.

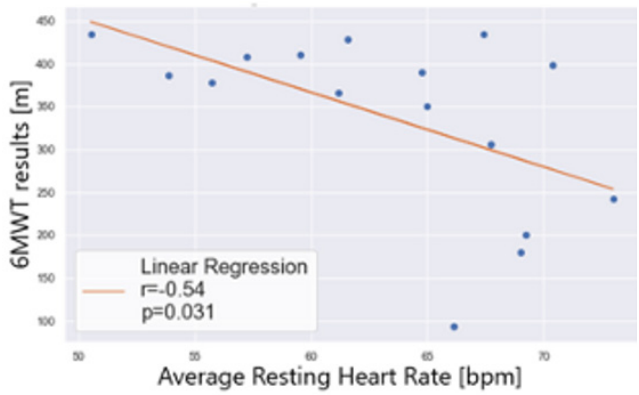

Figure. Resting heart rate and 6MWT results

Conclusions: RHR wearing a low-cost wearable device for 7 days before surgery is associated with patient performance during 6MWT. Results from this pilot study suggest wearable technology may be used in the future for preoperative surgical risk stratification.

01AP08-07
Correlation between the Six-Minute Walking Test and patient physical capacity using a wearable device

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Background and goal of study: The Six-Minute Walking Test (6MWT) is a simple low risk test for assessment of patient functional capacity. Functional capacity assessment is fundamental for risk stratification of patients before major surgery. However, due to time and resource constraints, it is not possible to use 6MWT for every patient before surgery. Activity trackers are low-cost commercial wearable devices (WDs) capable of monitoring physical activity and selected physiological parameters. The aim of this study is to assess whether step counting with a WD can predict patient performance during 6MWT
Materials and methods: After IRB approval, consenting patients were requested to wear a WD for one week before surgery, and conduct their normal life. Inclusion criteria were age > 70 years, scheduled for major noncardiac surgery, with no mobility deficit or orthopedic problems. IRB approval and informed consent were obtained.Patient preoperative data, 6MWT data and MET data were collected, along with the number of daily steps as estimated by a commercial WD (Fitbit Inspire 2)
Results and discussion: We included 16 patients, with a mean age of 77.14 (SD=4.95, range=70-87), mostly male (75%). Mean distance at 6MWT was 338.25 ± 104.09 (mean ± std). Median MET was 4 with an IQR of 2.25.
A positive correlation between the number of daily steps and the distance walked during the 6MWT was found (linear regression results: r=0.57, p-value=0.022), as shown in the Figure. It can be noted that there is an outlier in the bottom left of the figure, without which the correlation would be even stronger.

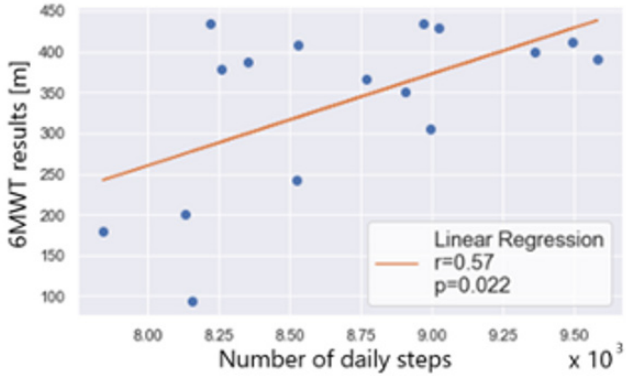

Figure. Daily steps and 6MWT results

Conclusions: A simple low-cost wearable device used as an activity tracker for some days may predict patient performance during 6MWT. Further studies are needed to assess whether wearable devices could be a useful strategy to assess patient functional capacity and for preoperative risk stratification.

01AP08-08
Deep learning based segmentation of cervical blood vessels in ultrasound images

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Background and goal of study: Puncture of central vessels is a frequently used therapeutic and diagnostic procedure. The use of ultrasound (US) during needle insertion has become the gold standard. Handling the US probe and needle is challenging, especially in difficult anatomic conditions. Our long-term vision is a deep learning based and augmented reality (AR) assisted needle puncture. We aim to visualize the vessel structures in 3D based on 2D US image segmentation. While punctuating, the relative needle tip position and relevant vessels can be highlighted via AR lenses to optimize the image guidance process.

Materials and methods: Our experimental setup (Fig. 1) allows to record robot poses for 3D reconstruction[1] and US images simultaneously while moving the probe manually over the vessel structures. We record a pre-clinical dataset consisting of 3445 US images of the v. jugularis and art. carotis from seven different probands. The data is split into individual subsets for training and testing of a neural network, LinkNet[2], for segmentation.

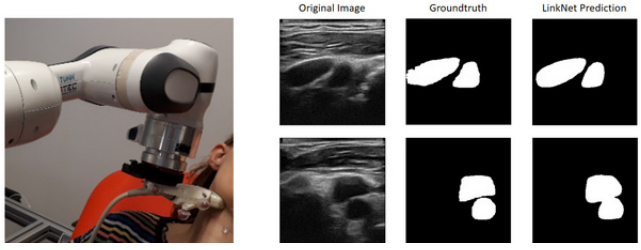

Figure 1. Our experimental setup with the US probe mounted to the robot (Panda, Franka Emika) and positioned at the v. jugularis with a visualization of exemplary US images along with the segmentation label and the segmentation mask predicted by the neural network.

Results and discussion: We obtain the best segmentation results for the LinkNet pretrained with a ResNet101 backbone, resulting in a DICE score of 0.915 and a Jaccard Index of 0.847. The segmentation masks of the vessels show a high amount of overlap to the labels (Fig. 1) and capture the form of the vessels. Minor errors occur in areas where the two vessels are too close in the underlying US images.

Conclusion: Our results show that the LinkNet is capable of segmenting the area of interest with high quality. It is a small network, sufficient for fast data processing. Future work can improve our results using more data. Peripheral nerve block or puncture of groin vessels are further possible applications, as well as training of US inexperienced users.

References:

1. Virga, S., et al. “Automatic force-compliant robotic ultrasound screening of abdominal aortic aneurysms.”*IEEE/RSJ IROS*, 2016.
2. Chaurasia, A., and E. Culurciello. “Linknet: Exploiting encoder representations for efficient semantic segmentation.”*IEEE VCIP*, 2017.

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01AP09-01
Is there diffusion limitation of alveolar-capillary uptake of volatile agents in anesthetized patients?

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Background and goal of study: Inefficiency of lung gas exchange during general anesthesia is reflected in alveolar-arterial (A-a) partial pressure gradients for inhaled gases resulting in an increase in alveolar deadspace.[1,2]
Ventilation-perfusion mismatch is a major contributor to this, but it is unclear what contribution arises from alveolar-capillary diffusion limitation, especially for gases of high molecular weight (MW) such as volatile agents.[1,2,3]

Materials and methods: A-a partial pressure gradients for two inhaled gases with similar blood solubility but different molecular weights, desflurane and nitrous oxide (N_2O) administered together at 2-3% and 10-15% inspired concentration (FI*G*) respectively, were compared in anesthetized ventilated patients undergoing cardiac surgery.
Simultaneous measurements were done of tidal gas concentrations, and arterial and mixed venous blood partial pressures by headspace equilibration, and gas uptake rate calculated using the direct Fick method using thermodilution cardiac output measurement. A larger A-a partial pressure gradient relative to inspired concentration (PA*G*–Pa*G*)/FI*G*for desflurane than for N_2O was hypothesized.

Results and discussion: Mean (standard deviation) measured (PA*G*–Pa*G*)/FI*G*for desflurane was significantly smaller than that for N_2O (0.86 (0.37) versus 1.64 (0.58) mmHg, $p<0.0001$), as was the calculated alveolar deadspace fraction (0.492 (0.141) versus 0.758 (0.080), $p<0.0001$).
Following adjustment for the higher measured rate of alveolar-capillary uptake relative to inspired concentration (V*G*/FI*G*) of desflurane than N_2O (median [interquartile range] 3.9 [3.6, 5.1] versus 2.7 [2.4, 3.3] ml/min, $p=0.001$), no difference was found in (PA*G*–Pa*G*)/FI*G* (1.26 (0.41) versus 1.32 (0.47) mmHg, $p=0.602$) or alveolar deadspace fraction (0.636 (0.081) versus 0.661 (0.127), $p=0.492$).

Conclusion: No evidence was found in measured A-a partial pressure gradients to support an additional diffusion limitation to alveolar-capillary uptake of desflurane relative to N_2O.

References:

1. Peyton P, Hendrickx J, Grouls RJE, et al. End-tidal to arterial gradients and alveolar deadspace for anesthetic agents. Anesthesiology, 2020; 133(3):534-547
2. Scheid P, Hlastala MP, Piiper J. Inert gas elimination from lungs with stratified inhomogeneity: Theory. Respiration Physiology 1981; 44: 299-309
3. Landon MJ, et al: Components of the inspiratory-arterial isoflurane partial pressure difference. Br J Anaesth 1993; 70:605–11

01AP09-02
Risk factors for desaturation during rapid sequence induction anaesthesia and a risk prediction model for desaturation

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Background and goal of study: Patients undergoing emergency surgery anaesthetised with rapid sequence induction (RSI) technique have an increased risk for desaturation(1) compared to patients undergoing elective procedures. To our knowledge, no previous study has investigated risk factors for desaturation during RSI-anaesthesia. This retrospective cohort study explored variables associated with desaturation during induction of RSI-anaesthesia.
Materials and methods: This register study included patients from two previous randomised controlled trials investigating oxygen desaturation in adult patients, with BMI <35, undergoing emergency surgery and anaesthetised with RSI-technique (2, 3). Patients were recruited in both Sweden and Switzerland. The present study divided the cohort into two groups, those desaturating <95% from start of preoxygenation until one minute after intubation and those who did not. Univariate analyses were done for comparison of descriptive data between the groups. A multiple logistic regression model was used to investigate variables associated with oxygen desaturation <95% from start of preoxygenation until one minute after intubation. Results from univariate analyses and multiple logistic regression model, together with a linear regression for sanity check, were used to create a scoring model for risk prediction aiming to preoperatively predict high-risk patients for desaturation.
Results and discussion: Data from 427 patients were analysed of which 23 patients desaturated <95%. Variables associated with oxygen desaturation <95% were BMI, (OR, 1.26 per 1 kg/m^{2}increase; p<0.001), apnoea time (OR, 1.01 per sec increase; p=0.004), SpO_2before preoxygenation (OR, 0.82 per 1% increase; p=0.046), and comorbidity with respiratory diseases, excluding asthma and COPD (OR, 4.03 for yes vs no; p=0.03). A four-point scoring model was developed, one point was given for each of the following: preoperative oxygen treatment, ASA ≥3, modified Mallampati score ≥3, and BMI >25. Using one point as cut-off, the model had a sensitivity of 0.90 and a specificity of 0.34 (positive predictive value 0.09, negative predictive value of 0.98) in patients recruited in Sweden. The Swiss cohort was used for validation where one point had a sensitivity of 1.0 and a specificity of 0.31 (positive predictive value 0.18, negative predictive value of 1.0).
Conclusion(s): Patients with an increased risk for oxygen desaturation during RSI-anaesthesia can be identified preoperatively. This could help the clinician prepare accordingly and improve outcome.
References:
1. Baillard, C., Boubaya, M., Statescu, E., Collet, M., Solis, A., Guezennec, J., Levy, V., Langeron, O. (2019). Incidence and risk factors of hypoxaemia after preoxygenation at induction of anaesthesia.*Br J Anaesth, 122*(3), 388-394. doi:10.1016/j.bja.2018.11.022
2. Lodenius, A., Piehl, J., Ostlund, A., Ullman, J., & Jonsson Fagerlund, M. (2018). Transnasal humidified rapid-insufflation ventilatory exchange (THRIVE) vs. facemask breathing pre-oxygenation for rapid sequence induction in adults: a prospective randomised non-blinded clinical trial.*Anaesthesia*. doi:10.1111/anae.14215
3. Sjöblom, A., Broms, J., Hedberg, M., Lodenius, Å., Furubacke, A., Henningsson, R., Wiklund, A., Nabecker, S., Theiler, L., Jonsson Fagerlund, M. (2021).Pre-oxygenation using high-flow nasal oxygen vs. tight facemask during rapid sequence induction.*Anaesthesia, 76*(9), 1176-1183. doi:10.1111/anae.15426

01AP09-03
Hypotension with continuous intraarterial versus intermittent oscillometric blood pressure monitoring during anesthetic induction: the AWAKE randomized trial

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Background and goal of study: Postinduction hypotension is common and associated with organ injury. Close blood pressure monitoring during anesthetic induction presumably helps avoid postinduction hypotension. We tested the primary hypothesis that continuous intraarterial compared to intermittent oscillometric blood pressure monitoring during anesthetic induction reduces postinduction hypotension in non-cardiac surgery patients.
Materials and methods: In this single center randomized trial, 242 patients scheduled for non-cardiac surgery were randomized to unblinded or blinded continuous intraarterial blood pressure monitoring during anesthetic induction. In patients assigned to unblinded continuous intraarterial monitoring, radial arterial catheter blood pressure values were available, but the treating physician was blinded to intermittent upper-arm cuff oscillometric measurements. In patients assigned to blinded continuous intraarterial monitoring, only blood pressure values from the oscillometric upper-arm cuff were available.
The primary endpoint was postinduction hypotension quantified as the area under a mean arterial pressure (AUC-MAP) of 65 mmHg within the first 15 minutes of anesthetic induction. Secondary endpoints included the AUC-MAP of 60, 50, and 40 mmHg, and the duration of MAP <65, <60, <50, and <40 mmHg.We used 2-sample Wilcoxon rank-sum tests to perform primary and secondary endpoint analyses.
Results and discussion: Data of 224 patients were available for the final analysis with 112 patients in each group. The median (25th, 75thpercentile) AUC-MAP of 65 mmHg was 14 (2, 33) mmHg x min in continuous intraarterial monitoring patients and 42 (7, 101) mmHg x min in intermittent oscillometric monitoring patients (P<0.001). Continuous intraarterial monitoring patients had significantly smaller AUC-MAPs of 60, 50, and 40 mmHg and shorter durations of a MAP <65, <60, <50, and <40 mmHg than intermittent oscillometric monitoring patients.
Continuous intraarterial compared to intermittent oscillometric blood pressure monitoring thus reduced both the severity and duration of postinduction hypotension. Clinicians might therefore consider inserting arterial catheters before rather than after anesthetic induction.
Conclusion: Continuous intraarterial blood pressure monitoring during induction of general anesthesia reduces postinduction hypotension compared to intermittent oscillometric blood pressure monitoring in non-cardiac surgery patients.

01AP09-04
Technical aspects of blood transfusion: how good are we?

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Background & Aim: National guidelines, set by Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee (JPAC) & NHS Blood and Transplant (NHSBT), detail safe bedside transfusion practices. Focusing on technical aspects, we reviewed local practices comparing them to national standards.
Methods: A clinical audit via online tool circulated among anaesthetists at Manchester Royal Infirmary (UK), June - August 2021. The survey had questions around the often-overlooked technical aspects of transfusion.
Results: National recommendations (*responses in brackets*):
1. Blood products should be transfused through a giving set with 170–200μm integral mesh filter (*100% agreed; although 47% always checked filter size, 45.1% never did*).
2. Although special platelet giving sets are available, it is safe to use standard sets too (*53% agreed, however 41.1% favoured using special platelet sets only*).
3. Platelets should not be transfused through a set previously used for RBCs (*70.5% agreed; while 68.6% changed sets only between different blood components, 27.5% used one set for all blood products*).
4. It's not necessary to prime blood giving sets with saline (*33.3% agreed, while 55% did prime*).
5. It's recommended to change blood giving sets at least 12 hourly (*88.2% agreed*).
6. Elective or emergency, the National Institute for Health and Care Excellence (NICE) recommends warming blood products to 37°C before transfusion (*80.4% said warming is desirable but not essential & only 19.6% always used blood warmers*).
7. It's good practice to avoid co-administration of any IV fluid through the same line used for blood products.
8. Calcium-containing fluids (e.g. Ringer's lactate) or calcium-containing colloids (Haemaccel or Gelofusine) may form clots if given in the same transfusion line.
9. Hypotonic fluids (e.g. 5% dextrose) can cause haemolysis of red cells (*96% agreed saline was compatible with blood; acceptance for other IV fluids varied*).
10. As possible, IV drugs should be given between transfusions or through a second IV line or separate lumen of a central line (*82.3% agree*).
Conclusion: Awareness of the above transfusion aspects is vital for safe delivery of blood products.
References: 1. www.transfusionguidelines.org/transfusion-handbook/4-safe-transfusion-right-blood-right-patient-right-time-and-right-place/4-12-technical-aspects-of-transfusion. 2. Norfolk D (2013) Handbook of Transfusion Medicine, 5th edition. ISBN 9780117068469.

01AP09-05
Validation of regional oximetry for somatic and renal oxygenation monitoring in healthy volunteers during a controlled hypoxia sequence

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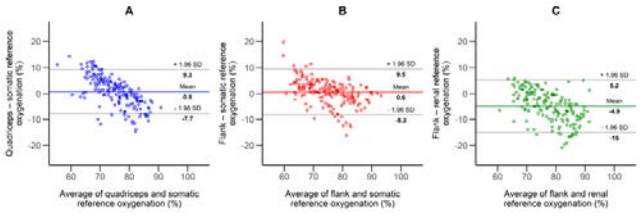
Background and Goal of Study: The O3 regional oximeter (O3™, Masimo, Irvine, USA) is a near-infrared spectroscopy device already validated for cerebral oxygenation monitoring. We conducted a study to validate the O3 device for somatic and renal tissue oxygenation monitoring.
Materials and Methods: Twenty-six healthy volunteers were included and O3 sensors were placed bilaterally on the quadriceps and flank (on the skin overlying the kidney, located with ultrasound guidance). Catheters were placed in the radial artery, iliac vein and renal vein to obtain blood samples for calculation of reference values of somatic and renal tissue oxygenation. A stepped, controlled hypoxia sequence was performed by mixing nitrogen and room air. Blood samples and O3-derived oxygenation values were obtained at baseline and at six subsequent decremental oxygenation levels (5% SpO_2 steps). The agreement between O3-derived values and blood reference values was assessed by repeated-measures correlation analysis (r_{rm}), root-mean-square error accuracy (A_{rms}), and Bland-Altman plots.
Results and Discussion: O3-derived quadriceps and flank oxygenation values correlated well with somatic reference values (r_{rm}=0.91 and 0.92, respectively; p<0.0001). The A_{rms} was 6.0% for quadriceps oxygenation and the mean bias was 0.8%, with limits of agreement from -7.7% to 9.3% (Fig. A). The A_{rms} was 5.1% for flank oxygenation and the mean bias was 0.6%, with limits of agreement from -8.3% to 9.5% (Fig. B). O3-derived flank oxygenation values correlated well with renal reference values (r_{rm}=0.93; p<0.0001), with A_{rms} of 7.7%. However, flank oxygenation underestimated renal reference values: the mean bias was -4.9%, with limits of agreement from -15.0% to 5.2% (Fig. C). The depth of the kidney capsule (3.1±0.9cm) exceeded the penetration depth of the O3 sensors.



Conclusion: The O3 regional oximeter can be used on the quadriceps and flank to monitor somatic oxygenation. O3-derived flank oxygenation values should not be considered a surrogate for renal oxygenation, since it is unlikely that the flank sensors did directly measure renal tissue oxygenation.
Acknowledgements: The study was funded by Masimo Inc.

01AP09-06
Changes in EEG alpha-band activity and their impact on monitoring

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Background: Commercial monitoring systems can be used to evaluate the hypnotic component of anesthesia. They translate the raw EEG into an index that inversely correlates with the anesthetic level. Most of these monitors use algorithms to detect changes in the EEG spectrum by tracking the change from a low-amplitude, high-frequency EEG (awake) to a high-amplitude, low-frequency EEG during unconsciousness. Strong alpha band activity (8-12 Hz) in the EEG during anesthesia seems associated with an adequate level of anesthesia and a good outcome [1-3]. However, EEG alpha-band power may not or only partly be considered by the algorithms calculating the index. Hence, we investigated the influence of modulated alpha-band activity on three monitoring systems

Methods: We used the EEG from 20 patients to evaluate the performance of three indices (BIS; qCON; State Entropy (SE)). We isolated the alpha-band by band-pass filtering (8–12 Hz) and added/subtracted this alpha-band to/from the original EEG in a stepwise manner. For example, an amplification factor of 0.2 means that the modified signal contains the original signal plus 20% of the extracted (original) alpha-band amplitude. The modulated EEG was replayed to the three monitor-systems. We then investigated the impact of alpha-band modulation on the indices.

Results and Discussion: Our findings revealed a heterogeneity in index behaviour, as already shown for other EEG parameters [4]. SE showed a linear relation between the modulation of the alpha-band and the index behaviour. The stronger the alpha-band activity is, the lower was the SE. The BIS also showed this trend, although less pronounced. The qCON in contrast showed an increase in index behaviour towards the edges of the modulation steps.

Conclusion: These different index reactions to alpha-band modulation could cause problems in the interpretation of the anesthetic level. An increase in the index caused by stronger alpha-band activity (qCON) could lead to an unnecessary deepening of anesthesia whereas a decrease (SE, BIS) could lead to a reduction of the anesthetic concentration. Hence, the risk of underdosage (awareness) or overdosage (delir) may increase. Our findings could help to improve commercial monitoring approaches and help to progress from a “depth of anesthesia” monitoring to a “quality of anesthesia” monitoring.

References:

1. Front Syst Neurosc, 2017. 11:24
2. Front Syst Neurosc, 2019. 13:56
3. BJA, 2019.**122**(5):622-634
4. Anesth Analg, 2021. 133(6):1577-87

01AP09-07
Results of the application of a medical training program in hemodynamic monitoring with Hemodynamic Prediction Index

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Background: Intraoperative hypotension (IH) is associated with increased morbidity and mortality. Both duration and severity of IH are determinants of poor outcomes.The Hypotension Predict Index (HPI, Edwards Lifesciences Corp., Irvine, USA), a machine learning–derived predictive early warning system, aims to predict a IH up to 15 min prior to the event, enabling preventive treatments.

The hypothesis of our study is based on the fact that a training medical program in hemodynamic monitoring with HPI might reduce the number of IH events compared to arterial waveform analysis alone in adult patients.

Methods: Data obtained from Flo Trac Monitors which use arterial waveform analysis were analyzed retrospectively in unselected adult patients . We then conducte training in which hypotension data in these patients were shown in order to raise awareness of the importance of intraoperative hypotension. A specific program in HPI monitoring was started which involved: a training lecture with animal experimentation in a reference site Center and also a training practice in our center instructed by Edwards Lifesciences accredited instructors.

Subsequently, data obtained from Hemosphere monitors using arterial waveform analysis with HPI (Aqumen IQ) from 22 patients were collected in whom an algorithm designed to maintain HPI < 80 was used.

The primary endpoint was the incidence and duration of IH defined as MAP <65 mmHg assessed by the time-weighted mean of hypotension.

Results: In the Pre-training group, 77.8% of patients experienced an hypotensive episodes while in the Post-training group, only 12% patients. The median number of hypotensive events per patient in the Pre-training group was 6, with a median duration of 9 minutes compared to 1 event in the Post-training group, with a median duration of 4 minutes . Finally, the median time-weighted average of IH in the Pre-training group was 0, 27 mmHg versus 0,18 in the Post-training group.

Conclusions: The application of hemodynamic monitoring with HPI after the implementation of a specific medical training program was associated with a decrease in the number of intraoperative hypotensive events.

01AP09-08
Implementation of the patient blood management program in a tertiary hospital in Portugal and the role of anesthesiology

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Background and goal of study: The implementation of a Patient Blood Management (PBM) program is a multidisciplinary approach based on optimizing perioperative hemostasis and minimizing transfusion requirements.The preoperative anesthesia consultation as a part of this program is crucial not only in the management of the perioperative anemia but also in minimizing the limiting institutional factors to its implementation.
The objective of this work was to evaluate and monitor the impact of the PBM program implementation in a portuguese tertiary hospital and the role of the Anesthesiology in this subject.
Materials and methods: A descriptive, retrospective, observational study was conducted including patients with iron deficiency anemia or iron deficiency admitted to the PBM program of the preoperative anaesthesia consultation in São João University Hospital Center, between November 1, 2019 and July 31, 2021
Results and discussion: Of the 467 patients admitted to the PBM program, 405 were prescribed oral iron (if surgical indication was longer than 6 weeks) and 62 patients were prescribed intravenous (IV) iron. Of the latter, with a median age of 69.8 years, 58.1% were men and 66.1% were classified with ASA physical status class III. Mean hemoglobin (Hb) values at the preoperative consultation and after treatment with IV iron in the immediate preoperative period were 10.2±0.8 g/dl and 11.4±0.5g/dl, respectively.Of these, 9.7% were transfused with 1 unit of red blood cells intraoperatively and 7.5% postoperatively.
About 47% of patients treated with IV iron required level II/III care in the postoperative period, 5.7% under invasive mechanical ventilation and infectious complications during the hospitalization period were the most representative (18.9%). At discharge, patients treated with IV iron had a mean Hb value of 11.01 g/dl and the 30-day mortality rate was 5.6%. Despite the barriers to its implementation in clinical practice, the PBM program was quite beneficial in improving health outcomes in our hospital.
This impact is mainly due to the role of the preoperative anesthesia consultation in the immediate recognition and treatment of anemia and the daily availability of human resources and physical space for IV iron treatments.
Conclusion(s): The implementation of PBM program in our hospital had a positive impact in patient outcomes and the inclusion of the Anesthesiology Department as a stakeholder in this program was one of the key points for its success.

01AP09-09
Evaluation of the use of intraoperative cerebral oximetry monitoring during shoulder surgery

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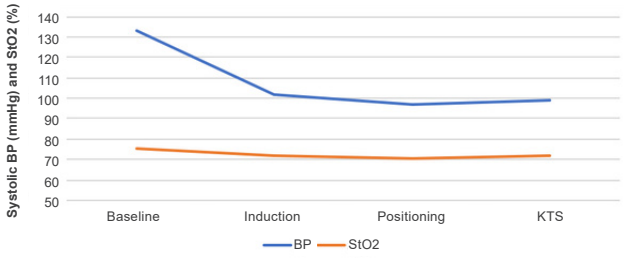
Background and goal of study: Conventionally, beach chair or semi beach chair positions are used for shoulder surgery to optimise surgical access. However, it is well established that these positions in combination with anaesthesia are associated with hypotension that can lead to cerebral hypoperfusion. This causes concern about rare but catastrophic neurological events.
Currently, cerebral perfusion is not routinely monitored intraoperatively. Cerebral oximetry using near infrared spectroscopy allows direct assessment of cerebral tissue oxygenation, enabling more immediate intervention for treating intra-operative cerebral desaturation events (CDEs).
We evaluated the use of cerebral oximetry monitoring intra-operatively during shoulder surgery, to determine its value as standard monitoring during such cases.
Materials and methods: Cerebral oximetry monitoring (Edwards ForeSight system) was tested, in addition to standard monitoring, on 20 patients scheduled to undergo elective shoulder surgery. Data was collected on patient characteristics, positioning and physiological variables at 4 key timepoints: baseline, post induction of anaesthesia, at completion of patient positioning and at knife to skin. CDEs, defined as >20% reduction from baseline in cerebral oxygen saturation (StO_2), were recorded at any point during surgery. Feedback was also obtained from anaesthetists involved.
Results and discussion: All 20 cases were in beach chair or semi beach chair positions. Whilst average systolic blood pressure (BP) dropped from 133mmHg at baseline to 97mmHg at positioning, average StO_2 values remained constant between 70% and 75%. 4 CDEs were detected across all patients, which were managed with vasopressor therapy or manipulating head position. All anaesthetists surveyed felt patient safety was improved.



Conclusion: Our findings show that, although hypotension occurred, StO_2 was largely unchanged. Cerebral oximetry can thus be a valuable monitor and enhance patient safety by demonstrating that adequate cerebral perfusion can be maintained despite induced hypotension, thereby reassuring anaesthetists that they are safely facilitating optimal surgical conditions.

01AP09-10
The influence on EMG on EEG-based monitoring: putting the forearm on the forehead

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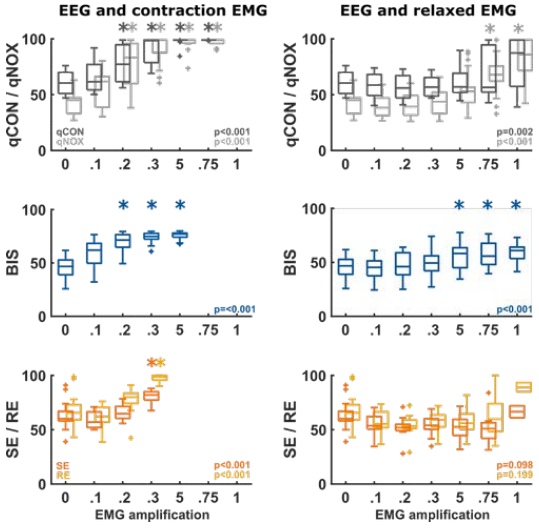
Background: Electroencephalogram (EEG) based monitoring can help monitoring the level of anesthesia. Therefore, the EEG is recorded from the forehead and translated into an index inversely correlating with the anesthesia level. The electrode location can cause an EMG contamination of the EEG in patients without neuromuscular blockade (NMB). With limited electrodes, it is difficult to distinguish between EEG and EMG signals, as both share a similar frequency frame. Previous research described a significant index decrease in awake volunteers caused by NMB. Now the question arises to what extent the indices change when EEG, recorded during surgery with NMB agents,are superimposed with EMG.
Methods: We recorded EMG (sample rate: 1024 Hz) from the forearm of 18 healthy volunteers with the CONOX monitor during contraction using a grip strengthener and during active diversion (relaxed arm). Therefore, the volunteers performed a p-q test with a pen in the non-recording hand. The EMG was z-scored and added to EEG recorded during anesthesia 5-7 minutes after the application of the muscle relaxant rocuronium (TOF: 4-16%) in difference amplification steps from 10-100%. We replayed these EEG traces superimposed with EMG to different monitors, i.e., BIS, CONOX with qCON and qNOX, and Entropy Module with state and response entropy (SE/RE). To evaluate a significant change, we used the Friedman test and a Tukey Kramer post hoc correction. In the figure, we only highlighted significant differences (*) to the control condition, i.e., the EEG without added EMG.
Results: We observed an significant increase in the index for all monitors when the EEG was superimposed with the contraction EMG(Figure, left side). At the high EMG amplifications the monitors returned invalid values, representative of artifact contamination. For the EEG with “relaxed” EMG, the qCON and BIS showed significant increases, but not SE and RE (Figure, right side). For SE and RE we observed an increased amount of invalid values.



Conclusion: We could show that active as well as resting state EMG can influence the monitoring systems. This knowledge may help to improve EEG-based patient monitoring in the future.

01AP10-01
Metal allergy – molybdenum – on a total hip arthroplasty: an anaesthetic challenge

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Background: The prevalence of metal allergy is high in general population and can compromise not only the anaesthetic strategy but also the results after orthopaedic surgery with implanted prostheses. We describe a case of a total hip arthroplasty in a patient with confirmed molybdenum anaphylaxis.
Case report: Female, 62 yrs old, ASA III (morbid obesity and depression), scheduled for a second elective total hip arthroplasty after failure of first hip prothesis 3 years ago. She had an anaphylaxis to a body cream that was attributed to molybdenum protheses component. The patient was kept under outpatient immunology’ surveillance, maintaining elevated levels of serum tryptase since the event.
We performed a general anaesthesia (GA), since until the day of the surgery the regional anesthesia(RA)’ needles available weren’t confirmed as molybdenum free steel. The immunologist’s recommendations were followed. It was administered 125mg of methylprednisolone and 2mg of clemastine prior to induction. Standard ASA and invasive arterial pressure monitoring, neuromuscular and *BIS®* monitors were used. Induction of anaesthesia was performed uneventfully. The *McGrath®* laryngoscope with plastic disposable blade*X3*was used. There were 2 hypotensive events when surgeons used orthopedic reamers that were not molybdenum free. It was administered a total of 20mg of ephedrine and 200mL bolus crystalloid with satisfactory hemodynamic response. Surgery lasted for 210 minutes. The patient remained hemodynamically stable during the rest of the procedure and anaesthetic emergency. The patient recovered in the intermediate care unit and the postoperative period was uneventful.
Discussion and Learning points: Perioperative allergic reactions are rare but associated with significant morbidity and mortality, especially anaphylaxis.
Furthermore, elevated baseline tryptase level are associated with an increased risk of a subsequent perioperative allergic reaction. Molybdenum is a component of steel that might be present in numerous tools used on a daily routine at the operating theatre. RA would be preferred because it has less cardiovascular and pulmonary complications, reduced risk of thromboembolic events and would permit a faster recovery.
On the other hand, GA was the safest alternative according to the lack of information on the components of RA’ needles.
References:
1. J Biol Regul Homeost Agents. 2020 Sep-Oct;34:125-130.
2. J Allergy Clin Immunol Pract. 2021 May;9(5):1980-1991.

01AP10-02
Anesthesia management of a patient with fulminant hepatic failure and posterior reversible encephalopathy syndrome due to alcohol and psychotropic substance abuse undergoing emergency orthotopic liver transplantation

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Background: Fulminant Hepatic Failure (FHF) is a situation requiring urgent liver transplantation (LT) with 3-month mortality rate from 7% to 90% depending on MELD score. Posterior reversible encephalopathy syndrome (PRES) is a rare clinical and radiologic entity more commonly related to acute hypertension. In the case presented, a patient with FHF& PRES was listed for an expedited LT.

Case report: A 17y teenager was admitted in coma and shock with (+) pupilary light reflex (PLR) after alcohol and substance abuse. After initial resuscitation he was transferred to the ICU, where he was diagnosed with acute cardiac failure, tachyarrhythmia, FHF, AKI & leukoencephalopathy. He was listed for an urgent LT (MELD 40) and transferred by air to our hospital.

On admission to the OR, bilateral mydriasis with (-) PLR was observed and brain function monitoring (pEEG, burst suppression, spectral edge frequencies, patient state index, frontal brain oximetry, MASIMO®) findings were compatible with serious brain damage on the verge of brain death, so the indication for transplant liver disposal was questioned. The patient was transferred for an urgent brain MR Arterio/Veno/graphy indicating PRES with preserved cerebral perfusion. LT was decided and balanced anaesthetic technique was initially used turned into TIVA for better brain protection. Mechanical ventilation was adjusted to maintain normocapnia. Norepinephrine and landiolol infusions were necessary for haemodynamic support. Negative fluid balance with CVVHDF was set during the operation. Thromboelastometry (ROTEM®) was used for tranfusion guidance. 3 PRBCs units, 140 ml salvaged RBCs, 1g fibrinogen concentrate and 7 PLT units were given. Gradual improvement of brain monitoring parameters was noted. The patient had an impressively good course. On day 30, an MRI/MRA/MRV showed tremendous amelioration and on day 41, he was discharged fully conscious and in good state.

Discussion: FHF and PRES have never been reported before as coexisting situations before LT. Fast decision making on the legitimacy of organ donation to a patient with grave cerebral damage was the main challenge of this case.

References: Largeau, B. et al., 2020. Posterior reversible encephalopathy syndrome in clinical toxicology: A systematic review of published case reports. Front. Neurol. 10:1420.

Learning points: Meticulous brain monitoring and fast MRI access provide answers over clinical ambiguities when a grim prognosis is evident.

01AP10-03
Diagnosing an acute abdominal compartment syndrome by its anaesthetic repercussions

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Background: Abdominal compartment syndrome (ACS) occurs when the intra-abdominal pressure exceeds 20mmHg in association with new organ dysfunction. It carries a high morbidity and mortality, representing a challenge for the anaesthesiologist[1].

We describe the case of a patient who developed an acute ACS during a cystoscopy resulting in irreversible cardiac arrest.

Case Report: An 83 years old male patient was admitted in the emergency department with acute renal failure, haematuria and infection of an artificial urethral sphincter (AUS). He had history of prostate cancer with prostatectomy, radiotherapy and AUS implantation. A cystoscopy under general anaesthesia was performed. The airway was secured with a laryngeal mask and induction underwent without complications. At 30 minutes of surgery a continuous increase in airway pressure was noted, along with a decrease in pulmonary compliance, with desaturation and endotracheal intubation was performed without improvement. The surgical team was alerted for the possibility of an ACS, and a large abdominal distension was then noted. On conversion to exploratory laparotomy a substantial amount of fluid drained from the abdomen and the patient developed bradycardia and cardiac arrest.

Discussion: ACS has various aetiologies. In this case the ACS occurred due to an undiagnosed vesical perforation with continuous leakage of irrigation fluid into the intraperitoneal space during the procedure. ACS has numerous physiological effects and leads to multisystem dysfunction. Changes in respiratory system include ventilation/perfusion mismatch and decreased pulmonary and chest wall compliance with hypoxia, hypercarbia and increased respiratory pressures, all present in this case. Changes in cardiovascular system lead to reduced cardiac output due to heart and great vessels compression leading to haemodynamic instability. The sudden decrease in systemic vascular resistance after decompression results in an abrupt afterload fall[1]. All this factors contributed to the cardiac arrest in this patient.

References: 1 - Berry N, Fletcher S, Abdominal compartment syndrome, Continuing Education in Anaesthesia Critical Care & Pain. 2012; 12(3):110–117

Learning points: Surgical complications may pass undiagnosed and the resulting anaesthetic repercussions may be key. Extreme care should be taken in ACS, especially on decompression. Strong measures to maintain stability should be taken, although it may not be enough.

01AP10-04
Subtotal mandibulectomy for ameloblastoma resection and reconstruction using a free fibula flap: anesthetic approach case report

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Background: Ameloblastomas are rare odontogenic tumors that mainly affect the jaw. Usually benign but locally invasive, they frequently cause facial distortion. Treatment often implies aggressive surgery with*en bloc* resections and reconstruction to restore function and aesthetics.

Case Report: 16 years old female, ASA I, with bilateral jaw ameloblastomas underwent a 12-hour surgery for subtotal mandibulectomy plus reconstruction using a free fibula flap. She had an anticipated difficult airway due to limited mouth opening and neck distortion. An awake intubation approach using dexmedetomidine, ketamine and laryngotracheal topical anesthesia with nebulized lidocaine was performed.

Intubation was achieved after 3 attempts using a videolaryngoscope. Anesthesia was maintained with remifentanil and propofol infusion combined with epidural block.

Afterwards, a tracheostomy was placed for airway protection. Prior to extubation dexmedetomidine (0,3mcg/Kg/h) was reinitiated and kept for the first 12 hours after surgery. Emergence from anesthesia was uneventful. No pain or airway compromise were registered during the immediate postoperative period. A multimodal analgesia regimen was used, including bilateral mandibular nerve block. She received PCEA for flap donor site pain relief.

Discussion: The use of videolaryngoscopy for awake intubation has become more popular in recent years. The type of sedation used is not standardized but often based on the Anesthesiologist's own experience. Dexmedetomidine off-label use in this context appears to be safe and efficient. Its combination with ketamine provides great sedation with minimal respiratory depression.

When infused alone at the end of surgery, it led to a smooth emergence, which is imperative in these cases. Pain control is also of great importance, with regional analgesic techniques assuming a relevant role.

References:

1. Wilson WM, Smith AF. The emerging role of awake videolaryngoscopy in airway management. Anaesthesia, 73. 2018;1058–61.

2. Boffano P*et al*. The epidemiology and management of ameloblastomas: A European multicenter study. J Cranio-Maxillofacial Surg. 2021;49(12):1107–12.

Learning points: Ameloblastoma surgery is complex and challenging. A meticulous anesthetic plan with anticipation of a possible difficult airway is crucial. Multimodal analgesic regimens including regional techniques provide optimal perioperative pain control in such aggressive surgeries.

01AP10-05
Hereditary hemorrhagic telangiectasia: a challenge for the anaesthesiologist

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Background: Hereditary hemorrhagic telangiectasia (HHT) is an autosomal dominant disorder characterized by vascular dysplasia (mucocutaneous telangiectasia and arteriovenous malformations). Its estimated prevalence in the population is 2/10,000 and the lesions can affect the central nervous system, respiratory system, gastrointestinal tract and conjunctiva.

Case report: We present the case of a 66-year-old woman, with a history of HHT with several episodes of epistaxis, hypovolemic shock requiring hospitalization and blood transfusions, anemia, asthma, a pulmonary arteriovenous fistula surgically corrected and a stroke in 2008 without sequelae. She was proposed for cauterization of multiple telangiectasias of the nasal cavities after clinical and laboratory optimization of the underlying disease.

Under standard ASA monitoring, anaesthetic induction was performed with infusion of remifentanil and bolus of propofol, lidocaine and rocuronium. We opted for orotracheal intubation using videolaryngoscope, for better visualization of the structures. Anaesthetic maintenance was performed with sevoflurane. The right radial artery was catheterized for monitoring, and as prophylactic measure tranexamic acid was administered. She maintained stability during the surgery, with estimated blood loss of 150mL. At the end of the procedure, the patient was transfered to the intensive care unit for ventilatory and hemodynamic support, being extubated 48 hours after surgery and discharged from the hospital on the 6th postoperative day.

Discussion: The main objective is to keep hemodynamic stability, prevent bleeding and the formation of emboli. If possible, approaching the airway should be avoided or performed gently. In the presence of pulmonary arteriovenous malformations, the patient may present with hypoxemia and invasive mechanical ventilation may exacerbate the right-left shunt.

In the presence of brain malformations, adequate blood pressure values must be maintained in order to not increase the intracranial pressure.

References: BMJ Case Rep.2016: bcr2015213647; Macri A, et al. Osler-Weber-Rendu Disease. StatPearls.

Learning points: The challenges for the anaesthesiologist in the management of patients with HHT are multiple. Patients must be meticulously evaluated and optimized before the intervention. The decision on the anaesthetic technique must be individualized and based not only on the proposed surgery, but also on patient factors and associated comorbidities.

01AP10-06
Perioperative anesthetic management of hereditary angioedema: a case report

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Background: Angioedema is a self-limited edema limited to subcutaneous and submucosal tissue resulting from fluid extravasation to the connective tissues. It is a life-threatening condition due to the risk of airway compromise throughout the perioperative period. It affects up to two-thirds of patients with hereditary angioedema or acquired angioedema during their lifetimes with a 15%–33% mortality rate.

During the perioperative period it is critical to develop a plan to assure adequate prophylaxis, intraoperative management and rescue in consultation with an immunoallergologist and a pharmacist.

Case report: This case reports a 55-year-old man known to suffer from hereditary angioedema with an absolute deficit of C1 esterase inhibitor posted for elective hemorrhoidectomy. Preoperatively, the case was evaluated by a multidisciplinary team and a careful medical record was collected to identify possible triggers. Tranexamic acid (500mg + 500mg) and prophylaxis C1 esterase inhibitor (1000 UI) was administered 1 hour before the procedure. C1 esterase inhibitor and 2 units of fresh frozen plasma were requested for the intraoperative period. Difficult airway equipment was available and verified. Surgery was performed under spinal anesthesia.

Standard *American Society of Anesthesiologists* monitoring was used and there were no intraoperative complications. Postoperatively the patient was admitted to the postoperative care unit, 3 hours later was transferred to the ward and discharged the day after without any complications recorded.

Discussion: Hereditary angioedema can be life threatening and require immediate intervention, thus medication to manage an acute crisis should be promptly available. Triggers like stress, drugs and invasive surgical procedures should be minimized and prophylaxis is recommended.

References:

1. Williams AH, Craig TJ. Perioperative management for patients with hereditary angioedema. AllergyRhinol, 2015: 6:e50-5

2. Szema A, Paz G, Merriam L, et al. Modern preoperative and intraoperative management of hereditary angioedema.*Allergy Asthma Proc* 2009; 30: 338–342.

3. Levy J, Freiberger D, Roback J. Hereditary angioedema: current and emerging treatment options.*Anesth Analg* 2010; 110: 1271–1280

Learning points: Optimization of perioperative outcomes in patients with history of angioedema requires the development of a patient-specific perioperative plan, including the adequate level of care and support, prophylaxis and rescue therapies.

01AP10-07
Combined anesthesia for a limb girdle muscular dystrophy case

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Background: Limb girdle muscular dystrophies (LGMD) are a group of uncommon hereditary myopathies that vary in severity but share a clinical phenotype of proximal muscle weakness [1]. Available evidence of the specific anesthetic management is lacking.

Case report: 51 year-old-woman, ASA III with LGMD and breast cancer was proposed for right radical mastectomy with axillary sentinel lymph node biopsy and bilateral breast reconstruction. TIVA associated to regional block was performed.

After rapid sequence orotraqueal intubation by videolaryngoscope, anesthetic maintenance was with remifentanil, propofol and rocuronium bolus. Neuromuscular block was monitored by train-of-four evaluation and reversed with sugammadex at the end of the procedure. Bilateral block of the lateral branches of the intercostal nerves in the middle axillary line (BRILMA), right pectoral nerve block (PECS) and left parasternal intercostal block (PSI) was performed using levobupivacaine.

No significant changes in paCO2 and serum potassium were observed during or after surgery. Length of surgery was 5 hours. Patient was successfully extubated after recovering spontaneous breathing without respiratory support. Postoperative pain control was obtained with intravenous acetaminophen and dexketoprofen.

Discussion: Muscular dystrophies have an increased risk of perioperative complications such as difficult airway, arrhythmias, respiratory failure, rhabdomyolysis or malignant hyperthermia [2].

Avoiding halogenated anesthetics, careful use of neuromuscular blockers, regional anesthetic techniques to reduce opioid consumption and adequate monitoring are crucial to prevent major complications.

References:

1. Narayanaswami P et al. Evidence-based guideline summary: diagnosis and treatment of limb-girdle and distal dystrophies: report of the guideline development subcommittee of the American Academy of Neurology and the practice issues review panel of the American Association of Neuromuscular & Electrodiagnostic Medicine. Neurology. 2014.

2. Chu ML et al. The Limb-Girdle Muscular Dystrophies: Is Treatment on the Horizon? Neurotherapeutics. 2018.

Learning points: A thorough preoperative assessment is essential in patients with LGMD. Potential complications and limited drug usage must be kept in mind during anesthesia. Combined anesthetic approach, with thoracic wall blocks, may be a good option for major surgery in these patients.

01AP10-09
Brugada syndrome, a challenging condition for all

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Background: Brugada syndrome (BS) is a rare and life-threatening condition, accounting for up to 20% of sudden deaths(1). Anesthesiologists should be aware of this condition, because a large number of anesthetic drugs interfere with electricals' heart impulse.
We present a patient with this syndrome, carefully studied before surgical submission.
Case report: A 56-year-old female patient proposed to elective laparoscopic cholecystectomy has a medical history of dyslipidemia, hypertension, hypothyroidism and asymptomatic type 1 BS with an implantable loop recorder. She had a past history of hysterectomy with no complications and no altered findings on physical examination.
The transthoracic echocardiogram presented a mild aortic and mitral valves insufficiency and electrocardiogram identified the known type 1 BS with sinusal rhythm. Since no formal contraindications to the anesthetic procedure were found, the ASA III patient was submitted to an event recording analysis the day prior to surgery, with no dysrhythmic events.
Special attention was given to normothermia control and administered drugs, a lidocaine free solution was used for endotracheal tube's lubrification and general anesthesia performed with intravenous boluses of etomidate and fentanyl, 22 mg and 50 mcg, respectively, and sevoflurane for maintenance. Another 2 extra boluses of 50 mcg fentanyl were given, along with 30 mg of rocuronium, 4 mg of ondansetron, 50 mg of pethidine and 200 mg of sugamadex.
Continuous monitorization was conducted with special attention to hemodynamic and electrical stability with defibrillator pads and standard electrodes placement, as well as invasive blood pressure assessment. The patient remained hemodynamically stable and no complications were found during the surgical act nor the remaining 2 hours in the post anesthesia care unit.
Discussion: With this report we aim to alert health professionals to this rare syndrome and to important implications in the approach to these patients, being possible to undergo invasive procedures with caution to patient's monitorization and to choose the safest possible drugs to administer.
References:
1. Smith D, Martz DG (2014) Brugada Syndrome: A Review of Perioperative Management for the Anesthesiologist. Int J Clin Anesthesiol 2(1): 1019
Learning points: Although this syndrome is rare, anesthesiologists must be aware of its singular specifications. There are widely available lists of drugs contraindicated to these patients.

01AP11-03
The statistical fragility of high-impact trials and a comparison of the Fragility Index between anesthesiology and other disciplines

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Background and goal of study: The validity and relevance of RCT results reaching statistical significance is increasingly questioned [1]. In 2014, the Fragility Index (FI) was developed as a tool to supplement the P-value [2].
The FI is an intuitive measure of trial robustness that disclosess the minimum number of outcome events that have to be changed in order to shift the P-value to >0.05. The metric has quickly gained popularity and has often been reproduced in medical (sub-)specialties. We aimed to provide an update of the Fragility Index in high-impact RCTs, and to compare the FI of anesthesiology literature with other specialties.
Methods:
Meta-research study: we included all RCTs published 2014-2021 in the *New England Journal of Medicine*, *The Lancet*, the *Journal of the American Medical Association*, and the*British Medical Journal*. Trials with dichotomous, statistically significant, superiority results were eligible for the Fragility Index analysis.
Umbrella review: all systematic reviews with Fragility Index data were included. They were analyzed by weight based on the number of RCTs included in the original review.
Results: Out of 2432 RCTs screened, 623 RCTs were eligible for the Fragility Index analysis, which had a median sample size of 647 [IQR: 267–2108] and a median Fragility Index of 12 [IQR: 3–28]. The umbrella review included 57 reviews from 15 different disciplines. The four reviews in anesthesiology had a median FI of 3 [IQR: 1–6.5], comparable with the medians of between 1 and 4.5 for the other disciplines (see figure 1).

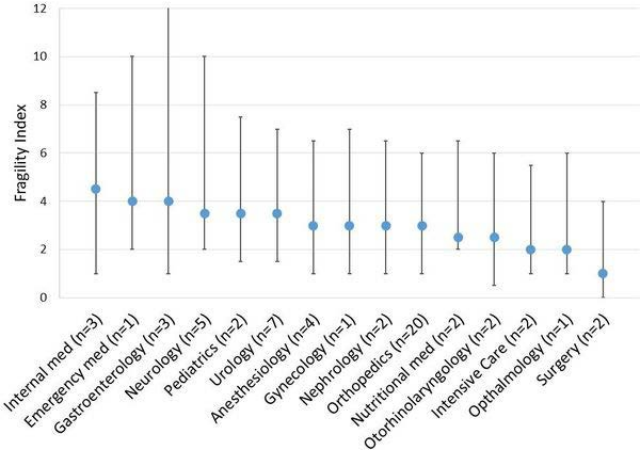

Figure 1: Fragility Index in medical disciplines. The blue dot is the weighted median FI, the black bars show the upper and lower quartiles, n=number of reviews per discipline.

Conclusion(s): RCTs published in high-impact journals had a median Fragility Index of twelve, which is quite robust. However, 25% of trials is dependent on three or less events. Among medical disciplines, the FI was considerably lower. For most disciplines, the lower bound of the IQR revealed that 25% of RCTs would lose significance if just one outcome event was changed.

References:

1. Ioannidis 2005 PLoS Med.
2. Walsh et al 2014 J Clin Epidemiol.

01AP11-04
Total hip arthroplasty in sickle cell disease: a case report

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Background: Sickle cell disease (SCD) is an autosomal recessive disorder characterized by chronic hemolytic anemia, vaso-occlusive crises and end-organ failure[1]. Avascular necrosis (AVN) of the femoral head is a skeletal manifestation, with an incidence ranging from 3-50%[2]. Perioperative complications, sickle or non-sickle-related, are higher compared to the general surgical population[1].

Case report: 18-year-old man with severe SCD phenotype and multiple admissions caused by sickle-related complications was submitted to elective total hip arthroplasty due to AVN of the femoral head. Coordinated by a multidisciplinary team including orthopedists, anesthesiologists, hematologists and nurses erythrocytapheresis was performed 72 hours before surgery with 8 red blood cell (RBC) units (decreasing the patient's hemoglobin S from 74 to 30.8%). As the patient had no peripheral IV accesses, a central line was placed. Dehydration was prevented. Anesthesia was induced with IV fentanyl, propofol and rocuronium and maintained with sevoflurane. Standard ASA, invasive blood pressure, BIS®, TOF® and urinary output monitoring were used. The temperature was monitored with an esophageal probeand maintained between 36.5 and 37ºC. 1g Tranexamic acid was administered 30 minutes before the intervention. Estimated intraoperative blood loss was 300ml, replaced with 2 RBC units and 1000mL polyelectrolyte. Urinary output was approximately 2,4mL/Kg/h. Hemodynamic stability was maintained and hypoxia and acidosis were avoided. Postoperatively the patient was admitted to an intensive care unit for 24 hours and discharged home 5 days later without complications.

Discussion: Assessment by a multidisciplinary team and a timely preoperative optimization of SCD patients is crucial to prevent perioperative complications. The anesthetic management of these patients must take into account specificities related to sickle cell disease[1].

References:

1. Walker, I et al. "Guideline on the peri-operative management of patients with sickle cell disease: Guideline from the Association of Anaesthetists." Anaesthesia vol. 76,6 (2021): 805-817. doi:10.1111/anae.15349
2. Kenanidis, Eustathios et al. "Total hip arthroplasty in sickle cell disease: a systematic review." EFORT open reviews vol. 5,3 180-188. 2 Mar. 2020, doi:10.1302/2058-5241.5.190038

Learning points: A multidisciplinary assessment of SCD patients and proper anesthetic management are essential to prevent complications.

01AP11-05
TURP syndrome: a rare presentation with an unexpected difficult airway management

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Background: Transurethral resection of prostate (TURP) syndrome is a rare but potentially life-threatening complication due to excessive absorption of irrigant fluids. It is a clinical diagnosis based on signs and symptoms ranging from asymptomatic hyponatremia to seizures, coma and death. Clinical findings result from fluid overload with electrolyte imbalance and severity is proportional to rate and volume of absorption.[1]

Case report: We report a case of a 82-year-old male patient, ASA II, diagnosed with benign prostatic hyperplasia undergoing TURP surgery. General anesthesia was induced and surgery lasted for 90 minutes with 18 liters of saline irrigant fluid being used. Patient was discharged uneventfully the next day. Three days later the patient presented with hematuria and suffered a tonic-clonic seizure with tongue bite while being admitted in the emergency department.

A total of 20 mg IV diazepam was administered and orotracheal intubation was attempted to secure airway, unsuccessfully. A laryngeal mask airway (LMA) was placed and IV hydrocortisone plus intramuscular adrenaline were administered.

The patient was transferred to the emergency room and fiberoptic intubation through LMA was attempted with no success due to severe edema of the glottis and surrounding structures. After a failed second attempt it was decided to proceed with surgical tracheostomy and the patient was transferred to the Intensive Care Unit.

Arterial blood gas revealed severe hyponatremia (Na^+105 mmol/L) which was corrected with hypertonic saline administration. Patient's clinical condition progressively improved and 3 days later he was transferred to the surgical ward and decannulated 2 days later with hospital discharge.

Discussion: The major risk factors for TURP syndrome are the rate, amount and type of irrigant, opened venous sinuses, resection time, blood loss and capsular perforation.[2]

TURP syndrome is rare with newer surgical techniques and irrigant fluids but it carries a non-neglectable mortality. This case of severe TURP syndrome with a late presentation increases awareness for the importance of an early recognition and treatment according to symptoms severity, which may result in catastrophic consequences.

References:

1. Demirel, I., et al.TURP syndrome and severe hyponatremia under general anaesthesia. BMJ Case Reports,2012.
2. O'Donnell, A., et al. Anaesthesia for transurethral resection of the prostate. Continuing Education in Anaesthesia Critical Care & Pain, 2009.

01AP11-06
General anaesthesia in a patient with a pulmonar carcinoid tumor: a case report

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Background: Carcinoid tumors have the potential to metastasize and the ability to secrete bioactive substances[1,2]. Carcinoid crisis is a serious event that may be triggered during anaesthesia and it is a challenge to the anaesthesiologist because it can provoke severe oscillations of blood pressure, flushing, bronchospasm and arrhythmias unresponsive to conventional therapies[3].

Case Report: We report our anaesthetic management of a 63-year-old male with a pulmonar carcinoid tumor with liver and bone metastases that was submitted to surgical correction of bilateral inguinal hernia. The usual medication included a monthly injection of 30mg of octreotide. Before induction an arterial catheter was placed and octreotide infusion was initiated at 25mcg/h. We used fentanyl, propofol and rocuronium in the induction and sevoflurane for maintenance. The procedure had a duration of approximately 60 minutes and there were no complications, with hemodynamic and ventilatory stability. The octreotide infusion was maintained for 24 hours after the surgery.

Discussion: Carcinoid crisis is a life-threatening complication and can be difficult to manage. The anaesthesiologist has to prevent stressful situations that can provoke the release of bioactive substances. Most patients with carcinoid tumors are submitted to general anaesthesia to avoid sympathectomy related to neuraxial anaesthesia[1–3]. Prior to induction, placement of an arterial catheter is recommended[1].

Propofol may be the most appropriate induction agent since it is more effective in supressing the sympathetic reaction to intubation[1].

Opioids and non-depolarizing neuromuscular blocking agents that cause histamine release must be avoided[3].

A good anaesthetic depth and analgesia are essential to prevent stimulation of sympathetic activity[1].

Octreotide is the drug of choice to prevent and treat carcinoid crisis. The literature is scarce and contradictory regarding the efficacy and ideal dose. However, due to its low cost and high safety profile, octreotide continues to be used by many anaesthesiologists[3].

References:

1. Journal of Clinical Anesthesia (2011) 23, 329-341
2. Journal of Clinical Anesthesia (2016) 32, 189-193
3. Anesthesiology Clin 35 (2017) 327-339

Learning points: Carcinoid crisis is a life-threatening complication. It is important to prevent stressful situations that can provoke the release of bioactive substances. Octreotide appears to play a role in the prevention and treatment of carcinoid crisis.

01AP11-07
Patient safetyduring anesthesia inUkraine: a prospective cohort study

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Background and Goal of Study: Patient safety in the operative and perioperative period is critically important. The consequences of anesthesia complications have a significant impact on long-term surgical outcomes, morbidity, and mortality.

The study aimed to assess the implementation of the Helsinki Declaration in Ukrainian hospitals.

Materials and Methods: The survey was conducted by filling out a standard Google form. The link to the survey was distributed on the official page of the Association of Anesthesiologists of Ukraine, through social networks. A total of 174 respondents took part in the survey.

Results and Discussion: 176 anesthesiologists took part in the survey, 79.3% of them are aware of the Helsinki Declaration. 19.1% of medical institutions began to implement the principles of this declaration in 2012-2014.

Most of the responders claimed that the quality of the work of their departments significantly increased, as well as the level of patients' safety after the implementation of these principles in work. Simultaneously, 16% of responders stated the absence of any positive impact after the declaration's application.

In those medical institutions, where the respondents are working, the standards of mandatory perioperative monitoring include pulse oximetry (99.4% of cases), blood pressure measurement (94.8%), electrocardiography (83.3%), capnography (73, 6%), temperature monitoring (64.9%), BIS (28.2%). While 19% of hospitals have no access to pulse oximetry for all patients in the operating room and intensive care unit.

Talking about clinical protocols, only 64,3% of responders use protocol for the cases of massive bleeding, 76,2% - for difficult airway, 59,5% - for infection control. Only 36,2% of responders have established their local protocols, 69% use the National ones or the orders of the Ministry of Health, while 10% do not use protocols at all.

Complications records are present only in 74% of the hospitals, while the rest do not keep records of anesthesia complications at all.

Conclusion(s): The study showed that despite the fact that principles of Helsinki Declarations are being implemented in Ukraine, there are still quite many areas for further development.

References:

Staender SE. Anesthesia and patient safety: have we reached our limits? Curr Opin Anaest 2011; 24:349–353
Mellin-Olsen J et al.The Helsinki Declaration on Patient Safety in Anaesthesiology.Eur J Anaest 2010;27:592–597

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01AP11-08
Comparison of patient satisfaction between standardized preoperative counseling guided by NSQIP surgical risk calculator and conventional counseling: a prospective randomized study

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Background and Goal of Study: Preoperative counseling of surgical patients is non-standardized. American college of surgeons' NSQIP surgical risk calculator provides risk information to guide shared decision making and informed consent.
We hypothesized that, in high-risk patients, the NSQIP surgical risk calculator guided preoperative counseling will have higher patient satisfaction than the non-standardized counseling.
Materials and Methods: After approval from the institutional review committee, this randomized parallel assignment prospective interventional clinical trial was conducted in ASA III or above and age above 65 high-risk surgical patients. Adults who could not consent, pregnant women and non-Nepali speakers were excluded from the study.
Participants were randomly assigned to Group N (Counseling using NSQIP surgical risk calculator tool) or Group C (Counseling using conventional non-standardized methods, might have varied from anesthesiologist to anesthesiologist).
The primary outcome measure was patient satisfaction as assessed by a 7-point Likert scale, 7 being the most satisfied and 1 being the least. The secondary outcome measures were preoperative anxiety measured by the Amsterdam Preoperative Anxiety and Information Scale (APAIS) questionnaire validated in local language and the duration of counseling. The comparisons were made using standard statistical tests and a p-value of <0.05 was considered to be significant.
Results and Discussion: A total of 69 patients were enrolled in the study. There were no significant differences in terms of age, gender, ASA-PS and education level between the groups. Median patient satisfaction scores were similar (p-value>0.05) between the groups evaluated by eight different questions. At the end of the counseling, both anesthesia and surgery related anxiety scores evaluated by the APAIS were significantly higher in the NSQIP group (p-value<0.05). Total duration of counseling was increased by 25% when the NSQIP surgical risk calculator was used for counseling.
Conclusion: Satisfaction among Nepalese surgical patients was similar between standardized counseling using NSQIP surgical risk calculator and conventional counseling. However, anesthesia and surgery related anxiety were higher in the NSQIP group. It took a significantly longer duration to counsel the patient in the NSQIP group.

01AP11-10
Anaesthetic management of a kidney transplantation in an adult with multiple drug allergy syndrome

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Background: Multiple drug allergy syndrome (MDAS) is defined as the predisposition to develop allergic reactions toward two or more chemically unrelated agents. The overall prevalence is 1%, with the 3 leading perioperative culprits being neuromuscular blocking agents, antibiotics and latex.
Case report: A 41-year-old woman presented for a second living-donor renal transplant for end-stage renal disease secondary to bilateral vesicoureteral reflux. Past medical history included a series of urological surgeries, a renal transplant 17 years ago and 2 intraoperative anaphylactic episodes attributed to latex.
Further allergy consultation revealed sensitivity to atropine, remifentanil, cisatracurium, rocuronium and mannitol, but not to fentanyl and etomidate. An informed consent, after detailed explanation of all the possible complications, was taken. The organ donation and transplantation were processed in a latex-free environment, under general anaesthesia.
Premedication comprised dimetindene 4mg, hydrocortisone 100mg and midazolam 2mg. Sevoflurane 8%, fentanyl 3mcg/kg and etomidate 0.3mg/kg were administered for induction. Maintenance was achieved with sevoflurane (MAC 1.3) and fentanyl 0.7mcg/kg/h, in accordance with anaesthetic depth monitoring (SedLine®).
Postoperative analgesia was provided with ketamine 0.5mg/kg, magnesium sulfate 25mg/kg, acetaminophen 1g and tramadol 100mg. Haemodynamic and oxygenation stability was attained throughout the surgery and diuresis occurred spontaneously after ureterovesical anastomosis and administration of furosemide 80mg. The operation lasted 8 hours and the patient was extubated uneventfully.
Discussion: Ideally, a detailed history and a thorough allergological evaluation (serological and skin tests) should be performed in groups at high risk. Prophylactic treatments with corticosteroids and H1 antagonists are still debated, albeit they seem to be beneficial. Implementation of preventive measures (allergens avoidance), vigilance for allergic reactions recognition and readiness to deal with them are the cornerstones that contribute to an optimal outcome, as in our case.
References: Patil SS et al., Multiple drug allergies: Recommendations for perioperative management. Best Pract Res Clin Anaesthesiol. 2020 Jun;34(2):325-344.
Learning points: Individualised anaesthetic management of patients affected by MDAS should be guided by allergological assessment; if unattainable, inhalation anaesthesia is a prudent practice.

Ambulatory Anaesthesia

02AP01-01
A case of post extubation negative pressure pulmonary edema - unusual or underdiagnosed?

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Background: The incidence of negative pressure pulmonary edema (NPPE) is uncommon in the postoperative and it is likely to be underdiagnosed. It is a potentially life-threatening condition[1]. We describe a case of NPPE in a postoperative context, triggered by an acute airway obstructionin a young patient with history of asymptomatic asthma.
Case Report: An 18 years old male patient was proposed for extraction of multiple third molar teeth in our ambulatory unit. He was previously diagnosed with asthma, but had been asymptomatic and unmedicated for 10 years. A general anaesthesia was performed and the surgery went without complications. During recovery from anaesthesia the patient developed a laryngospasm which resolved with positive pressure ventilation. Some minutes later he developed an episode of desaturation and wheezing. Positive pressure was applied as well as bronchodilators and corticotherapy with partial response.
After admission in the post anaesthesia care unit (PACU) the patient remained with respiratory difficulties even with reinforcement of bronchodilator therapy, elevation of the bed headboard and high oxygen concentration therapy. A new physical examination revealed crackles on auscultation. An urinary catheter was placed for diuresis monitoring and diuretics were administered with respiratory improvement. The bed side echocardiogram was normal and the thoracic radiography showed thickening of the bronchovascular bundle. The patient had a full recovery and was discharged 24 hours later.
Discussion: Acute airway obstruction can cause NPPE and its incidence is increased in patients with asthma. The forced inspiration against an obstructed airway generates a strongly negative intrathoracic pressure causing fluid to move from the capillary to the interstitial space and alveoli[1].After the laryngospasm the patient developed a bronchospasm like reaction, which didn't resolve completely with bronchodilation.
Only later in the PACU, due to the presence of crackles, the diagnose of NPPE was considered and diuretics were administered with overall improvement, so more aggressive measures, such as mechanical ventilation, were not needed.
References: 1 – Holmes JR, Hensinger RN, Wojtys EW. Postoperative pulmonary edema in young, athletic adults. Am J Sports Med. 1991 Jul-Aug;19(4):365-71.
Learning points: NPPE can be an unexpected complication in young healthy patients and an unusual presentation may difficult the diagnose.

02AP01-02
Anesthesia in electroporation

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Background: Tumor-specific electroporation (TSE) is a technique involving the application of high voltage pulsed electric impulses to the tumor lesions. Electrochemotherapy using chemotherapy and electroporation helps in the delivery of anticancer drugs to the tumor cells by creating adequately sized open pores and thus, produce a therapeutic effect. As per the limited literatureavailable, general anesthesia is considered a standard technique for electroporation.
Case Report: TSE is done using a dynamic pulse train of eight 1000-400 V, 100 micro-seconds duration pulses applied at 5 kHz at our institute. We performed TSE in four patients with different indications and airway scenarios. We oxygenated all 4 patients using THRIVE (Trans-nasal Humidified Rapid-Insufflation Ventilatory Exchange)with 100% inspired oxygen concentration with a flow rate of 40 L/min throughout the procedure.
We preferred using dexmedetomidine at a loading dose of 1 microgram/kg for 10 minutes, followed by an infusion of 0.5 mcg/kg/min for the remaining surgery, keeping the patients under conscious sedation. BIS was maintained in the range of 60-70. Post-procedure THRIVE and dexmedetomidine infusion was stopped. We altogether avoided general anesthesia and muscle relaxant.
Discussion: TSE is a new procedure done for patients with primary or secondary skin tumors when surgery is not feasible and fails chemotherapy or radiotherapy. The electric pulse field generated by TSE is a risk factor for cardiac arrhythmias, cardiovascular abnormalities, abnormal cerebral activity, post-procedural pain, and muscle spasm.
This case series reflects those various untoward effects of general anesthesia that can be avoided by oxygenating the patient with THRIVE and dexmedetomidine infusion, which provide analgesia, sedation, and amnesia. Top-up drugs like paracetamol, ketamine, or fentanyl can be used in titrated justified doses.
References:
1. Narayan SM, Baykaner T. Electroporation: The End of the Thermal Ablation Era?.*J Am Coll Cardiol*. 2019;74:327-9
2. Nielsen K, Scheffer HJ, Vieveen JM, van Tilborg AA, Meijer S, van Kuijk C, van den Tol MP, Meijerink MR, Bouwman RA. Anaesthetic management during open and percutaneous irreversible electroporation.*Br J Anaesth*. 2014;113:985-92
Learning points: This case series depicts that general anesthesia can be prevented by using THRIVE and dexmedetomidine infusion. Conscious sedation is a possible option for conducting TSE.

02AP01-04
A system for surveying outcomes of anaesthesia 24 hours post discharge: the DayCOR (Day Care Outcomes Reporting) Registry

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Background: The survey is delivered to patients through SMS and email based secure web links by the registry set up in Australia in March 2018. DayCOR is a Clinical Quality Registry, "monitoring the quality of health care, within specific clinical domains,collecting analysing and reporting health-related information, for a self-improving health system".

Materials and Method: The CAST (Clinical Anaesthetic Survey Tool) platform was used with the following demographics and clinical parameters recorded: Patient Hospital ID, email address and mobile telephone number, Age, Gender (M or F), ASA status, procedure performed (by Australian MBS item number), Anaesthetist, Anaesthetic type, Duration of procedure, time in PACU, Condition at discharge (Comfort and PONV status).

A 15-question survey was sent by text and mobile phone 24 hours post discharge, covering return to hospital, urgent contact, confusion, sleep disturbance, pain level, PDNV incidence, patient experiences (positive and negative) suggestions and need for later contact.

After a 12 month trial period in two Private Hospitals, recruitment began but was severely limited due primarily to the COVID pandemic. However over 160,000 patients have now been surveyed, including the parents of some 6000 paediatric patients.

Results and Discussion: The response rate has been 83% overall, and 88% from the parents of included children. A text message has the immediacy for response that neither a telephone follow up call (best response 50% with repeated calls) nor the opening of an App (response rate 60%) possesses.

Any response with an abnormality or issue as determined with the assistance of Artificial Intelligence creates an Alert sent to a senior hospital group and the treating anaesthetist. They then determine any action to be taken: patient contact, surgeon or proceduralist advised and the resolution placed in the patient's medical record.

Those responses are then de-identified along with all normal responses and placed on a secure cloud server.

Conclusion: Patient outcomes can be readily compared with respect to procedure, co-morbidity status and age. The outcomes are made available by regular reports to all stakeholders including the community.

A survey of this type is extremely useful in patient management, and is perhaps even more relevant in this time of a pandemic, where many groups have been denied or have denied themselves proper medical care particularly with cancer or severe medical disease.

02AP01-05
Opioid prescribing pattern as treatment for acute perioperative pain in outpatient surgery

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Background and Goal of Study: One of the challenges in Ambulatory Surgery (AS) consists in controlling acute postoperative pain (APP) without increasing patient morbidity. The most recommended techniques to control APP include the application of multimodal analgesia regimens and limit the use opioids after procedures.

The aim of this review was to analyze the pattern in opioids prescription in adult patients after procedures in AS.

Materials and Methods: A retrospective cohort study conducted over a consecutive three-week period of patients undergoing major AS was performed. The following data were recorded: anthropometric parameters, ASA physical status classification, medical history, surgery type, expected postoperative pain (mild, moderate, severe), analgesia technique and drug prescription at home.

Additionally, phone calls were made to patients in order to evaluate postoperative pain through a numerical rating scale (NRS) within 24 hours and 1 week after surgery. Data are shown by mean, median, interquartile range (IQR) and percentages. Chi-Square and ANOVA tests were used to compare groups.

Results and Discussion: 238 patients were included, 60% women, mean age of 49+/-16 years. Expected pain after surgical procedures was classified into three categories: 28% mild pain, 42% moderate pain and 30% severe pain. Weak opioids were prescribed in 8% of patients.

When we evaluated the prescription at home related to expected pain after surgical procedures, we found out that prescription was higher in moderate-severe expected pain (14%) versus mild pain (5%), p=0,0001. Opioids as rescue medication were prescribed in higher percentage for procedures with moderate-severe expected pain (11%) than surgeries with mild expected pain (4%), but this finding was not statistically significant (p=0,28).

Patients who received tramadol showed higher NRS after 24 hours (median (IQR) was 4,5 [2,25-6,75]) compared to the ones who did not receive this opioid (median (IQR) was 3 [1,75-5]), p=0,05. There were no differences in NRS values after 7 days of surgery. Opioid prescription did not modify NRS values neither 24 hours nor 7 days after procedure.

Conclusion(s): Results show that opioid prescription is unusual in outpatient surgery. Even if opioid side effects are undesirable, its use as part of analgesic treatment or rescue medication for procedures with severe expected pain can improve pain management and help achieve patient comfort.

02AP01-06
Challenges in anaesthesia management of comorbid patient with Lennox-Gastaut syndrome for dental treatment

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Background: Lennox-Gastaut syndrome (LGS) is a severe form of epilepsy and consists of a triad of cognitive dysfunction, multiple seizures and abnormal activity of electroencephalography. Most patients with LGS have tonic seizures during sleep and they can seizure at any time. Nearly all have treatment-resistant, lifelong epilepsy

Case report: We present a young 22 years old female patient, scheduled for dental treatment, who was diagnosed with LGS, severe mental retardation and congenital brain malformation-cortical dysplasia of the left cerebral hemisphere. She was with high therapeutic resistance of most anticonvulsant drugs and with persistent polymorphic seizures, despite polytherapy with Depakin, Lamiktal, Clonazepam, Brivaracetam and Phenobarbital.

History for operatively stabilized scoliosis after dorsolumbar osteosynthesis and 2 times craniotomies for colossus formations. At the moment of the dental treatment the patient was with vagal stimulator.

Anaesthesia induction was with Propofol (3.7mg/kg) intravenously, mask ventilation with 100% oxygen, Dexamethason 4mg, Fentanyl 50mcg and Atropin 0.5mg.

For the surgical time of 90 min, anaesthesia was maintained with Propofol infusion 830mg (0.17mg/kg/min). During the operation, the blood pressure was 95-110/50-60 mmHg, heart rate was 65-70/min, end-tidal CO2- 32-35, oxygen saturation was 100%. The patient was extubated without registered any kind of seizures.

Discussion: LGS is challenge for anesthesiologists to determine the best approach for anesthesia for patients with uncontrolled and treatment resistant epilepsy. Anesthesia management hides risks of that the anesthetics can modulate or potentiate seizure acitvity and the use of a combination of antiepileptics may interact with anesthetic drugs. Propofol has a dose-dependent effect on EEG, produces anticonvulsant effects and has been used to treat refractory status epilepticus.

We report successful anesthetic management for general anesthesia with propofol and fentanyl and highly recommend their use in this kind of patients.

References: Ren WH. Anesthetic management of epileptic pediatric patients.Int Anesthesiol Clin.2009;47:101–116

Learning points: Intractable epilepsy can create difficulties for anesthesiologists, both during anesthetic induction and recovery. Anesthesiologists have to keep in mind that the patients can seizure at any time which can produce a variety of traumatic injuries, vomiting, hypertension, hypoglycemia.

02AP01-07
Postoperative analgesia prescription pattern in adult patients undergoing major outpatient surgery

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Background and goal of study: Acute postoperative pain (APP) in patients undergoing ambulatory surgery (AS) remains a significant problem despite of recent progress in the knowledge of pain pathophysiology, publication of guidelines for the treatment of APP and the advances in minimally invasive surgical techniques. Adequate APP control must include a precise analgesic prescription adapted to the procedure by the professionals involved.

The aim of the study was to evaluate the pattern of analgesic prescription in AS procedures in a university hospital.

Materials and methods: A retrospective cohort study conducted over a consecutive three-week period of patients undergoing major AS was performed. The following data were recorded: anthropometric parameters, ASA physical status classification, medical history, surgery type, anesthetic technique and drug prescription at home. Additionally, phone calls were made to patients in order to evaluate postoperative pain through a numerical rating scale (NRS) within 24 hours and 1 week after surgery. Data are shown by mean, median, interquartile range (IQR) and percentages.

Results and discussion: 238 patients were included (60% women), mean age of 49±16 years. ASA classification was: 32%; 48%; 19% and 1% ASA class I, II, III and IV respectively.

Orthopedic surgery was performed in 42% of the patients: stomatology in 19%; general surgery in 13%; vascular surgery in 18%; plastic surgery in 3% and gynecologic surgery in 5%.

General anesthesia was performed in 43% of the patients, 18% with local anesthesia and sedation, 36% with peripheral nerve block and 3% with spinal anesthesia. 73% of the patients received local anesthesia as part of the anesthetic technique.

One patient required unplanned admission due to severe uncontrolled pain. Analgesic prescription after hospital discharge included: acetaminophen associated to NSAIDs in 72% of the patients, acetaminophen in 20%, acetaminophen associated to tramadol in 5%, and NSAID associated to tramadol in 3%.

Pain median (IQR) in NRS was 3 (2-6) and 3 (1-5) at 24 hours and 7 days respectively. 33% and 27% of patients reported moderate to severe pain 24 hours and 7 days after surgery

Conclusion(s): Our results show that the presence of moderate-severe pain is still common in AS patients. This incidence persists despite of the use of local anesthetics as a multimodal analgesic strategy and the combination of NSAIDs and acetaminophen.

02AP01-08
Study of acute perioperative pain analgesic procedures in major ambulatory surgery: impact of the surgical specialty

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Background and goal of study: Acute perioperative pain (APP) in ambulatory surgery (AS) is still a common issue which causes a decrease in perceived quality by patients. Multimodal analgesia strategy is recommended by several scientific association guidelines. However, following these strategies is not a constant in practice; one reason might be the difference between specialists' criteria related to analgesic prescription.

Our objective was to study the analgesic prescription according to the different surgical specialists in an AS unit in an university hospital.

Materials and methods: A retrospective cohort study conducted over a consecutive three-week period of patients undergoing major AS was performed. The following data were included: anthropometric measures, ASA physical status classification, medical history, surgical specialty, analgesic prescription depending on the surgical specialty, rescue analgesia. APP was evaluated through a numerical rating scale (NRS) within 24 hours and 1 week after surgery. Data are shown by mean and percentages. ANOVA and Chi-square were used for comparisons between groups.

Results and discussion: 238 patients were included (60% women), mean age of 49±16 years. Data of six surgical specialties were analyzed: Orthopedic Surgery (42,4%), General Surgery (13%), Stomatology (18,9%), Vascular Surgery (17,6%), Plastic Surgery (3,4%) and Gynecology (4,6%).

Orthopedic, General Surgery and Stomatology procedures were related to expected moderate to severe pain (p value=0.0001) Acetaminophen associated to NSAIDs were prescribed in 72% of patient, without differences between specialties. Minor opioid prescription (tramadol) was made only by Orthopedic, (p value=0.0001).

The higher values in NRS were for Stomatology and Plastic Surgery, without statistically significant differences compared to other specialties. Seven days after surgery, pain was higher in patients of Stomatology procedures compared to the rest of specialties (p value=0.05). Rescue analgesia was prescribed more frequently in General Surgery (94%), Orthopedic (75%) and Gynecology, (p value=0,001)

Conclusion(s): Our results show different patterns related to analgesic prescription between surgical specialties of AS. Although some procedures are associated with severe pain, this is not handled properly.

The reporting of results and the training of professionals should be part of the continuous improvement process in the AS units to optimize patient comfort.

02AP01-09
The efficacy and safety of remimazolam versus propofol for endoscopy in Chinese patients: a meta-analysis of randomized controlled trials with trial sequential analysis

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Background and Goal of Study: In China, the number of patients requiring endoscopy has ranked first around the world.Remimazolam is a novel benzodiazepine with fast onset, rapid recovery, fewer cardiovascular side events.However, there was no meta-analysis focused on remimazolam compared with propofol for endoscopy.

We performed this meta-analysis of RCTs to investigate the efficacy and safety of remimazolam compared with propofol for endoscopy.

Materials and Methods: We have registered this review on PROSPERO (CRD42021272208). We searched PubMed, EMBASE, the Cochrane Library, China Wan Fang, and ClinicalTrials.gov from inception to 6 November 2021.

The inclusion criteria were:

1. RCTs;
2. Chinese patients undergoing endoscopy;
3. Age >= 18 years old;
4. ASA I-III;
5) Patients in the experimental group treated intravenously with remimazolam, and in the control group with propofol.

The exclusion criteria were studies focused on patients suffering hepatic impairment.

The primary outcome was the sedation success rate, defined as:

1. Satisfying the sedation for endoscopy;
2. No need to use other rescue sedatives;
3. A maximum of 5 supplementary doses within 15 minutes of the initial dose.

The secondary outcomes were injection pain, intraoperative hypotension, respiratory depression. We reported RR with 95% CIs for outcomes using the Mantel-Haenszel method.

We also performed Trial Sequence Analysis (TSA) to evaluate the power of conclusions. The level of certainty was evaluated with the GRADE system.

Results and Discussion: Seven RCTs (n= 1122) reported the sedation success rate (RR= 0.99, 95% CI 0.97 - 1.01, I^2= 15%, P = 0.19, moderate quality);

Seven RCTs (n= 1144) reported injection pain (RR = 0.03, 95% CI 0.01 to 0.08, I^2= 0%, P < 0.001, moderate quality);

Seven RCTs (n= 1184) reported the intraoperative hypotension (RR = 0.37, 95% CI 0.23 to 0.60, I^2= 78%, P < 0.001, low quality);

Seven RCTs (n= 1144) reported respiratory depression (RR = 0.17, 95% CI 0.10 to 0.28, I^2= 0%, P < 0.001, moderate quality).

Moreover, the cumulative TSA Z curve crossed both the conventional boundary and TSA monitoring boundary.

Conclusion(s): Moderate quality evidence was found to support that remimazolam showed high sedation success rate, less injection pain and respiratory depression compared with propofol.

Low quality evidence was found that remimazolam resulted in less intraoperative hypotension compared with propofol.

Regional Anaesthesia

03AP01-01
A comparative study of peripheral nerve stimulator guided supraclavicular brachial plexus block using bupivacaine- lignocaine v/s bupivacaine – lignocaine with buprenorphine

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Background and goal of study: Supraclavicular brachial plexus block is ideal for upper limb surgical procedures. Local anaesthetics when used with additives provides synergistic effect. This study was therefore conducted to see the effect of addition of Buprenorphine to Bupivacaine and Lignocaine in Supraclavicular Brachial Plexus block and study its time of onset of sensory block and motor block and total duration of sensory block and motor block. We even studied the total duration of post-operative analgesia and the need for any rescue analgesia.
Materials and methods: Written, informed consents were taken from 62 patients posted for elective upper limb orthopaedic surgery belonging to ASA grade I and II.
Group A(n=31) was given: Inj. 0.5% Bupivacaine (15ml) + Inj. 2% Lignocaine (15ml) + 2 ml of 7.5% (w/v) Sodium Bicarbonate + normal saline (1 ml).
Group B(n=31) was given: Inj. 0.5% Bupivacaine (15ml) + Inj. 2% Lignocaine (15ml) +2 ml of 7.5% (w/v) Sodium Bicarbonate + Inj. Buprenorphine 0.3 mg (1 ml).
Results and discussion: Patients of group A and group B did not show any significant changes in heart rate, blood pressure, MAP and Spo2. The mean time of onset of sensory and motor block among both the groups were insignificant. The total duration of sensory and motor block was more in group B as compared to group A ($p<0.01$). Mean time for rescue analgesia was also longer in group B as the duration of post operative analgesia was significantly prolonged in group B ($p<0.01$).
Conclusion(s): Buprenorphine (0.3mg) when added to 0.5% Bupivacaine and 2% Lignocaine in Supraclavicular Brachial Plexus block prolongs the duration of sensory and motor block and thereby the duration of post- operative analgesia. Buprenorphine also improves the quality of blockade with no significant hemodynamic alterations and systemic side effects or complications.
References:
1. Merskey H, Albe Fessard D, Bonica JJ, Carmon A, Dubner R, Kerr FWL, Lindblom U, Mumford JM, Nathan PW, Noordenbos W, Pagni CA, Renaer MJ, Sternbach RA, Sunderland S. Pain terms: a list with definitions and notes on usage. Recommended by the IASP subcommittee on taxonomy. PAIN 1979;6:249–52.
2. Briggs E. Understanding the experience and physiology of pain. Nurs stand Royal Coll Nurs (Great Britain). 2010;25(3):35-9.
Acknowledgements: Dr H.S. Rawat

03AP01-02
Analgesia and sedation concepts for the placements of peripheral regional anesthesia: pilot-RCT

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Peripheral regional anesthesia should be performed under general anaesthesia or deep sedation only in special situations due to risk of inadvertent nerve injuries or respiratory depression. There is no evidence on analgesia or sedation concepts during pre-operative placement of peripheral nerve block from the patients' perspective. Aim of the study was to estimate the best practice approach for analgosedation for regional anaesthesia.
RCT pilot trial conducted from 08/2020-12/2020 at the University Clinic Graz, Austria. 50 patients were computer-based randomized to one of five possible treatment concept groups:
1. Remifentanyl-Infusion (no bolus, 6-9 mcg/kg/h i.v.),
2. Fentanyl-Bolus (100 mcg i.v. for BW > 50 kg / 50 mcg for BW <50 kg),
3. Clonidine 150 mcg bolus i.v.,
4. Lidocaine/Prilocaine topical cream 30 min prior to the puncture,
5. Placebo
The pain intensity as a main outcome was assessed by a numeric rain scale (NRS) at the time of a needle insertion (22-G 50 mm and 21-G 100 mm needles), as well as a validated questionnaire for patients' wellbeing (Anaesthesiological Questionnaire).
Tab. 1 Pain and wellbeing findings

Outcome	Remifentanil	Lidocaine/ Prilocaine	Fentanyl	Clonidine	Placebo	P
Pain at puncture (NRS)	2.00 [1.5 to 3.0]	2.50 [1.25 to 4.0]	3.00 [2.0 to 4.75]	4.00 [3.0 tot 5.0]	3.00 [2.0 to 4.5]	0.172
Light pain (1 to 2)	7/9	6/12	5/12	1/9	3/8	0.80
Medium or strong pain (3)	2/9	6/12	7/12	8/9	5/8	
Wellbeing (ANP)						
None	0/9	1/12	0/11	0/9	0/8	0.535
Some	1/9	3/12	3/11	0/9	1/8	
Quite	6/9	3/12	8/11	9/9	1/8	
Strong	2/9	1/12	0/11	0/9	1/8	
Complication	None	None	None	None	None	n.a

Table. P values for pain and Wellbeing are from exact x2 test, P value for pain (NRS) - Kruskal–Wallis test.

Remifentanil infusion lead to the lowest (statistically NS) experienced pain levels (NRS 2,0 [1,5-3,0]) followed by Lidocaine/Prilocaine creme (NRS 2,5 [1,25-4,0]) and Placebo (NRS 2,5 [1,25-4,5]). (Tab. 1) The highest wellbeing was observed in Remifentanil (2,2 [2-2,2]) and Clonidin (2 [1,9-2,1]) groups. No adverse effects were found (e.g. nonresponsiveness, drop in oxygen saturation or blood pressure, nerve injury).

One of the issues to investigate, whether it is reasonable to reduce the pain intensity from NRS 3 to 2 or 1 for the price of vigilance. It is also questionable whether the patient has to be completely awake during the placement of regional anaesthesia.
Analgosedation with remifentanil seems to lead to the lowest pain while best ensuring patients' wellbeing for pre-operative regional anaesthesia. Optimal approach has to be adjusted according to the patient needs, medical personnel and their expertise and a hospital's logistics.

03AP01-03
Dexmedetomidine as an adjuvant to levobupivacaine and lidocaine in ultrasound-guided superficial cervical block for carotid endarterectomy: a prospective, randomised, double-blinded study

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Background and goal of study: Numerous additives were tried in combination with local anaesthetics to increase the quality of anaesthesia and prolong postoperative analgesia. Research on use of a-2-receptor agonist dexmedetomidine as an adjuvant in regional anaesthesia has positive effect on duration of block, but there are no studies on usage in superficial cervical block (SCB) in carotid endarterectomy (CEA), where management of mean arterial pressure is essential. We therefore designed a prospective, randomised, double-blinded study to investigate the effect of adding dexmedetomidine to levobupivacaine and lidocaine on the quality of SCB in CEA surgery.
Materials and methods: Ultrasound-guided SCB was performed on thirty-three ASA Grade II and III patients undergoing elective CEA surgery. Patients did not receive any premedication. All patients had invasive blood pressure monitoring and parameters were noted every 5 minutes. Patients were randomly assigned into two groups: both groups received 2 mg/kg 0.5% levobupivacaine with 200 mg of 2% lidocaine supplemented with saline to a volume of 50 mL.
Subject group S additionally received 50 micrograms of dexmedetomidine in mixture. The onset and duration of sensory block and analgesia, haemodynamic parameters and side effects: bradycardia, hypotension, respiratory depression, nausea, vomiting, pruritus and shivering were recorded.
Results and discussion: Demographic data and surgical characteristics were comparable in both groups. The time to first analgesia was significantly higher in Group S (N=16) vs control Group C (N=17) (median 920 [IQR 503] vs. 590 [IQR 210]) minutes respectively, Mann-Whitney p=0.032).
There was no significant difference in block onset times or duration of sensory block between groups. The log-rank test indicated a significant difference in the Kaplan-Meier curves for the time to VAS ≤3 (p=0.038). There was no difference in incidence of side-effects and hemodynamic parameters.
Conclusion(s): Addition of 50 mcg of dexmedetomidine to 0.5% levobupivacaine and 2% lidocaine for SCB does not increase the duration of SCB, but increases the time to first request of rescue analgesia and increases the probability of VAS ≤3 in the postoperative period, without influence on haemodynamics and frequency of side-effects.

03AP01-04
Ultrasound-guided transversalis fascia plane blockfor postoperative pain control in pediatric patients undergoing laparotomy, a comparative study between two approaches

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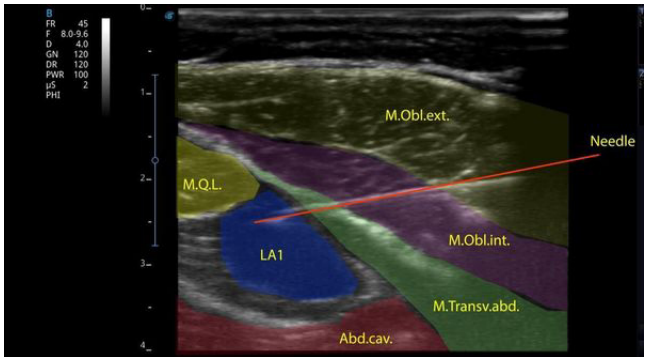
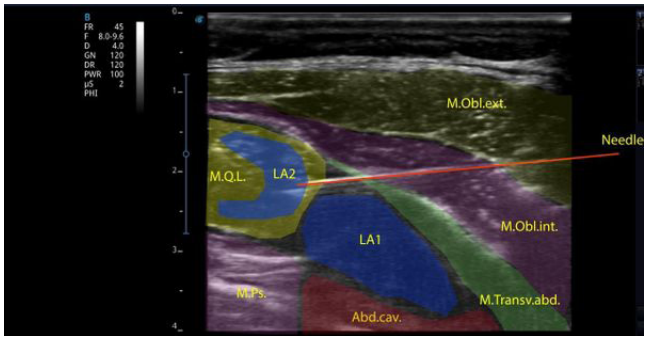
Background: Transversalis fascia plane block (TFPB) has been described to provide adequate postoperative analgesia after abdominal surgery. This randomized comparative trial was designed to compare the duration of analgesia provided by two different TFPB approaches; the TFPB and intramuscular QLB + TFPB in patients undergoing laparotomy.
Methods: 23 patients, aged from 12 to 18 years, ASA physical status I or II, scheduled for laparotomy were enrolled. At the end of the surgical procedure and before recovery from general anesthesia, Patients were randomly assigned into two groups to receive either TFPB (Group TFPB) (pic.1) or intramuscular QLB+TFPB (Group Q+TFPB) (pic.2) using 10 ml 0.25% bupivacaine. Duration of analgesia, postoperative VAS and postoperative opioid consumption were recorded.



PIC.1, TFPB approaches



PIC.2, QLB+TFPB approaches

Results: Duration of block was significantly longer in Q+TFPB group when compared to TFPB group (20.3+ 3.2 h versus 12.2 + 3.4 respectively) with P value of < 0.001. A statistically significant lower VAS score was recorded in Q+TFPB group immediately and 12 h postoperative. Q+TFPB group showed a statistically significant delayed time of first analgesic request and less postoperative morphine consumption with P value of < 0.001 and 0.001 respectively.

Conclusions: Ultrasound guided postsurgical intramuscular QLB+TFPB using 10 ml 0.25% bupivacaine produces more postoperative analgesic effect and less postoperative opioid consumption when compared to intramuscular TFPB in patients underwent laparotomy under general anesthesia.

References:

1. Dmytro D, Oleksandr N, Kostiantyn D, Evgenii L, Olesya Z. Selecting the ideal adjuvant to improve neuraxial and regional analgesia: A narrative review. Anaesth. pain intensive care 2020;24(6):682-693; DOI: 10.35975/apic.v24i6.1209

03AP01-05
Sedation reduction with audio AIDS under regional anaesthesia: an observation study

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Introduction: The use of music or white noise to aid sleep has been shown to relieve anxiety and pain, and decrease anxiety during regional anaesthesia in orthopaedic surgery. We aim to investigate whether music (M) or white noise (WN) reduces sedation requirements in a prospective randomised investigator-blinded observational study.

Methods: Anxiety state of patients undergoing arthroplasty surgeries (knee or hip) under regional anaesthesia was assessed with the 6-item State Trait Anxiety Inventory (STAI) and 100mm Visual Analogue Score (VAS) for anxiety. Although we did not prescribe regimen, all patients received a subarachnoid block with Propofol and Fentanyl sedation as per institutional practice. No patients received a peripheral nerve block. Noise-cancelling headphones (Sony WF-1000XM3) were used post successful block and IV propofol infusion started after being randomized to receive either white noise (gentle waves) or music ("Weightless" by Marconi Union). Total propofol and fentanyl usage was recorded. The primary anaesthetist, who is blinded to the intervention, titrates the sedation to target Patient State Index 50 – 75 on the Sedline® monitor. Patients were interviewed by the Acute Pain Service (APS) team on sedation satisfaction and pain VAS scores post-op.

Results: We recruited 34 patients equally randomized to receive WN and M. Baseline characteristics of the groups are similar. Cronbach's alpha for STAI is 0.716, suggesting good internal validity but correlation of STAI to VAS is poor at 0.558.

Patients receiving WN had lower sedation requirements. Mean propofol dose for WN vs M is 224.9 mg vs 304.1 mg ($p = 0.009$) with corrected propofol parameters for time and weight showing statistical significance. Mean fentanyl dose when used showed 7.35 mcg vs 24.1 mcg ($p = 0.031$) and corrected parameters showing similar results. Post-op VAS scores and satisfaction between the groups are similar.

Discussion: The large reduction in propofol and fentanyl usage for the WN group may signify the calming effect of white noise. With the Sedline monitor, the patient's sedation state can be more accurately titrated with minimal interruption. Although the satisfaction scores are similar, some ($n < 5$) have reported WN as jarring, which may be due to the volume delivered.

Conclusion: There seems to be a good effect in using WN as an aid to anxiety reduction. However, more research especially with a control may delineate a greater clinical effect.

03AP01-06
Anesthesia and laboratory markers of hyperalgesia and chronization of acute pain after spine surgeries

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Background: A large percentage of spinal deformities with severe pain are treated with complex and traumatic spinal surgeries. Intensive pain therapy with narcotic analgesics is required both intra- and postoperatively. The maximum number of measures should be set to reduce the use of opiates not only during surgery, but also during the postoperative period.

We propose bilateral erector spinae plane block as a component of general anaesthesia for spinal surgery as an effective and safe method for reducing the use of narcotic analgesics, reducing pain intensity, and preventing hyperalgesia and chronization of acute pain.

Materials and methods: One hundred patients which underwent posterior transpedicular fixation of the spine were randomly assigned to either general anaesthesia (control) or general anaesthesia with bilateral erector spinae blocks (study). Booth groups were divided into subgroups according to sex (male and female) and age (20-49 years and ≥50 years).

Main outcome: Testosterone, cortisol, C-reactive protein and glucose levels before and after surgery, quantity of narcotic analgesic intra- and postoperatively.

Results and discussion: No statistic difference were found before and after surgery in levels of testosterone (Male 20-49 - 20.73, Male ≥50 - 19.38; Female 20-49 – 0.65; Female ≥50 – 0.55 vs. Male 20-49 - 21.1, Male ≥50 - 16.35, Female 20-49 - 0.62; Female ≥50 - 0.71), cortisol (291.6 vs. 296.4), C-reactive protein (1.95 vs. 2.34) and glucose (5.09 vs. 6.06) in study group.

Significant difference was obtained before and after surgery from the levels of testosterone (Male 20-49 - 26.94, Male ≥50 - 17.67, Female 20-49 - 1,09, Female ≥50 – 1.15 vs. Male 20-49 - 6.79, Male ≥50 - 2.63, Female 20-49 – 0.11, Female ≥50 – 0.1) cortisol (322 vs. 767.24), C-reactive protein (1.48 vs. 8.54) and glucose (5.2 vs. 9.23) in control group. The quantity of fentanyl administered during the operation was significantly lower (1.68 $\mu g\ kg^{-1}h^{-1}$) in study group compare to control group (4.7 $\mu g\ kg^{-1}h^{-1}$).

In the study group, morphine was administered to 5 patients once at a dose of 10 mg. In the control group, morphine was administered to 23 patients at doses of 10–30 mg.

Conclusion: Bilateral ESPB as a component of general anaesthesia in spinal surgery reduces the quantity of narcotic analgesics used during surgery and in the postoperative period and depresses the stress response to surgical trauma, hyperalgesia, and chronisation of acute pain.

03AP01-07
Influence of pericapsular nerve group (PENG) and lateral femoral cutaneous nerve (LFCN) blocks on the lenght of stay at the Postoperative Care Unit after surgical treatment of hip fracture in the elder patient: a retrospective descriptive study

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Background and goal of study: The Pericapsular Nerve Group Block (PENG) is a regional anesthetic technique described in 2018 in the context of total hip arthroplasty (THA) with the purpose of providing postoperative analgesia while avoiding the limb weakness attributable to femoral nerve blocks. It is based on the block of the high articular branches from the femoral nerve and accessory obturator nerve, which innervate the anterior hip capsule and are consistently found between the anterior inferior iliac spine and the iliopubic eminence[1].

The Lateral Femoral Cutaneous Nerve (LFCN) block provides analgesia for the surgical incision area of THA. Our team made a retrospective descriptive study to compare the difference in the postoperative care unit (PCU) length of stay among elder patients (>65 yo) who had undergone PENG and LFCN blocks prior to surgical treatment of hip fractures, and those who not.

Materials and methods: Our team examined our institutional PCU database, then included 108 patients in the PENG/LFCN group and 111 patients in the control group. The PCU length of stay of each patient was recorded.

All patients in the PENG/LFCN group provided informed consent for both blocks to be performed on them. Mean PCU length of stay and mean deviation was calculated for each group, followed by a comparison between groups using the Student T-Test for individual samples assuming equal variances.

Results and discussion: A statistically significant difference of -39.11 min was found. This fact contributes to an enhanced recovery of the patient; to a faster release of PCU beds (an important issue for institutions with a large volume of surgical procedures) and reduces hospitalization costs.

	PENG+LFCN (mean +/-SD)	CONTROL	Difference (95%IC)	Signification
PCU length of stay (min)	149.09 +/- 70.40	188.21 +/- 91.03	39.11 (17.40 - 60.83)	.000

Table 1. PCU length of stay

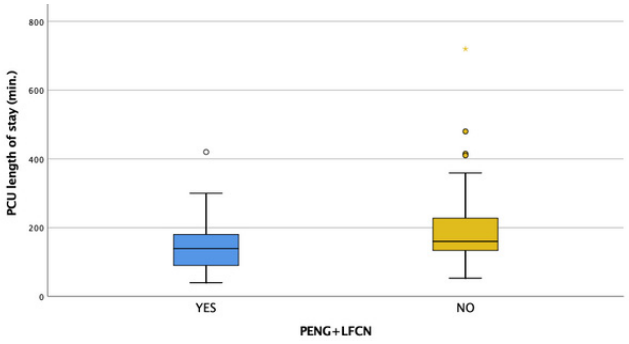

Figure 1. PCU length of stay comparison

Conclusion: The use of the PENG and LFCN blocks on elder patients who undergo surgical treatment of hip fracture reduces the PCU length of stay in a statistically significant way.

References: 1. Giron-Arango L et al. Pericapsular Nerve Group (PENG) Block for Hip Fracture. Reg Anesth Pain Med. 2018;43(8):859-63.

03AP01-09
ESP - block, as a component of multimodal anesthesia during an open kidney surgeries with lumbotomic access

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Background and goal of study: Being less invasive than paravertebral blockade and epidural anesthesia, ESP block bears lower risk of complications;it is simple in implementation and can be an effective component of multimodal anesthesia lowering severity of post-operational pain. The current study aims to evaluate the clinical efficacy of the ESP block as a component of multimodal anesthesia during lumbotomy kidney surgery.

Materials and methods: This research has included 59 patients of II –III class according to ASA, aged between 20-75 years. All patients underwent inhalation anesthesia with isoflurane. Proactive analgesia was administered using NSAID (Diclofenac 75 mg).

For the 1st group (37 patients) after tracheal intubation and positioning ESP block was carried out under ultrasound control at theTh9 level with 0.5% Bupivacaine (25-30 ml).

For the 2nd group (22 patients) inhalation anesthesia was administered. ESP block was not carried out.

To assess post-operational pain a visual analogue scale (VAS) was used. Registration was carried out every 6 hours, during the day.

Results and discussion: 20 patients of the first group have scored 0-2 points according to the VAS. NSAIDs were not repeatedly administered.

14 patients have scored 4-5points which required repeated administration of NSAIDs (Diclofenac), between 14 to 20 hours after the surgery.

For 3 patients the pain was not associated with surgery (two cases it was positional plexitis; one case, the patient complained on the pain in the neck). They required the administration of a narcotic analgesic (Trimperidin 20 mg).

While, in the second group, only 1 patient scored 2 points.8 patients scored 5-6 points and NSAIDs were used in the first 6 hours after surgery.12 patients scored 7-8 points requiring the prescription of the narcotic analgesic Trimperidin 20 mg in combination with NSAIDs and Paracetamol.

1 patient was not assessed on the VAS due to prolonged stay on mechanical ventilation (within 3 days).

Conclusion: Results of our research have indicated the effectiveness of the ESP block reducing the consumption of NSAIDs and opiates. We believe that further studies of ESP block application in lumbotomy access surgery are required. The advantages of the ESP block are its simplicity, safety of implementation and the possibility of using catheter technology. Mastering methods of ultrasound navigation will allow this method to become a reliable and highly effective component of multimodal anesthesia.

03AP01-10
Opioid sparing effect of transversus abdominis plane (TAP) block in open ventral hernia repair: case series

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Background: Open ventral hernia repair surgery is characterised with pain that arises from skin, muscles of the anterior abdominal wall and parietal peritoneum. Transversus abdominis plane (TAP) block can be suitable for these operations and can lower usage of opioids during surgery and in the postoperative period.
Case report: We represent five patients, all ASA classification 2, scheduled for open ventral hernia repair surgery. After induction to standard general anesthesia with 2 mg midazolam, 100 μgr fentanyl, propofol 2 mg/kg, and rocuronium bromide 0.6 mg/kg, ultrasound-guided TAP block was performed with 20 ml 0.25% bupivacaine + 4 mg dexamethasone on both sides before surgical midline incision. Anesthesia was maintained with sevoflurane 0.7-1 MAC. Pain was measured first 48 hours after surgery with numeric rating score (NRS) from 1 to 10, where for NRS 4-6/10 1 gr metamizol was given, and for NRS 7-10/10 1 mg/kg tramadol was administered.
Opioid consumption during surgery and in the postoperative period was measured too. The first three patients have pain 22 hours after surgery with NRS 4/10, other two patients have pain 25 hours after surgery with NRS 6/10 and all received 1 gr metamizol. Next complaint was 34 and 46 hours after surgery in all patients with NRS 4-5/10 and 1 gr metamizol was given. Total opioid consumption during surgery in all patients was 150 μgr fentanyl and none of the patients received opioids in the postoperative period.
Discussion: Pain in open ventral hernia repair operations is from somatic origin and can lead to high pain scores in the postoperative period, bigger opioid consumption and prolonged stay in hospital.[1] Bilateral TAP block is ideal for treatment of somatic pain and given together with dexamethasone can prolong analgesia in first 48 hours after surgery.
References:
1. Zhang D, Zhou C, Wei D, Ge L, Li Q. Dexamethasone added to local anesthetics in ultrasound-guided transversus abdominis plain (TAP) block for analgesia after abdominal surgery: A systematic review and meta-analysis of randomized controlled trials. PLOS ONE 14(1): e0209646. https://doi.org/10.1371/journal.pone.0209646
Learning points: TAP block given with steroids before surgical incision achieves prolonged analgesia during and after surgery, minimise opioid consumption and better pain control.

03AP01-11
Patient control ESP block analgesia in adult cardiac surgery: a case control study

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Background: In postoperative phase of cardiac surgery, neuraxial technique was refrained due to hypotension and bleeding risk. Erector spinae plane (ESP) block is a fascia plane block aim to block dorsal and ventral rami of thoracic spinal nerves.*Krishna et al.*had found that single shot of ESP block before cardiac surgery provides significantly better pain relief compared to intravenous paracetamol and tramadol. Patient-controlled analgesia might provide better pain relief and efficacy considering patient mobility. The aim of this study is comparing 72 hours opioid consumption and numerical rating scale (NRS) between patient-controlled analgesia intermittent programmed bolus (PCA-PIB) of ESP block and conventional care in cardiac surgery.
Method: We reviewed 32 patients who received ESP catheter insertion before induction of cardiac surgery (open/robotic CABG, open/robotic valve surgery) since Jan. 2021 to Aug. 2021; and other 32 non-ESP patients were matched by propensity score. Bolus 0.5% Ropivacaine based on body weight would be given before sternotomy/thoracotomy and wound closure in ESP group. For postoperative analgesia, both groups would be prescribed tramadol and morphine if necessary. ESP group would addtionally receive 0.2% Ropivacaine through patient-controlled analgesia machine combined programmed intermittent bolus mode every 4 hours.The primary outcome of this study is the repeated measure of postoperative numerical rating scale (NRS) within 72 hours in six time points (0-8hr, 8-16hr, 16-24hr, 24-36hr, 36-48hr, 48-72hr) after patients extubated. The secondary outcome is postoperative opioid cumulative dose in 72 hours.
Result: Patients in the PCA-PIB ESP group had significant lower NRS score in six time points within 72 hours ($p<0.001$) (Fig 1) and lower opioid consumption in 72 hours after cardiac surgery compared with patients in the conventional care group (41.52(28.11) mg vs. 78.5(35.55) mg, $p<0.001$).

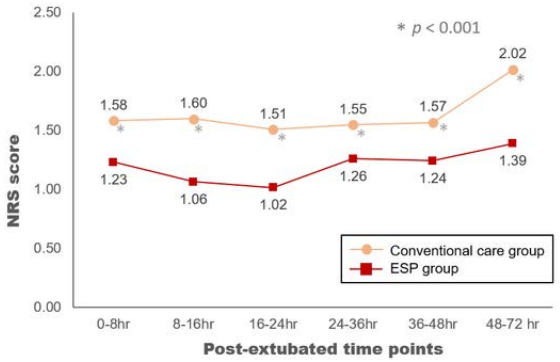

*Figure 1. Repeated measures of postoperative numerical rating scale (NRS) within 72 hours in six time points after extubation. *p<0.001 means significant differences between both groups at each time point.*

Conclusion: Based on this study, we found that PCA-PIB group had lower NRS score and consumed fewer postoperative opioid in 72 hours. In conclusion, patient control ESP block was proved to be a better way for pain relief of adult cardiac surgery.

03AP01-12
Intrathecal morphine in postoperative analgesia for open colorectal surgery: a retrospective single centre study

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Background and goal of study: Thoracic epidural analgesia (TEA) remains the gold standard for management of postoperative pain after open colorectal surgery. The use of intrathecal morphine (ITM) in open colorectal surgery has been limited, in our practise to situations where TEA has failed or there is a relative contraindication. ITM has also been used in minimally invasive procedures, occasionally converted to open surgery. The aim was to evaluate ITM use in open colorectal surgery regarding postoperative analgesia and complications.
Materials and methods: Retrospective single centre study where all patients receiving ITM before open colorectal surgery at Västerås Hospital from April 2016 to June 2020 were identified via the Swedish PeriOperative Registry. Patients receiving ITM were monitored in accordance with national guidelines to prevent and detect respiratory depression. Medical records were reviewed and data regarding postoperative outcomes including complications and need for TEA were extracted.
Results and discussion: In total 114 patients (60 female) were included with a median age of 74 years (range 22-92). Indications for ITM were minimally invasive procedure (later conversion) in 60 patients (52%), failed TEA placement in 10 patients (9%), uncertain hemostasis in 2 patients (2%) and not specified in 42 patients (37%). Median ITM dose was 200 μg. Intrathecal adjuvants were bupivacaine in 92 patients (81%) median dose 5 mg, clonidine in 11 patients (10%) median dose 75 μg, fentanyl 10 μg in 6 patients (5%) and ropivacaine 5 mg in 1 patient (1%).
Surgery was performed electively in 83 patients (73%) and the incisions were midline in 112 patients (98%) and transverse in 2 patients (2%).
Median length of stay was 8 days (range 3-34), 7 patients (6%) received postoperative TEA, 4 (4%) due to pain and 3 (3%) prophylactic.
One patient was treated with naloxone and oxygen for apnoea and desaturation after receiving intravenous opioids on a ward and 1 patient was treated with oxygen for desaturation in the postoperative care unit. Postoperative nausea and vomiting occurred in 10 patients. No patients suffered from postdural puncture headache.
Conclusion: Adverse events after ITM were few as well as need for postoperative TEA for pain management. The results suggest that ITM could be a viable alternative to TEA for postoperative pain management after open colorectal surgery. A randomized controlled trial would be necessary to confirm the results.

03AP02-01
Absence of analgesic benefit of a Pecs II block vs. surgical field infiltration for open biceps tenodesis

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Background and goal of study: Open subpectoral biceps tenodesis is an effective treatment for biceps tendinopathy, increasing biceps strength and decreasing pain. This surgery is often performed in conjunction with shoulder arthroscopy.
Unfortunately, axillary pain is common after this procedure as the skin incision is not covered by a brachial plexus block. Based on its skin coverage, we hypothesized that a Pecs II block would provide better analgesia than surgical infiltration following open subpectoral bicep tenodesis surgery.
Materials and methods: In the treatment group of this randomized single-blind trial, patients received a Pecs II block with 20mL 0.25% bupivacaine. In the control group, they received local infiltration of up to 15 mL 0.25% bupivacaine by the surgeon.
All participants received an interscalene nerve block with 20 mL 0.5% bupivacaine. All patients received either intravenous sedation or general anesthesia with laryngeal mask airway, and intraoperative opioids at the anesthesiologists' discretion.
The primary outcome was opioid utilization the first 24 hours after surgery (PACU + POD1). Secondary outcomes were NRS scores in PACU and at 24hrs, NRS scores on POD1 and POD3, reaction to surgical subpectoral incision (such as motion or tachycardia) and postoperative skin assessment of sensation in the axilla.
Results and discussion: At the time of this interim analysis, the data for 64 participants is available. Despite randomization, pain scores on the baseline preoperative assessment were significantly higher in the Pecs group (1.3 ± 2.3 vs. 3.3 ± 3.2; $p = 0.005$).
For the first 24 hours after surgery, the treatment group used 32.8 ± 26 mg morphine mg equivalents (MME) vs. 29.9 ± 21; $p = 0.63$. There were no differences in terms of reaction to incision, postoperative paresthesia/anesthesia on skin distal to surgical dressing, or postoperative pain scores.
While Reynold et al. showed a benefit compared to a sham block, surgical infiltration seems simpler and yields comparable analgesia.
Conclusion(s): While the preoperative higher pain scores in the Pecs could be a confounder, the theoretical advantage of the Pecs 2 block over surgical infiltration for open biceps tenodesis was not supported by this study, with similar opioid consumption and NRS scores in the Pecs 2 group.
References:
1. Levy DM et al. Am J Orthop 2016 Feb;45:68-74
2. Arena C et al. Arthrosc Tech 2017; 6:e1625-e1631
3. Reynolds JW et al. Anesthesia Analgesia 2019; 129:538-542

03AP02-02
Comparison of the efficiency of ketamine and propofol alone and in combination for prevention of post spinal shivering in elderly

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Background and goal of study: Neuroaxial anesthesia associated shivering has potentially detrimental effects, especially in elderly. This prospective randomized double-blind controlled study has the purpose to explore the effectiveness and safety of low dose intravenous ketamine, propofol and ketamine plus propofol for prophylaxis of shivering in elderly undergoing lower abdominal surgery under spinal anesthesia.
Materials and methods: 100 patients (ASA I-III, age>65 years) scheduled for lower abdominal surgery under spinal anesthesia participated in the study. They were randomized to four groups, each of them with 25 patients, to receive 0,25 mg/kg ketamine (group K), 0,25 mg/kg propofol (group P), 0,25 mg/kg ketamine and 0,25 mg/kg propofol (group KP) and saline (group S). Drugs were diluted with normal saline to a volume of 4 ml, administered as iv bolus after subarachnoid anesthesia with hyperbaric bupivacaine was performed.
During surgery we recorded every 10' the incidence of shivering and its severity using Bedside Shivering Assessment Scale as primary endpoints.
Secondary endpoints included the incidence of sedation and nausea/vomiting and the evaluation of hemodynamics during surgery. Intravenous pethidine (15-25 mg) was injected in all patients as rescue medication for shivering score ≥3. ANOVA and chi square test were valuable tools for statistical interpretation of our results considering p<0,05 as significant.
Results and discussion: The incidence of shivering was significantly lower in groups K (p<0,05), P (p<0,01), KP(p<0,001) compared to placebo. Among the groups that received prophylactic medication, group KP showed an advantage documented by statistically relevant decrease of shivering incidence (p<0,01) compared to the other two groups which appeared similar.
Concerning the shivering score we found significant lower grading in all study groups versus placebo (p<0,01). Group KP proved its superiority by significantly lower severity scores (p<0,05) compared to each of the groups K and P, which were similar in this respect, as well. The incidence of sedation, the occurrence of nausea/vomiting and hemodynamic parameters registered similar values in all study groups.
Conclusion(s): The combination of low doses of ketamine and propofol as intravenous bolus proved a good safety profile and a superior efficiency compared to ketamine and propofol as single agents in preventing post-spinal shivering in elderly undergoing lower abdominal surgery.

03AP02-03
Continuous erector spinae plane block provides adequate postoperative analgesia and improves respiratory function in adult cardiac surgery patients: a retrospective case-control study

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Background and goal of study: Post-sternotomy pain is severe and may cause delayed recovery of respiratory function among cardiac surgery patients. Erector spinae plane(ESP) block is a fascial plane block and has recently seen utilization for acute postoperative analgesia involving chest and abdominal surgeries.
The aim of this study is to examine the analgesia efficiency and incentive spirometry volume improvement between patients with programmed intermittent bolus (PIB) ESP block and conventional treatment.
Materials and methods: We retrospectively analyzed thirty patients who received ESP block postoperatively using the PCA-PIB delivery system from January to July 2021. The control group was a historical group of 30 patients by propensity score matching with age, gender, surgical approach, EuroScore II, and operation date. Patients in the ESP group received 0.2ml/kg of 0.5% ropivacaine through a catheter inserted at T5 level before surgical incision.
After the surgery, a pump to infuse intermittent automatic blouses of 0.2ml/kg of 0.2% ropivacaine every 4 hours, and patients demanded boluses of the same volume in 30 minutes lockout time intervals was used. Both groups received intravenous dexmedetomidine infusion 0.2-0.4 mcg/kg/hr at postoperative day 1 and intravenous morphine or tramadol as rescue analgesia.
Repeated measurement of daily maximum visual analogue scale (VAS) and incentive spirometry volume in the first 72 hours after extubation were analyzed using generalized estimating equation.
Results and discussion: The ESP group had lower daily maximum VAS (Fig 1a) and lower demand of rescue opioids (1.0[0-5] vs. 2.0[0-8],$p < 0.001$) after extubation. Both groups had significant improvement in incentive spirometry volume during the first 72 hours.
The ESP group had higher spirometry volume with a mean difference of 25ml, 150ml, and 235ml compared with the control group (Fig 1b). The duration of ventilator-dependent, the length of stay in the ICU and hospitalization were similar.
Conclusion: Utilizing ESP block provides adequate postoperative analgesia and may improve inspiratory capacity in open cardiac surgery patients.

03AP02-04
A randomised trial of bilateral erector spinae plane block vs no block for thoracolumbar decompressive spinal surgery

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Background and goal of study: Major spinal surgery causes more pain in the first 24h postop than most operations [1]. Multimodal analgesia, including opioids, is used to limit pain after spinal surgery. The erector spinae plane (ESP) block deposits local anaesthesia on the transverse processes of thoracic vertebrae, deep to the erector spinae muscle complex. The Quality of Recovery-15 (QOR15) score asks the postop patient 15 questions about how they feel and function [2].
We conducted a randomised trial to test the effect of adding ESP block to multimodal analgesia on QOR15 after thoracolumbar spine surgery.
Materials and methods: We recruited ASA I-IV adults scheduled for open thoracolumbar vertebral decompression at two or more levels, with or without fusion. We randomly allocated participants to no block or ESP block. ESP block was performed in prone anaesthetised participants, injecting 40ml levobupivacaine 0.25% bilaterally in the midpoint of the planned incision.
Primary outcome:QoR-15 at 24h postop.
Results and discussion: We analysed results from 60 participants. ESP block increased the QoR-15 score (95%CI) at 24h postop by 13 (4-22), p = 0.0041. We used more intraoperative oxycodone in the control group; mean (SD) 8.7 (4.8) mg vs 5.7 (3.9) mg after block, p = 0.010.
The mean pain in PACU was more in control patients than block patients: at rest, 3.9 (2.3) vs 2.1 (2.0), p = 0.0021; and on sitting, 5.4 (2.6) vs 3.5 (2.4), p = 0.0047.
The mean (SD) dose of intravenous oxycodone in PACU was 5.4 (4.4)mg in control patients vs 4.3 (4.4)mg in block patients, p = 0.3.
The mean (SD) pain at 12h postop was more in control patients than block patients: at rest, 3.5 (2.6) vs 2.1 (1.9), p = 0.021; and on sitting, 5.6 (2.5) vs 2.5 (3.8), p< 0.001.
There were no differences between control and block patients in mean (SD) pain at 24h postop. The cumulative oxycodone dose to 24h postop was 26.8 (18.4)mg vs 19.4 (25.8)mg, respectively, p = 0.21.
Conclusion: We found that the addition of intraoperative ESP block to multimodal analgesia improved recovery and reduced pain up to 24h after thoracolumbar decompressive spinal surgery.
References:
1. Gerbershagen HJ et al. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures.*Anesthesiology*2013;**118**(4): 934-44
2. Myles PS et al. Systematic review and consensus definitions for the Standardised Endpoints in Perioperative Medicine (StEP) initiative.*BJA*2018;**120**(4): 705-11

03AP02-05
Anesthetic dye distribution monitoring during ultrasound-guided peripheral regional anesthesia with three different modalities: preliminary comparative results

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Background and goal: Effectiveness of peripheral nerve block is conditioned by distribution of anesthetic solution in contact with nerves. If ultrasound (US) and nerve stimulation have helped to optimize nerve localization, local anesthetic tissue distribution monitoring remains somewhat neglected. We tried to address this issue by comparing three US modalities: the 2D view (morphological approach), the more dynamic Doppler Energy (DE) and Stress Elastograsphy (SE) for studying the anesthetic dye (AD) distribution (D).
Materials and methods: 37 ASA 1-3 adult patients (15M/22F / lower limb orthopedy) were studied. In each patient, morphological measurements were taken before and just after AD injection (Fig.1 Methodo 1 & Methodo 2 on left). On final post-injection sonograms, an original matrix, centered on the needle tip, was used to study morphology of AD D ("injectogram" on Fig.1 Methodo 2 on right).

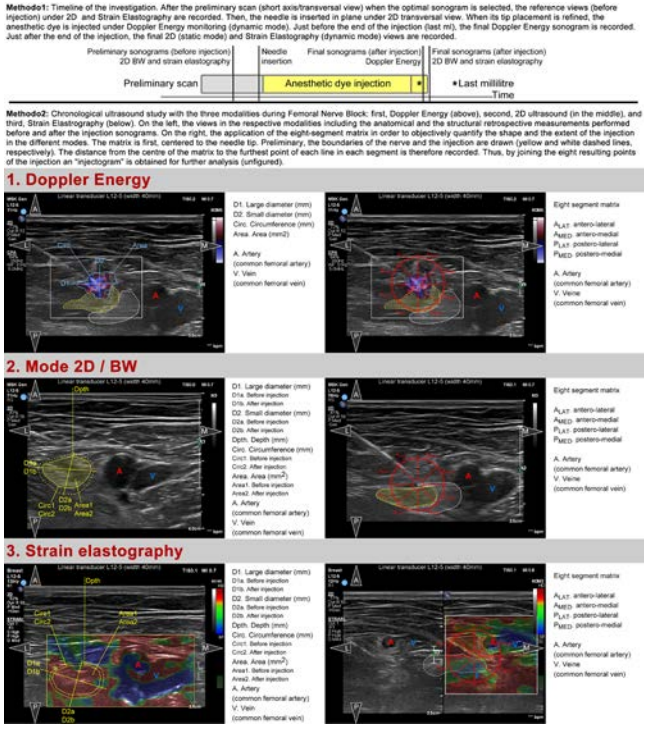
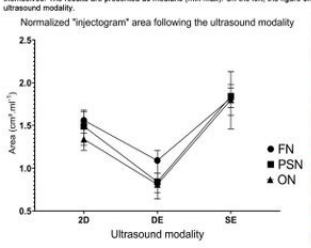


Figure 1

Results and discussion: 19 femoral (FN), 13 popliteal sciatic (PSN) and 5 obturator (ON) blocks were performed. None failed regarding surgery. We compared the "injectogram" in different modalities (Fig.2). In order to make these results comparable between the different types of blocks, they are presented as cm^2 per ml of AD as normalized values (Fig.2). All three US modalities were able to monitor the injection. The absence of difference between the normalized areas values of FN, PSN & ON in each US modality validates this method in terms of results comparability (Fig.2). In this context, the DE normalized areas are significantly lower than those of 2D and SE remaining quite close.

The eight-segment matrix (Fig.1 Methodo2) allowed to establish in the three ultrasound modalities an "injectogram" whose surface can be measured (cm²). In order to be able to compare this surface regardless of the block performed, this surface is indexed to the number of milliliters of anesthetic solution injected in each technique (Tab. on right). Thus, it is possible to compare this normalized surface in cm².ml⁻¹ (Tab. on right, numbers in red) between the different categories of blocks and between the ultrasound modalities themselves. The results are presented as medians (min-max). On the left, the figure shows the comparison of the normalized areas of the "injectograms" according to the ultrasound modality.



Total n=37	2D Median (min-max)	DE Median (min-max)	SE Median (min-max)	p value
FN « injectogram » area n=19/AD=13ml				
Raw (cm²)	20.6 (18.3-21.8)	14.2 (11.3-15.7)	23.7(22.2-25.2)	*0.001 ** 0.15 *** 0.05
Normalized (cm².ml⁻¹)	1.56 (1.41-1.68)	1.09 (0.87-1.21)	1.82 (1.71-1.94)	*0.02 ** 0.23 *** 0.05
PSN « injectogram » area n=13/AD=15ml				
Raw (cm²)	22.4 (18.1-23.1)	12.7 (10.6-14.1)	27.5 (24.3-29.7)	*0.001 ** 0.14 *** 0.05
Normalized (cm².ml⁻¹)	1.49 (1.21-1.54)	0.84 (0.71-0.94)	1.84 (1.62-1.98)	*0.02 ** 0.18 *** 0.05
ON « injectogram » area n=5/AD=8ml				
Raw (cm²)	10.7 (10.2-13.2)	6.5 (5.1-7.5)	14.4 (11.7-17.1)	*0.02 ** 0.24 *** 0.005
Normalized (cm².ml⁻¹)	1.37 (1.27-1.66)	0.81 (0.64-0.94)	1.80 (1.46-2.13)	*0.04 ** 0.34 *** 0.007
Statistical comparison * 2D vs DE / ** 2D vs SE / *** DE vs SE / * significant				

Figure 2

Conclusion(s): If 2D remains a reference to assess AD D, SE could represent an alternative (dynamic and higher spatial resolution). DE is disqualified because it underestimates the AD D. DE spot matches only for injection artifact (area more limited) and no really for AD D.

03AP02-06
Effect of erector spinae plane block on diaphragm movement in laparoscopic cholecystectomies

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Background and Goal of Study: Erector spinae plane block (ESPB) is an interfascial plane block performed with ultrasonography with a low side-effect profile, providing effective analgesia in laparoscopic cholecystectomies (LC).
In this study, we aimed to evaluate the effects of thoracic ESPB (TESPB) on diaphragm movement, postoperative pain level, and opioid consumption.
Materials and Methods: After Ethics committee approval (NCT05021822) 66 patients, 18-65 years of age, American Society of Anesthesiologists (ASA) score I-II, undergoing LC under general anesthesia were accepted to this prospective randomized controlled study and were randomized into block and control groups.
Thoracic diaphragm excursion was measured in all patients by taking the average of 3 consecutive measurements before premedication and 30 minutes after extubation. Bilateral TESPB was applied to the block group with 20 mL of 0.375% bupivacaine at T8 level after premedication. Patient-controlled analgesia with Tramadol was administered to all patients in the postoperative period.
Opioid consumption and pain levels were recorded at postoperative 1st, 6th, and 12th hours using a visual analogue scale (VAS) and numerical rating scale (NRS). Tenoxicam was administered if VAS/NRS scores were above 4.
Results and Discussion: Demographic data were similar between groups ($p>0.05$). In the block group, the decrease in postoperative diaphragm excursion was significant ($p=0.016$) and the postoperative pain levels (NRS, VAS)($p=0.015$, $p=0.023$), tramadol consumption in the 1st hour ($p=0.015$), tenoxicam consumption in the 1st and 6th hours ($p=0.012$, $p=0.010$), total tenoxicam consumption ($p=0.014$) and mean blood pressure (MAP) values at the 1st minute after intubation, when the minimum alveolar concentration value reached 1 (Tmac) and 10 minutes after Tmac ($p=0.004$, $p=0.023$, $p=0.009$) were significantly lower. TESPB can spread 10 levels craniocaudally in the paravertebral area as local anesthetics distribute into the intercostal muscles and act on the dorsal and ventral thoracic spinal nerve branches and sympathetic nerve fibers thus can decrease MAP. In this study, bilateral TESPB applied to the lower thoracic region hindered diaphragm movement, even though it reduced postoperative pain in the early period in LCs.
Conclusion(s): TESPB provides effective analgesia, reduces the need for additional analgesic drugs but needs close postoperative monitorization due to its negative effects on the diaphragm.

03AP02-08
Combination of a single block and an extended release formulation of bupivacaine and meloxicam

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Background: Recently, an extended release formulation of bupivacaine and meloxicam (ERFBM) has been approved by FDA (Zynrelef®). ERFBM has been shown to provide postoperative analgesia for 72 hrs. However, the current enhance recovery after surgery(ERAS) protocols for these surgeries often include the use of single nerve blocks as a part of a multimodal approach.
This case series is reporting on the safety and efficacy of such a combination in 4 patients undergoing an unilateral open inguinal hernia.
Case Report: This case report is focusing on 15 patients who underwent open inguinal hernia repair, and received a single quadratus lumborum block (QL) as a part of our standard ERAS protocol and ERFBM . QLB was performed 2 hours prior to surgery with 20 ml of 0.375% of bupivacaine. ERFBM was applied prior to wound closure (300mg of bupivacaine). Data are presented as mean ± standard deviation. Age was 73 ± 12 years, the duration of surgery was 55.2± 14.7 min, the total opioid consumption prior to discharge from the hospital was6.67± 7.80 mg OME and the pain at discharge was 1.75 ± 1.2 usinf an verbal analogue sclae (0=no pain and 10=worth possible pain).
Discussion: To our knowledge, this case report represents the first report on the safety of the combination of a single nerve block and the concomitant use of ERFBN.
Conclusion Our data suggest that the combination of a single nerve block performed for postoperative analgesia can be safely combined with ERFBM to provide effective postoperative analgesia in patients undergoing an open unilateral hernia repair. However, additionnal studies are required including pharmacokinetics to confirm these findings
References:
1.Viscusi E, Gimbel JS, Pollack RA, Hu J, Lee GC.Reg Anesth Pain Med. 2019 May 21:rapm-2019- 100531.
2. Luke Ch, Saleh J, Hardman D, Ottoboni T. HTX-011: Predictible release of bupivacaine and meloxicam for 72 hr. ASA, 2020; A4283
3. Jorfeldt L, Lofstrom B, Pernow B, et al: The effect of local anaesthetics on the central circulation and respiration in man and dog. Acta Anaesthesiol Scand 12:153-169, 1968
Learning point: Single nerve blocks for posteoprative analgesia in combination with ERFBM is safe:

03AP02-09
Continuous spinal anaesthesia in the urgent orthopedic elderly patient

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Background: Continuous spinal anaesthesia (CSA) can provide tight haemodynamic control during surgery. We present a successful case of an elderly patient proposed for urgent surgical treatment of a transtrochanteric fracture managed with CSA.
Case Report: A 89 years old, moderately frail, female patient with history of myocardial infarction, arterial hypertension, dyslipidemia, dementia and acute kidney injury was proposed for urgent surgical treatment of a transtrochanteric fracture with less than 24 hours. Preoperatively, the patient had a hemoglobin of 9.4 g/dl, an increase in creatinine by 0.3 mg/dl within 24 hours and a left pleural effusion in thoracic radiography.
On patient arrival at operation theater she was severely hypotensive (mean arterial pressure (MAP) of 50). After a 500 ml of normal saline bolus, ephedrine 20 mg, and arterial catheterization the patient remained hypotensive (MAP of 60) and we proceeded to a CSA. A 18G tuohy needle was used at the L4-L5 interspace and 4cm of catheter was left in the intrathecal space. A total of 4mg of hyperbaric bupivacaine and 2micrograms of sufentanil was used. Besides, we also performed ultrasound guided femoral and lateral cutaneous nerve block (75mg of ropivacaine).
No adverse haemodynamic events occured and the procedure was uneventful, other than the loss of 1L of blood that was managed with normal saline and transfusion of red blood cell concentrate.
Discussion: CSA is an effective technique for providing anaesthesia. It has advantages over single-dose spinal and epidural anaesthesia namely the administration of local anesthetics in small incremental doses titrated to the patient's needs and the cardiovascular stability that it provides.(1)
In this case, its use allowed the surgical treatment of the femur fracture in the first 24 hours, which is associated to fewer perioperative complications and mortality. (2)
References:
1. 10.4103/ija.IJA_387_18
2. doi: 10.5371/hp.2020.32.1.11
Learning points: CSA is an underused anaesthetic technique despite the well known clinical benefits of its use. An aging population and its increasing effects on severe cardiovascular disease challenges anesthesiologists to provide effective and safe intra-operative care.

03AP02-10
Type 1 myotonic dystrophy, a triple challenge: in the emergency department, ICU and operative room

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Background: Type 1 myotonic dystrophy (MD1) is a rare autosomal dominant disease. MD1 is a multisystem disorder that affects skeletal and smooth muscle as well as the eye, heart, endocrine, and central nervous system.
Case Report: 41 years-old patient, ASA PS III, with MD1 was admitted at the emergency department with dyspnea and the CT angiography revealed central pulmonary thromboembolism. The condition evolved to cardiac respiratory arrest and advanced life support was performed with fibrinolysis.
The patient developed obstructive shock and it was decided to perform a mechanical thrombectomy. At the hemodynamics room, cardiac respiratory arrest was observed and ECMO-VA was performed, in addition to thrombectomy. The patient evolved favorably. After removing the arterial cannulas, an extensive hematoma was detected, due to raffia of the superficial femoral artery, requiring treatment with angioplasty and massive transfusional support.
Due to inguinal wound necrosis, the patient was proposed for surgical cleaning. It was decided to perform a subarachnoid block with 10mg bupivacaine and 2.5mcg sufentanil. The surgery proceeded without complications, the patient was transferred to the ICU, and remained hemodynamically stable. Postoperative analgesia was accomplished with 1g acetaminophen.
Discussion: In this case we have a patient with classic MD1 that is characterized by muscle weakness and wasting, myotonia, cataract, and often cardiac conduction abnormalities.
The action of NMBAs, halogens, sedatives, and opioids is unpredictable and must be carefully and correctly monitored. Hence, we should prioritize neuraxial anesthesia to minimize complications like respiratory depression, dysrhythmias, aspiration, and prolonged intubation. In the postoperative period, the heightened sensitivity and prolonged interaction of sedatives and analgesics must be supervised.
References:
1. Bird TD. Myotonic Dystrophy Type 1. [Updated 2021 Mar 25]. In: Adam MP, Ardinger HH, Pagon RA, et al. Seattle (WA).
2. Gorelik, L., & Flores, A. (2018). Anesthetic Management for Multiple Family Members with Myotonic Dystrophy for Interventional Cardiac Procedures-A Case Series.
Learning Points: Anesthetic management of patients with MD1 can be challenging and regional anesthesia is preferred whenever possible.
Preoperative assessments of cardiac and pulmonary function, and close monitoring for postoperative apnea may reduce the risk of complications.

03AP02-12
Superior cluneal nerve block as an effective weapon in the postoperative pain management of the major hip surgery

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Background: Surgical interventions to acetabular fractures present a great anesthetic challenge, especially in the postoperative setting. We pretend to report a unique technique of regional anesthesia directed to the superior cluneal nerve with the purpose of postoperative pain management in a patient with blunt acetabular trauma(1).
Case report: A 48-year-old male patient presented thoracic and pelvic trauma with early and effective stabilization, ended up being proposed to deferred surgical treatment of fracture-dislocation of the right acetabulum, as seen in the attached image. With no contrain-

dications to surgery nor anesthetic procedures, general anesthesia and right lateral position for posterior and iliac crest surgical access were performed. Intravenous 150 mg of propofol and 100 mcg of fentanyl boluses were primarily administered, followed by desflurane use to maintain anesthesia depth and 1000 mg of paracetamol and 40 mg parecoxib were also used. Immediately after surgery completion an ultrasound-guided nerve block technique of the superior cluneal nerve was executed, as well as lateral femoral cutaneous nerve block and chosen ropivacaine 0.375% as local anesthetic, 10 mL and 15mL respectively.

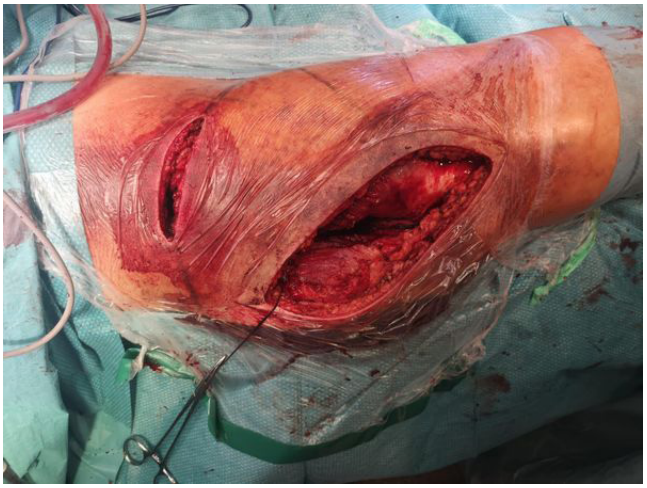
The patient remained in the post anesthesia care unit for 5 hours, reporting merely one episode of moderate dorsal pain handled with an intravenous bolus of pethidine and after discharge to orthopedic ward one episode of moderate pain about 10 hours after surgery.

Discussion: The selective superior cluneal nerve block is a novel procedure with very few published clinical evidence. It allows an increase to anesthetic coverage of hip surgery incisions, given skin and subcutaneous innervation of the superior gluteal region, without resulting in motor function impairment.

References:

1. Nielsen TD, Moriggl B, Barckman J, et al. Randomized trial of ultrasound-guided superior cluneal nerve block. Reg Anesth Pain Med 2019

Learning points: Given the scarce literature on this singular technique, this case aims to corroborate the promising results of the superior cluneal nerve block in the postoperative analgesia and to show its potential benefits in the clinical field.



03AP03-01
Musculus erector spinae plane block for postoperative analgesia after open upper abdominal surgery: case series

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Background: Indications for open abdominal surgeries still exist, particularly for patients with comorbidities. Pain control is of superior importance is such cases. Erector spinae plane block (ESPB) has many indications, but available data are controversial in terms of effective blockage of posterior and anterior roots of spinal nerves. We share our first experience in using ESPB for postoperative analgesia after open upper abdominal surgeries.

Case report: Totally, 11 (8 males, 3 females) patients with mean age 71±7.7 years underwent open upper abdominal surgery in RAKUS Gailezers, Riga, Latvia. Laparotomic cholecystectomies were performed in 10 patients, one had open biliodigestive anastomosis surgery. Five of patients were evaluated as ASA class II, 5-ASA III, 1-ASA IV. After the operation patients were positioned in lateral left side decubitus position and right side ESPB was performed at Th8 level with ultrasound guidance. Each patient received Bupivacaine 1.5mg/kg in 40 ml saline for ESPB and Dexametason 0.1mg/kg intravenously (IV). Standard analgesia with Paracetamol 1gx4 or Analgin 1gx4 and Dexketoprofenum 50 mg IV was provided. Pain was evaluated 1, 8, 24 hours (h) after surgery. Average pain after 1h was 3±2, after 8h was 4±1, after 24 h was 4±1. Only 2 patients 1h after surgery were free of pain (NRS 0-2) and had no pain for the next 9h. Average duration of the block was 12±4.5 h. Surprisingly, Pinprick test with ice showed, that most of patients had loss of sensation in right lateral subcostal region but still experienced cold in the subcostal region medially. Moreover, 7 patients experienced pain (NRS 5-6) on drainage area located in right lower quadrant. There were no complications of ESPB.

Discussion: Effective pain control may have a significant positive impact on outcomes. Particulary, for those with comorbidities, peripheral blocks help to reduce complications related to liver, kidney function. Some authors suggest to perform the block at Th 11 level, since the anterior ramus of the twelfth thoracis nerve lies in abdomen as the subcostal nerve. Our preliminarily results show that ESPB is safe, it helps to reduce pain after surgery, however in most of cases not all subcostal area and drainage area was covered enough. ESPB might be effective part of multimodal analgesia in patients after open upper abdominal surgeries, but further practise is essential, and level of the block should be discussed.

03AP03-02
The combnation of an interscalen block and Auriculotherapy for the perioperative pain managment following rotator cuff surgery

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Background: In the context of the current opioid crisis, there is a growing interest to evaluate non-pharmacological solutions to manage post-operative pain. In this respect, evidence supports the concept that Auriculotherapy may provide significant analgesia.

Objectives: Investigating the efficacy of Auriculotherapy to reduce post-operative opioid consumption following a rotator cuff surgery.

Settings: Academic medical center, USA

Methods: This was a prospective, randomized, placebo-controlled trial at the University of Pittsburgh Medical Center (UPMC) Shadyside and Montefiore Hospitals. The protocol was reviewed and approved by the Institutional Review Board for the University of Pittsburgh Human Resources Protection Office (STUDY18050099) and was registered to Clinicaltrials.gov (NCT0386025) before any eligible patients were approached and consented. A total of 39 subjects undergoing rotator cuff surgery and randomized to either an active Auriculotherapy treatment (n=20) or placebo Auriculotherapy treatment (n=20) were included in the analysis. In each subject, the

Auriculotherapy treatment was performed in the recovery room. The primary endpoint was overall opioid consumption (oral morphine equivalent = OME). Secondary endpoints included overall non-narcotic analgesic consumption on postoperative day 5. Functional recovery using the 12-Item Short Form Health Survey (SF-12) was evaluated pre-operatively as well as 14 days, 1 month, 2 months, and 3 months following surgery. Time to discharge from the recovery room, time to discharge from the hospital, and overall patient satisfaction was surveyed at 90 days, as was the number of patients readmitted because of pain related issues.

Results: The use of Auriculotherapy was associated with a 35% decrease in total opioid requirement over the first 5 day recovery period and a 15% decrease in pain with movement. Although, pain with movement in the Auriculotherapy group remained lower compared to the placebo for at least 14 days (5.84±2.39vs 4.47 ±2.12, placebo vs Auriculotherapy; p=0.0394), at 30, 60 and 90 days pain was similar in both group.

Conclusions: Evidence supports the concept that Auriculotherapy reduces postoperative opioid requirement and pain with movement for at least 14 days in patients undergoing rotator cuff surgery.

References:

1. Alimi D, Geisdsmann A, Gardeur D, et al. Radiology Photon 2014;125:133-41

2. Alimi D, Geisdsmann A, Gardeur D. . Med Acup 2002;13:18-21

03AP03-03
QL-block for postoperative analgesia after total abdominal hysterectomy: a prospective cohort observational study

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Background and goal of study: Regional anesthesia reduces postoperative opioid requirements. Its different approaches might be effectively used in multimodal pain therapy after total abdominal hysterectomy.

The aim of our study was to find out whether quadratus lumborum block bilaterally before the start of surgery has a preventative analgesic effect. The study hypothesis was that QL block bilaterally before the start of surgery have no impact on postoperative pain reduction.

Materials and methods: We performed prospective observational cohort study and examined 28 patients at the age 40-55 years old who need total abdominal hysterectomy. All patients were divided into two groups and underwent general anesthesia with QL block bilaterally via anterior (transmuscular) access with ultrasound navigation. In the 1st group QL block was performed immediately after the end surgery; in the 2nd group – before the start of surgery. 22 patients were included in the study results analysis. After surgery both groups received multimodal analgesia with dexcetoprofen, paracetamol, nefopam; in a case of severe pain, in addition, nalbuphine.

The outcomes were: pain level according visual analogue scale (VAS), daily requirement of nalbuphine. The stages of the study were 30 minutes (m_{30}), 6 hours (h_6), 12 hours (h_{12}), 24 hours (h_{24}), 48 hours (h_{48}) after the end of surgery.

Statistical Package for the Social Sciences was used and the results were presented using median [IQR], adjusted hazard ratio (HR), duration ratio.

Results and discussion: It was found that the level of pain according to VAS in 1st group reached its maximum values on the stages m_{30} and h_6 and was 5.3 [3,6; 6.0] points and 5.0 [3.9; 6.4] points, while in 2nd group - 2.8 [2,3; 3.8] points and 2.0 [1.6; 4.0] points, respectively ($p < 0.05$). The daily requirement of nalbuphine on h_{12} stage had the tendency ($p = 0.07$) to be lower in 2nd group (21.5 ± 1.1 mg / day), compared with the 1st group (23.4 ± 2.5 mg / day). The need for nalbuphine use on h_{12} stage was slightly lower ($p < 0.05$) in 2nd group (5.6 ± 0.8 mg / day), compared with 1st group (7.5 ± 1.1 mg / day).

Conclusion(s): QL block bilaterally before the start of surgery might reduce postoperative pain after total abdominal hysterectomy, compared to QL block performed after surgery, while moderate to severe acute pain after total abdominal hysterectomy impact clinical outcomes.

03AP03-04
Post partial hepatectomy analgesia with quadratus lumborum block type 5: a case report

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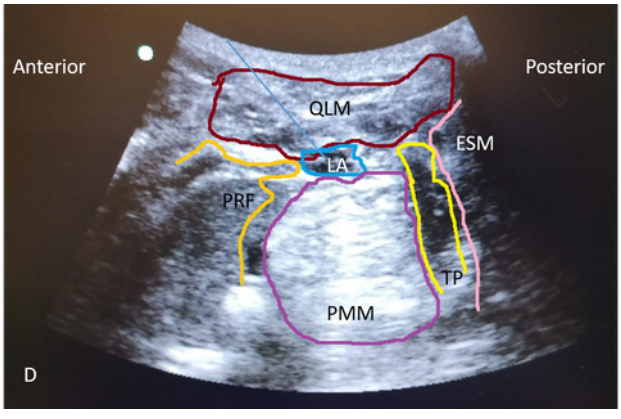
Background: Transmuscular QLB (T-QLB) is frequently chosen for analgesia after hepatectomy but unlike the quadratus lumborum block (QLB) 5 the patient must be positioned in lateral position.[1]

Case Report: A 78-yo woman underwent open partial hepatectomy due to carcinoma, under a balanced general anaesthesia. Neuraxial analgesia was not performed due to technique execution failure. The hepatectomy was uneventful. After extubation, in a supine position, an ultrasound guided QLB 5 was performed with a shot dose of 20 mL, on the right side, of ropivacaine 0,5%.

Then, it was placed a catheter and a perfusion of ropivacaine 0,2% at 5 mL per hour was started and maintained for the next 3 days. During these days, the patient remained comfortable, with bolus of 20 mL of ropivacaine 0,2% every 6 hours, via catheter, and with paracetamol 1g every 8 hours, intravenously, without other analgesic medication.



Discussion: Recently *Almeida et al*,[2] described the QLB5, using the same sonoanatomy of the T-QLB, but maintaining the supine position. The anesthetic is injected from anterior/lateral to posterior/medial direction between the psoas major muscle (PMM) and the quadratus lumborum muscle (QLM).[3] The insertion point at QLB5 is anterior to the probe.

This approach (QLB5) provides similar dispersion as the T-QLB and allows the patient to maintain the supine position. The continuous QLB5 allows prolonged abdominal (somatic and visceral) analgesia for post-hepatectomy avoiding to mobilize the patient and the use of less effective techniques for visceral pain as QLB 1 or 2.

References:

1. Pang M, Sun G, Yao W et al. Ultrasound-guided transmuscular quadratus lumborum block reduced postoperative opioids consumptions in patients after laparoscopic hepatectomy: a three-arm randomized controlled trial. BMC Anesthesiol. 2021 Feb 11;21(1):45.
2. Almeida CR, Cunha F, Pinto M et al. A lumbar anterior lateral transverse-process (LALaT) block for a patient with multiple traumatic injuries. J Clin Anesth. 2021; 71:110252.
3. Image (Abbreviations: ESM, erector spinae muscle; LA, local anaesthetic; PRF, Posterior renal fascia; TP, transverse process of lumbar vertebra.)

03AP03-05
Interpectoral-pectoserratus plane (PECS II) block in patients undergoing trans-axillary thoracic outlet decompression surgery; a prospective double-blind, randomized, placebo-controlled trial

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Background and Goal of Study: Postoperative pain after thoracic outlet decompression surgery might be improved by adding a regional anesthesia technique to the analgesia regimen.
The aim of this study was to investigate if an interpectoral-pectoserratus plane (PECS II) block decreases postoperative pain, postoperative nausea and vomiting and improves quality of recovery.
Materials and Methods: This is a prospective single center double blinded randomized placebo-controlled trial. Patients with neurogenic thoracic outlet syndrome planned for trans-axillary thoracic outlet decompression surgery were randomized to an interventional arm, receiving the block with ropivacaine 0.5%, and a placebo group, receiving a sham block with NaCl 0.9%. The hospitals' pharmacist prepared the study medication.

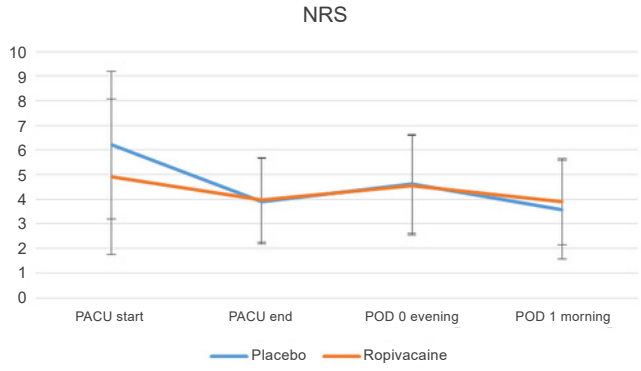

Figure.

The study was blinded for patients, researchers and medical personnel. Primary outcome parameters were postoperative pain, measured by numeric rating scale on the post anesthesia care unit (PACU) (start and end) and on the ward on postoperative day (POD) 0 and 1, and postoperative morphine consumption, measured on the PACU and on the ward during the first 24 hours.
Results and Discussion: Seventypatients received an interpectoral-pectoserratus plane block with ropivacaine (n=35) or placebo (n=35). There was no difference in NRS on the PACU at the start (ropivacaine 6.2 ± 3.0 vs placebo 4.9 ± 3.2, p=.08), or the end (ropivacaine 3.9 ± 1.7 vs placebo 4.1 ± 1.6, p=.77), and on the ward on POD 0 (ropivacaine 4.6 ± 2.0 vs placebo 4.6 ± 2.0, p=.10) and POD 1 (ropivacaine 3.6 ± 2.0 vs placebo 3.9 ± 1.8, p=.53). There was no difference in postoperative morphine consumption at the PACU (ropivacaine 8.9 mg ± 6.0 vs placebo 9.7 mg ± 7.1, p=.62) and on the ward (ropivacaine 9.6 mg ± 9.4 vs placebo 11.6 mg ± 8.5, p=.39).
Conclusion(s): The interpectoral-pectoserratus plane block is not effective for postoperative analgesia in patients with neurogenic thoracic outlet syndrome undergoing trans-axillary thoracic outlet decompression surgery.

03AP03-06
Continuous unilateral parasternal block for sternal fracture analgesia

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Background: Fractures of the sternum usually result from high impact velocity accidents and are concomitantly associated with fractures of the ribs and/or thoracic and lumbar vertebrae, and eventually pulmonary lesion[1].
These types of fractures may be associated with respiratory complications, therefore, effective analgesia is essential in the treatment. We describe the use of a continuous unilateral parasternal block for analgesia of sternum fracture.
Case Report: A 71-year-old patient with a fractured sternum had severe pain in the sternum (numeric pain rating scale (NPRS) 8-9) with difficulty coughing. After observation we decided to perform a continuous bilateral parasternal block for analgesia. Using a linear probe we located the sternum and by moving to more lateral position the intercostal muscle and the pectoralis major muscle were located. A 22G needle was inserted in-plane with the probe in a caudal-to-cranial direction until the tip was in the fascia between the pectoralis major and the intercostal muscles. A test dose of 3ml of 0.2% ropivacaine confirmed the location of the needle and an additional 20ml of 0.2% ropivacaine was administered and the catheter placed and an infusion of 0.2% ropivacaine at 5.2ml/h was started. After 15 minutes of the blockade, an improvement in pain with NPRS 2 was observed, with the patient being able to cough without difficulty, for this reason we decided to perform only the unilateral blockade. The patient continued the infusion for 8 days without complications, being discharged from the hospital 3 days after the infusion was stopped.
Discussion: The parasternal block is a relatively simple block with few complications. As the target is the location where the anterior cutaneous nerves emerge (nerves that are not blocked in the serratus block), this block is target-specific procedure, useful for an effective relief of pain related to the fracture of the sternum. For the

authors' knowledge, this is the first case described of a continuous unilateral paresternal block used with success in the analgesic treatment of sternum fractures.

References:

1. Thomas KP, Sainudeen S, Jose S, Nadhari MY, Macaire PB. Ultrasound-Guided Parasternal Block Allows Optimal Pain Relief and Ventilation Improvement After a Sternal Fracture. Pain Ther. 2016;5(1):115-122.

Learning points: The use of parasternal block in sternal fractures and the importance of observing the result of the block and adjusting decisions accordingly.

03AP03-07
Preoperative high anxiety VAS score as predictive factor of postoperative urinary retention after inguinal hernia repair under spinal anaesthesia

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Background and Goal of Study: Open inguinal hernia (IH) repair under spinal anaesthesia is one of the most common worldwide procedures performed by general surgeons. However, one of the drawbacks of this type of anesthesia is the possibility of postoperative urinary retention (POUR). POUR results to prolonged hospitalization and reduced patient satisfaction. Despite that, spinal anaesthesia, still, remains an attractive option for IH repair, since regional anaesthesia is associated with favorable results in terms of hypotension, postoperative nausea, vomiting and postoperative pain.

The aim of this study is to investigate perioperative predisposing factors for POUR after IH repair under spinal anaesthesia.

Materials and Methods: 100 consecutive male adults patients ≥ 50 years of age with unilateral inguinal hernia repair and ASA Score≤2, were prospectively included. All the procedures were done under spinal anaesthesia. The examined parameters were age, BMI, IPSS questionnaire scores, size and type of the hernia, operation duration, perioperative administration of intravenous (IV) opioids and/or atropine, administration of spinal opioids, perioperative iv fluids, postoperative pain and preoperative anxiety. Pain and anxiety assessment was based on the Visual Analog Scale (VAS) score.

Results and Discussion: The incidence of POUR was 37%. Bladder catheterization was applied in all POUR cases. Catheter removal was successful in less than 24 h in 34 patients, while in one patient the catheter was removed in the second postoperative day.

Two patients required prolonged catheterization. Preoperative patient's high anxiety VAS score (A-VAS) (>51mm) (p=0.007) and the intraoperative use of atropine (p=0.02) were detected as risk factors for POUR. Regression analysis confirmed theresults.

Most common causes of anxiety among patient with high A-VAS score were anxious personality (9/23), operation (7/23) and anaesthesia (4/23).The importance of the A-VAS score is that it can be easily measured and recognise those patients at higher risk for POUR preoperatively. These patients might need a different approach like a thorough explanation of their surgery or an alternative type of anaesthesia.

Conclusion(s): Among the measured factors only preoperative anxiety and the intraoperative use of atropine were identified as statistical significant factors of POUR. In patients with pre-operative high anxiety VAS score a different type of anaesthesia may be used.

03AP03-08
Epidural versus intrathecal analgesia in laparoscopic colorectal surgery: a retrospective study

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Background and Goal of Study: Both Intrathecal analgesia with morphine (ITM) and thoracic epidural analgesia (TEA) have shown to provide adequate pain treatment in laparoscopic colorectal surgery in an enhanced recovery after surgery (ERAS) program. However, the optimal and thus gold standard analgesia modality is yet to be determined. Overall advantages of ITM and disadvantages of TEA might have been overestimated in earlier studies warranting the need for further data. Our institution changed analgesic practice from TEA to ITM in laparoscopic colorectal surgery. Therefore, both analgesic modalities where evaluated and compared.

Materials and Methods: This retrospective single-center study included patients receiving TEA between the 1st of January 2018 and 1st of September 2019 and ITM between 1st of September 2020 until the 1st of April 2021 for laparoscopic colorectal surgery.

The primary outcome was to compare both techniques using a prospective International Pain Outcomes questionnaire which was kept for internal quality measurement. Secondary outcomes included postoperative morphine consumption, length of hospital stay and fit for discharge.

Results and Discussion: Thirty-nine patients were included in the epidural cohort and fifty-six patients were included in the intrathecal morphine cohort. Due to an uneven patient distribution, patients were categorized per type of surgery (i.e. colon versus rectal). In laparoscopic colon surgery there were no differences in pain experienced, side effects, or satisfaction with either ITM or TEA.

In addition, no differences were found in the time to Fit-for-Discharge day or length of stay. Lower pain scores, less interference of pain with activities and less severe pain was reported in the TEA cohort in laparoscopic rectal surgery. Still, patients were satisfied with analgesia in the ITM cohort.

Although not significant, in the ITM cohort more patients were out of bed on the first postoperative day (15 (65%) vs 8 (89%), p=0.383). There were no differences detected for the time to Fit-for-Discharge and length of hospital stay.

Conclusion: ITM and TEA provided similar analgesia in laparoscopic colon surgery. Yet in laparoscopic rectal surgery, epidural analgesia provided improved pain control, without affecting the length of stay. These findings suggest that a randomized controlled trial comparing epidural analgesia and intrathecal analgesia for rectal surgery is warranted.

03AP03-09
Patients' perspective of analgesia during the first two days after laparoscopic colorectal surgery using intrathecal morphine: a prospective study

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Background and Goal of Study: Intrathecal morphine in addition to general anesthesia in laparoscopic colorectal surgery is an effective analgesic modality. Since the duration of analgesia is approximately 24 hours, it has the disadvantage of possible rebound pain on the second postoperative day (POD).
Therefore, this prospective study investigated patients' perspective on postoperative pain management through International Pain Outcomes (IPO) Questionnaires on both the first and second POD.
Materials and Methods: The study was conducted between November 2020 and March 2021. The primary outcome was a difference in postoperative pain on the first and second POD. Secondary outcomes included opioid consumption, interference of pain with activities, side effects, patients' perspective on pain treatment and satisfaction with pain treatment.
Results: Forty patients were included in this study and filled out both questionnaires. There was no increase in the intensity of postoperative pain on the second POD (NRS 5 (2-7 [0-10]) vs. 5 (3-7 [1-10]), p=0.414) but the percentage of time in severe pain increased (20% (10-40 [0-90]) vs 30% (20-50 [0-80]), p=0.010).
There was no difference in opioid consumption (6 mg (0-12) [0-42] vs 6 mg (0-12) [0-29], p=0.914). Pruritis (NRS 2 (0-6 [0-10]) vs NRS 0 (0-3 [0-8]), p=0.001) and dizziness (NRS 2 (0-7 [0-10]) vs NRS 0 (0-2 [0-9]), 0.002) decreased on the second POD. Patients were highly satisfied during the first two days after surgery (NRS 8 (7-9) [0-10] vs NRS 8 (7-9) [0-10], p=0.395).
Discussion: We conclude that intrathecal morphine is a suitable analgesia modality in laparoscopic colorectal surgery within an Enhanced Recovery After Surgery (ERAS) program without signs of rebound pain. However, pain scores may be further reduced by adding non-opioid analgesics to intrathecal morphine.

03AP03-10
Regional anesthetic management of a patient with coagulopathy for an urgent transfemoral amputation

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Background: Diabetes is one major risk factor for peripheral artery disease. Limb ischemia can lead to necrosis and infection requiring amputation. Serious infections can be associated with coagulation disorders. Since patients with altered coagulation have an increased risk of epidural hematoma when neuraxial anesthesia is performed, peripheral nerve blocks (PNB) can be an adequate alternative.
Case Report: A 49-year-old woman, ASA 4 with a long-term diabetes *mellitus* type 1, end stage renal disease under dialysis and suspected early sepsis[1], 71 kg, is presented for an urgent transfemoral amputation, right above the left knee for a soft and bone tissue infection. There was necrosis in the first 3 fingers of the left foot She was confused, feverish and blood analysis showed an altered coagulation with a International Normalized Ratio (INR) of 1,95.
A combined Spinal-Epidural anesthesia was discarded because of her coagulation disorder. Thus, 4 ultrasound guided PNB were performed with 0.375% ropivacaine: an obturator nerve block, a lateral femoral cutaneous nerve block, a saphenous (adductor canal) block and a proximal sciatic popliteal block. The total volume was 30mL.
Discussion: The technique was performed with no complications. The patient was submitted to the amputation under light sedation with propofol bolus, maintaining spontaneous ventilation, stable hemodynamics and had no signs of pain during the whole procedure. She referred no pain postoperatively. No opioids were used in the first 24 hours and during her hospital admission she had satisfactory analgesia with non-opioid drugs.
In this case, general anesthesia was to be avoided due to patient status and neuraxial techniques were contraindicated. There are few reports of the use of PNB as the main anesthetic technique for above the knee amputations with no or under light sedation.[2] This combination of PNB provided a safe alternative for this high-risk patient while accomplishing post-operative analgesia.
References:
1. Neviere. R "Sepsis syndromes in adults: Epidemiology, definitions, clinical presentation, diagnosis, and prognosis" in UpToDate (visited in 16 January 2022)
2. Chandran R, et al. Peripheral nerve blocks for above knee amputation in high-risk patients. J Anaesthesiol Clin Pharmacol 2018;34:458-64
Learning points: Peripheral nerve blocks can provide a safe alternative for above the knee amputation in high-risk patients.

03AP03-11
Postoperative analgesic efficacy of liposome bupivacaine versus long-acting local anaesthetics for peripheral nerve block: a systematic review and meta-analysis

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Background and Goal of Study: Liposome bupivacaine is claimed by the industry to provide analgesia for up to 72 hours postoperatively. We undertook a systematic review and meta-analysis with the primary objective of comparing the postoperative analgesic efficacy of liposome bupivacaine versus long-acting local anaesthetics when administered for peripheral nerve blocks.
Materials and Methods: We systematically searched the literature for any trials comparing liposome bupivacaine versus bupivacaine or ropivacaine for peripheral nerve blocks after all types of surgery. Our primary endpoint was rest pain score (0–10) at 24 postoperative hours, analysed according to the type of local anaesthetic (ropivacaine or bupivacaine), the nerve block technique (ultrasound versus nerve stimulation) and the presence of a conflict of interest (trial

sponsored or not by the industry). Secondary endpoints included rest pain scores at 48 and 72 postoperative hours, and morphine consumption at 24, 48 and 72 postoperative hours.

Results and Discussion: Twenty trials including 1526 patients were identified. Rest pain score at 24 postoperative hours was similar between groups with a mean difference (95%CI) of -0.4 (-0.9, 0.04), I^2=91%, p=0.07, without subgroup difference between the type of local anaesthetics (p=0.43), type of nerve block technique (p=0.20) or the presence or not of a conflict of interest (p=0.93).

However, rest pain scores at 48 and 72 postoperative hours were significantly reduced when liposome bupivacaine was injected with mean differences (95%CI) of -0.4 (-0.7, -0.1), I^2=79%, p=0.01 and -0.7 (-1.1, -0.3), I^2=87%, p<0.001, respectively.

There were no differences in morphine consumption at 24 (p=0.88), 48 (p=0.48) and 72 postoperative hours (p=0.18). The quality of evidence for our primary and secondary outcomes was low to very low.

Conclusions: There is low to very low evidence that liposome bupivacaine might reduce rest pain score at 48 and 72 but not at 24 postoperative hours, and without impact on morphine consumption. The slight mean difference between groups in rest pain scores is below the minimal clinical significance threshold.

Comparisons	MD (95% CI)	Inconsistency	Imprecision (95% CI)	Indirectness	Publication bias	GRADE
ESPB vs opioids	-0.74 [-1.02, -0.45]	Yes 95% PI [−1.96; 0.39] I^2 = 86%	No [-1.02, -0.45]		No	Moderate
ESPB vs Sham	-0.16 [-0.34, 0.02]	No 95% PI [−0.57; 0.25] I^2 = 31%	Yes [-0.34, 0.02]			Moderate
ESPB vs PVB	0.20 [-0.06, 0.45]	Yes 95% PI [−0.60; 0.99] I^2 = 81%	Yes [-0.06, 0.45]	No – similar PICO criteria used in all included studies	No funnel plot made because <10 trials per comparison.	Low
ESPB vs TAPB	-0.17 [-0.40, 0.06]	Yes I^2 = 53%	Yes [-0.40, 0.06]			Low
ESPB vs PECS	0.18 [-0.09, 0.44]	No I^2=31%	Yes [-0.09, 0.44]			Low
ESPB vs Epidural	1.20 [-2.52, 4.93]	Yes I^2 = 96%	Yes [-2.52, 4.93]			Very low

Table 1:Postoperative pain at rest after 24 hours.

This abstract is based on a draft and pre-peer review version of a Cochrane Review. Upon completion and approval, the final version is expected to be published in the*Cochrane Database of Systematic Reviews* (www.cochranelibrary.com).

References: Forero, M., Adhikary, S. D., Lopez, H., Tsui, C., & Chin, K. J. (2016). The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. *Regional Anesthesia and Pain Medicine*,*41*(5),621–627.

03AP03-12
Erector spinae plane blocks (ESPB) for postoperative pain - a systematic review and meta-analysis

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Background: We performed a systematic review and meta-analysis to compare erector spinae plane blocks (ESPB) versus opioid treatment, sham block or other regional anaesthetic techniques (paravertebral block (PVB), transversus abdominis block (TAPB), pectoralis plain block (PECSB) and epidural analgesia (EA)) in adults undergoing surgery.

Methods: We included 54 randomised controlled trials including 3391 patients. Primary outcomes were postoperative pain at rest after 24 hours and block related adverse events. We used the Cochrane risk of bias 2 tool and GRADE criteria to assess quality of evidence for all primary outcomes.

Results: The mean difference (MD) for pain at rest after 24 hours was either not different or not clinically relevant between groups (moderate to low quality of evidence) (see table 1).

ESPB (compared to opioids, sham treatment or other regional anaesthetic techniques) may not have an effect on block-related adverse event. However, ESPB (compared to opioids, sham treatment) reduced the oral opioid consumption, which was associated with a reduced risk for postoperative nausea and vomiting (PONV) and pruritus.

Conclusion: An ESPB (compared to opioids, sham treatment, other regional anaesthetic techniques) probably does not reduce postoperative pain intensity at rest 24 hours after surgery, but may not have an effect on block-related adverse events. In contrast, our results showed a robust reduction in morphine consumption and opioid related adverse events (e.g. PONV and pruritus). However, further research is needed to better define the role of ESPB for postoperative pain treatment.

03AP04-01
Post-operative complications in patients receiveing continuous spinal anaesthesia for proximal femur fracture repair in a tertiary referral centre

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Background and Goal of Study: Spinal anaesthesia is the most common type of anaesthesia used for hip fracture surgery in Ireland(1). Continuous spinal anaesthesia (CSA) is used to prevent haemodynamic changes in frail patients or those with valvular heart disease. We hypothesized that the use of a CSA technique in patients undergoing hip fracture repair identified those patients as having higher risk of post-operative complications due to their physiological frailty. We retrospectively examined these patients clinical outcomes throughout their hospital stay.

Materials and Methods: We retrospectively reviewed the medical records of 60 patients who underwent CSA for surgical repair of a proximal femur fracture in Cork University Hospital between July 2019 and February 2020. Records were manually reviewed for documentation of serious post-operative complications.

Results and Discussion: We noted that 31.7% of patients experienced no significant post-operative complication. The most common post-operative complication observed was lower respiratory tract infection, being diagnosed in 16.6% of patients, significantly

higher than in other studies(2). In-hospital mortality was recorded in 13.3% of our patient cohort, considerably higher than previous studies(3). Delayed mobilisation was observed in the majority of patients, with only one patient having mobilised within 48 hours.
Our study of 60 patients who underwent CSA for hip fracture repair demonstrated a significant incidence of post-operative complications. Death and lower respiratory tract infection occurred at a much higher rate than in previous studies with larger cohorts examining outcomes following hip fracture repair. We suggest that patients who are identified as unsuitable for single shot spinal anaesthesia for hip surgery suffer a higher rate of post-operative complications up to, and including, death.
Conclusion(s): Further research on this patient cohort may allow anaesthetists to adequately prepare patients and families for poorer outcomes and identify patients who may require a higher level of care in the post-operative period.
References:
1. Irish Hip Fracture Database National Report 2020.
2. Complications following hip fracture: Results from the World Hip Trauma Evaluation cohort study; Lin Goh E, Lerner R, Achten J et al. Injury, 51 (2020), 1331-1336.
3. Causes of in-hospital mortality after hip fractures in the elderly: Groff H, Kheir M, George J et al. Hip Int 2020 Mar;30(2):204-209

03AP04-02
Outcome of epidural analgesia on cytoreductive surgery with hyperthermic intraperitoneal chemotherapy: the experience of a Portuguese oncologic institute

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Background and goal of the study: Citoreductive surgery with hyperthermic Intraperitoneal Chemotherapy (CRS+HIPEC) is a complex and multidisciplinary treatment. We aim to determine the impact of the anaesthesia and analgesic technics on the outcome in our population.
Materials and methods: After ethical approval (234/021) we retrospectively collected data from the records of the patients submitted to CRS+HIPEC, between January 2019 and December 2020. Data was collected from the pre, intra and post-operative period until the 30th day after the surgery. Morbimortality was stratified using the Common Terminology Criteria for Adverse Events (CTCAE) grading system and the adverse events (AE) registered until the 30th post-operative day, regardless of the discharge date. The hospital length of stay was also assessed.
After the surgery, patients submitted to Combined Anaesthesia (CA) received epidural analgesia (EA) by patient controlled epidural analgesia (PCEA) system, a solution of 0.1% ropivacaine and 0,5mcg/ml sufentanyl, with 5-15ml/h perfusion rate. Patients submitted to General Anaesthesia (GA) received an intravenous infusion of sufentanyl (2,5-20mcg/h); both combined with intravenous paracetamol 1000mg four times a day.
Results and discussion: 98 patients were submitted to CRS+HIPEC with mean age of 59,9 (11,1) years. CA with thoracic epidural was used in 74 patients (75,5%), all the others were submitted to GA. Both groups revealed statistically significant differences on the pre-operative evaluation.
AE occurred in 39 patients, on the EA group, 24 (32,4%) patients had AE and on the sufentanyl group, 15 (62,5%) reported AE.
The multivariate logistic regression analysis for the risk of developing AE until the 30th postoperative day showed a statistically significant relation with intravenous sufentanyl analgesia (OR 1,35), as well as the length of surgery and intraoperative fluids over six liters.Pre-operative variables (age, POSSUM, ASA, ECOG, BMI) did not influence the risk for development of AE until the 30th postoperative day.
On our population, EA provided adequate pain relief, without registering major complications associated with the epidural catheter placement.
We found a significative reduction on the incidence of AE on the postoperative period on the EA group (p=0,018)
Conclusion: EA appears to have a protective effect on the development of AE on the CRS+HIPEC post-operative period, when compared with intravenous perfusion of sufentanyl.

03AP04-03
A case of subaracnhoind injection during retrobulbar anesthesia: an eye-opener

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Background: The performance of retrobulbar anesthetic block for surgery of the posterior chamber of the eye is a common, effective and safe practice, although not without risks. We herein describe one of the most feared complications of this ophthalmic block, which demands a high degree of suspicion and agility for proper diagnosis and management.
Case report: The case reports back on a 91-year-old female patient, physical status ASA III, partially dependent for daily-life activities, presents for vitrectomy via pars plana of the left eye due to retinal detachment. Sedoanalgesia with 20mcg fentanyl and 0.625mg droperidol as well as left retrobulbar block were performed, with injection of 2.5mL of 1% ropivacaine and 2.5mL of 2% lidocaine. Approximately two minutes after the injection of the local anesthetic, a sudden clinical decline of consciousness with GCS 3 develops, accompanied by fixed mydriasis of the right eye, sinus tachycardia of 150bpm, hypertensive crisis with a maximum systolic blood pressure of 225mmHg, followed by central apnea. Orotracheal intubation and connection to a ventilatory prosthesis were performed, maintaining adequate oxygenation and ventilation. Once hemodynamically stable transfer to the emergency department was arranged. Complementary diagnostic methods were carried out, namely cranioencephalic computed tomography, without any abnormal findings. The condition progressively reversed, with gradual return to the initial state of consciousness, and it was possible to successfully extubate after 4 hours. The patient remained stable, under surveillance, and was discharged after 48 hours.
Discussion: The clinical findings are compatible with brainstem anesthesia, explained by the dispersion of the local anesthetic into the subarachnoid space, through inadvertent puncture of the ophthalmic artery or the meninges that involve the optic nerve. Although this technique is a rare complication, a low threshold of suspicion should be maintained, given the potential severity of the clinical condition. Early recognition should be followed by a systematic ABCDE approach, and the evolution, in most cases, is favorable, with complete remission of symptoms within a few hours.

Learning points: Careful surveillance and monitoring should accompany the performance of ophthalmic surgical procedures, and the presence of an anesthesiologist is essential for the quality of services provided and patient safety.

References:
1 - Almeida CR, Vieira L. Combination of a deep fascia iliaca block with ultra-low dose spinal anesthesia for hip fracture surgery. Can J Anaesth. 2021 Dec 21. doi: 10.1007/s12630-021-02178-w. Epub ahead of print. PMID: 34932178.

03AP04-05
Combination of a novel deep fascia iliaca (DeFI) block with ultra-ow dose spinal anesthesia of bilateral proximal femoral fracture

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Background: General anesthesia and standard dose spinal anesthesia may lead to hypotension, nevertheless lowering significantly the spinal dose leads to insufficient effectiveness and duration of action.
We used an ultra-low dose single shot anesthesia (SSA) combined with a bilateral low-dose fascia iliaca block (the DeFI block) to fulfill the allowed maximum local anesthetic dose, and provide long-lasting analgesia and prolonged anesthesia with minimal sympathetic block.[1]
Case report: A women, aged 64 years old, without medical history, was proposed for nailing of Bilateral Femoral Fracture. A DeFI block with 20 mL of 0.375% ropivacaine was performed in each side. After confirmation of sensory blockade produced by the DeFI block, a SSA was performed with 2,5 mg (0.5 cc) of hypobaric levobupivacaine 0.5% plus 20 micrograms (0.4 cc) of fentanyl and 0.3 cc of saline solution to achieve 1.2 cc of solution (levobupivacaine 0,21%).
The block reached Th10 at the beginning of surgery in each side, the surgery underwent under target control propofol infusion (target <1 ug/mL) to achieve light to moderate sedation. The surgery lasted 4 hours, and hemodynamic stability was mantained despite significant blood loss. No analgesic drug was administered.[1]
Discussion: At the end of the surgery, only the dermatomes corresponding to the iliac fascia block were blocked. The innervation depending primarily on the spinal block for blockade were only the sacral roots, which are less relevant for bilateral femoral nailing.
This anesthetic approach provides successful bilateral blockade for (prolonged) bilateral femoral nailing with minimal hypotension which allows better accomodation of eventual significant blood lossusing a semiredunctant technique for the anterior branches of the lumbar plexus.[1]

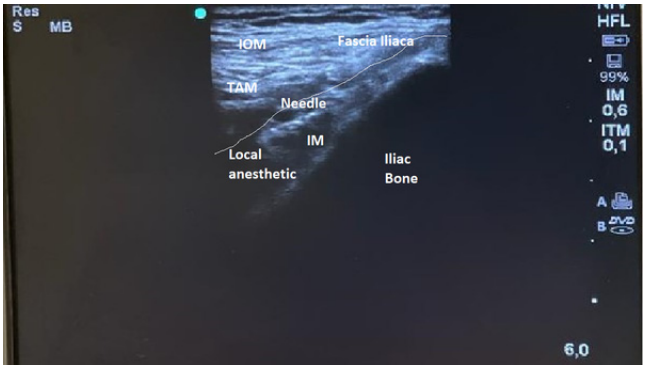

Figure. (IM - Iliac Muscle; IOM - Internal Oblique Muscle; TAM - Transverse Oblique Muscle)

03AP04-06
Audit to a Portuguese block room: a two month analysis to improve perioperative care

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Background and Goal of Study: A Block Room (BR) increases efficiency by allowing parallel processing of patients: diminishes anesthetic time (increasing patient turnover), increases the number of nerve blocks performed and allows for more time in trainees' education. We decided to perform an audit to our BR in order to describe the use of it.
Materials and Methods: During december 2021 and january 2022, a daily review of the elective procedures was done to access which patients were eligible for a regional anesthesia technique. Patients were considered eligible by the auditing team when a regional anesthetic technique was adequate or standard of care for the patient's surgery. All the procedures done at the BR were registered.
Results and Discussion: During 40 working days, the daily average of eligible patients was about 10. The BR was used for 90 patients, corresponding to 22,5% of the eligible patients: 74,4% for inpatient setting and 20,0% patients for outpatient surgery. 5 non-surgical patients were admitted in the BR for central venous catheter placement. The BR was mainly used in the morning period (58,9%). The procedures performed were varied, with peripheral nerve blocks taking the majority (56,6%). Other types of procedures performed were spinal blocks, placement of epidural catheters and arterial catheterization for invasive monitoring.
Conclusion(s): The improvement in patient satisfaction, quality of recovery and decrease of postoperative nausea and vomiting with the use of regional anesthesiais well documented.
At our hospital, there is an empirical perception that our BR provides a faster patient turnover. However, there is still room for improvement. Our allocated nurse in the BR is frequently mobilized to other workstations, which makes some anesthesiologists more reluctant to check the block room availability whenever they feel appropriate. Our BR allows time for residents' training and also allows locorregional techniques to be carried out in a focused and calm manner, avoiding the rush to deliver the patient to the surgical team and allowing greater and more humanized care for the patient.

References:
Ilfeld, B. M., & Liguori, G. A. (2017). Regional Anesthesia "Block Rooms." Regional Anesthesia and Pain Medicine, 42(5), 551–553.
Chazapis, M., Kaur, N., & Kamming, D. (2014). Improving the Perioperative care of Patients by instituting a "Block Room" for Regional Anaesthesia. BMJ Quality Improvement Reports, 3(1), u204061. w1769.

03AP04-09
Local anesthetic systemic toxicity (LAST) despite best practice: a case report

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Background: LAST primarily affects central nervous and cardiovascular systems and may be fatal. Its reported incidence is very low, still this potential complication should always be considered with any local anesthetic (LA) or route. Prevention is key in avoiding morbimortality, however, it may still occur despite best practice.
Case report: A 78-year-old patient, with end stage renal disease, hypertension, sinus node dysfunction with a pacemaker and previous epilepsy was admitted for surgical revision of an upper limb arteriovenous fistula. A supraclavicular brachial plexus block was proposed. Maximum allowable doses of LA were calculated and 15ml 0,375% ropivacaine and 10ml 2% lidocaine were prepared.
During block performance a venous puncture was noticed by positive blood aspiration before injection,which resolved after partial withdrawal of the needle.All subsequent LA injections were fractionated and given after negative aspiration.
Within seconds the patient became unresponsive and started a generalized tonic-clonic seizure. LAST was considered and help was called.100% oxygen was delievered by facemask and 40mg of propofol were administered for seizure supression A wide complex tachycardia emerged, without hemodynamic instability, which was self-limited. Intralipid 20% was given (bolus of 1,5 mg/kg and infusion of 0,25 mg/kg/h for 15 minutes).
The patient gradually recovered basal conscious state.45 minutes later sensitive block was absent, corroborating a possible intravascular (iv) injection. Because of the urgent nature of surgery, it was decided to proceed with general anesthesia.
The procedure was uneventful, the patient was monitored at the post-anesthesia care unit for 6 hours with no adverse events. The case was documented in a local incident reporting system.
Discussion and learning points: Most reported cases of LAST have occurred after inadvertent intravenous injection. Highly vascular sites increase the risk of iv injection and systemic absorption of LA. Moreover, upper limb anatomy often presents variations with aberrant vasculature such as vascular branches adjacent/running through the brachial plexus and mimicking nerve bundles.
Other risk factors include hyperdynamic states and cardiac disease.
This case shows that despite meticulous technique, LAST may still occur. Key components of management include awareness of LAST, fast response, maintenance of oxygenation and ventilation,seizure suppression and cardiovascular support. Reporting Is of paramount importance.

03AP04-10
The safety of the regional anesthesia in hospitals of Ukraine

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Background and Goal: The common using of ultrasound navigation makes an opportunity to develop the regional anesthesia. Regional anesthesia reduces the length of stay in the hospital, reduces the intensity of perioperative pain and decrease opioid using. But systemic toxicity of local anesthetics (LAST) is a significant problem. Prevalence of LAST in Europe range from 0.04 to 1.8 cases per 100 thousand local anesthesia. No similar studies have been provided in Ukraine before, and there are no statistics on the LAST epidemiology. Goal of this survey - evaluation of the prevalence of LAST, the safety of regional anesthesia in Ukraine.
Methods: Anonymous survey of anesthesiologists in Ukraine through Google form. The questionnaire was posted on websites of professional societies and on pages of Chairs of Anesthesiology on social networks. Descriptive statistics used.
Results and Discussion: 186 anesthesiologists from 38 cities of Ukraine took part in the survey. In the structure of respondents, 64.9% practice in state hospitals, 24.4% - in private hospitals, 7.7% - in the university hospitals. The majority of respondents (60.3%) are skilled anesthesiologists who perform more than 100 regional anesthesia per year.
In 94.5% of hospitals, anesthesiologists perform spinal anesthesia, in 87.2% - epidural anesthesia. Peripheral nerve blocks are performed in 76.9% of hospitals. Among the respondents, 37.2% perform peripheral nerve blocks several times a week, 19.2% - several times a month, 16.7% - several times a year, do not make - 11.5% of responders.
Ultrasound is used by 64.1% doctors, landmarks-based approaches 60.3%, nerve-muscle stimulator 38.5%. Among the respondents, 37.2% encountered LAST cases in their hospitals. However, only 37% of hospitals have a LAST checklist. Only in 57.7% hospitals lipid emulsion is available. Usually (62.8%) patients are informed about the possible complications before anesthesia delivering. Non-rarely (in 35.9% of cases) information about complications is not recorded anywhere. If LAST occurs, the chief of anesthesiology is informed in 36.9% of cases, in 27.2% this is recorded in the patient's card. The study is still ongoing. Research limitation at this moment is the small number of respondents.
Conclusion: Regional anesthesia in Ukraine is not safe still in many hospitals due to the absense of US-navigation and medications against LAST. Checklists of LAST are often absent, medical staff are not good skilled in this situation.

03AP04-11
The contribution of erector spinae plane block in enhanced recovery after surgery to patients undergoing colectomy

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Background and Goal of Study: Colectomies are major abdominal surgeries. Postoperatively, patients complain for severe pain. Modern anesthesiology practices have embraced trunk blocks which contribute to multimodal analgesia.
In this novel study, we evaluated the efficacy of continuous, bilateral Erector Spinae Plane Block (ESPB), as a method of perioperative analgesia, in patients undergoing elective laparoscopic (LC) or open colectomy (OC).
Materials and Methods: This study is a double-blinded, randomized, controlled, prospective study, submitted to clinicaltrials.gov with identification number: NCT04879004. 20 patients scheduled for OC and LC were randomized into 4 equal groups. If the patient was randomized in Group R_L or R_O,Ropivacaine 0.375% (20 ml) was infused at each side 30 minutes before induction of GA and 0.2% (20 ml) 12, 24, 36 and 48 hours after surgery.
If the patient was randomized in Group C_L or C_O,N/S 0.9% (20 ml) was infused in the same manner. We recorded total opioid administration, mobilization time of the patient, quality of recovery (QoR) score on the 3d postoperative day, satisfaction score of the patient. Statistical analysis was performed with JamoviVersion1.2.27.0, using MannWhitneyU test.
Results and Discussion: Regarding LC, total intraoperative remifentanil and postoperative tramadol administration was significantly lower in Group R_L when compared to C_L ($p=0.016$, $p=0.011$ respectively). Regarding OC, total intraoperative remifentanil, postoperative tramadol and morphine administration and mobilization time of the patient was significantly lower in Group R_O when compared to C_O ($p=0.008$, $p=0.011$, $p=0.025$, $p=0.03$ respectively). QoR score was significantly higher in Group $R_O$when compared to C_O ($p=0.011$).
There is no literature evaluating the efficacy of this novel method to patients undergoing colectomy. Regarding LC, in our study we found that ESPB contributes to the reduction of intraoperative and postoperative opioid administration. Regarding OC, this trunk block reduced intraoperative and postoperative opioid administration, mobilization time of the patient and it contributed to the achievement of higher QoR scores from the patients.
Conclusion: In this study, we confirmed that ESPB is an effective, simple and safe method which contributes to the reduction of perioperative opioid administration, improvement of quality of perioperative analgesia, and the achievement of enhanced recovery to patients undergoing elective colectomy.

03AP05-01
Rectus sheath block for aortic bifemoral bypass, an alternative to neuroaxial analgesia: a case report

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Background: Aortic Bifemoral Bypass is a major vascular surgery, used in the management of aortoiliac occlusive disease. Bilateral rectus sheath blocks have emerged recently as an analgesic option for laparotomy incision associated with this procedure. As a superficial block, it may be performed in the presence of high doses of low molecular weight heparin, unlike neuroaxial procedures.
Case report: We report the case of a 56 years-old male, ASA IV, with peripheral artery disease of the right lower limb and pain at rest, proposed to an elective aortic bifemoral bypass. The patient had smoking habits (44 packs-year), without other commorbidities or allergies, and weighted around 45 kgs (IMC of 18). Enoxaparin 40mg was administered briefly 12 hours before surgery, as institutional protocol for venous thromboembolism prophylaxis.
Evaluating the short interval between the injection and surgery, and relative high dose of enoxaparin to the patients weight, the risks of a thoracic epidural outweighed the benefits.
After the surgical procedure and for analgesic purpose, an ultrasound guided bilateral rectus sheath single shot block was performed with the administration of a total of 40 ml Ropivacaine 0,2%. Inguinal incisions were infiltrated with 10 ml Ropivacaine 0,75%. The patient was extubated in the immediate pos-operative time, and transferred to Intensive Care Unit. Analgesic regimen included acetaminophen 1 gr IV 8/8h, a perfusion of Tramadol 300 mg/day IV and morphine fixed bolus of 2,5mg IV in 4/4h for the first 24 hours.
Thereafter, morphine was changed to a rescue therapeutical regimen due to absence of pain, and only one bolus of 2,5 mg was needed. Due to clinical stability the patient was transferred to the vascular surgery ward 48 hours after surgery.
Discussion: This case reports a valid analgesic option in patients with bleeding risk for neuroaxial procedures due to antithrombotic drugs. Bilateral rectus sheath block can be clinically efective for analgesia in the early postoperative period, as part of a multimodal analgesic regimen.
References: Can J Anaesth. 2022 Jan;69(1):140-176.
Eur J Anaesthesiol. 2022 Feb 1;39(2):100-132.
Learning points: Superficial abdominal wall blocks can be effective adjuvants to an analgesic plan after major surgery and may be performed safely in the presence of LMWH at high or low doses.

03AP05-02
Anaesthesia for hip fracture in a patient with Kutelberg-Welander amiotrophy: clinical case

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Background: Kugelberg-Welander amyotrophy is a type III spinal muscular atrophy characterised by late development and the most benign course.The choice of anaesthesia in patients with this pathology is a problem. Regional anaesthesia is often canceled without reason due to fear of exacerbation of the symptoms of the disease. However, the literature describes successful cases of both spinal anaesthesia (SA) and regional blockades.

Case report: Patient K., 22 years old, Diagnosis: a displaced spiral fracture in the upper third of the right femur. Kugelberg-Welander amyotrophy. The patient is not able to move independently, uses NIV assisted ventilation of the lungs in the supine position, during sleep and wakefulness.The patient was taken to the operating room using his own device (NIV of the lungs).

Prior to the start of the regional intervention, the patient received Sol infusion 30 minutes before. To provide additional analgesia 1% Paracetamoli (200 ml) and 3% Sol. Ketarolaci (2 ml) intravenously were used. A femoral nerve block was carried out using a neurostimulator with ultrasound navigation. The patient was injected 1% Sol. Lidocaini (10 ml) and Dexametazoni (8 mg) paraneurally. SA was performed using X-ray navigation (C-arm) Quincke 25G needle at the level of L2-L3. Also, the patient got 0.5% Sol. Ropivacaini (2 ml) intrathecally.

For the purpose of additional analgesia and postoperative anesthesia, with the use of a neurostimulator, under the control of ultrasound navigation, we performed a parasacral blockade of the sciatic nerve. Injections of 0.75% Sol. Ropivacaini (10 ml) and Dexametazoni (8 mg) were used paraneurally.

During the entire perioperative period, we used paracetamol in combination with ketorolac as a component of multimodal analgesia.The presence of pain did not exceed 25-30 mm according to VAS and was successfully stopped without the use of opioid derivatives of central analgesics and, directly opioids. The patient's postoperative period passed without any peculiarities, he was discharged 5 day after the operation.

Discussion: Given the patient's respiratory status, as well as the COVID-19 pandemic, the use of general anesthesia in combination with mechanical ventilation carries a risk of respiratory complications. The anaesthesia technique used in this clinical case was effective; it eliminated both the risk of using opioids against the background of multimodal analgesia and the development of postoperative complications.

03AP05-04
Quadratus Lumborum block (transmuscular approach) as primary anesthetic technique for inguinal hernia repair: a case report

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Background: Truncal blocks have been used for post-operatory analgesia. We present a case where we used a Quadratus Lumborum Block (QLB) has a single anesthetic technique for an inguinal hernia repair.

Case report: We report a case of a 62-year-old male, ASA III, with severe aortic stenosis, in need of valvular replacement, with heavy alcoholic habits, proposed for a strangulated inguinal hernia repair.

A transmuscular approach of QLB (QLB-3) was performed with 15 mL of 0,375% ropivacaine and 15mL of 0,5% lidocaine.

Fifteen minutes after the block, muscular relaxation allowed for manual hernia reduction. A Rutkow-Robbins hernioplasty was performed to repair the abdominal defect. There was no need to perform enterectomy. Hemodynamic stability was maintained during the entire procedure. Patient was transferred to the post anesthesia care unit.

There were no complications and the patient was discharged one day after surgery with a high satisfaction level.

Discussion: Severe aortic stenosis reduces cardiac output. Small changes to systemic vascular resistance are hard to compensate. General anesthesia diminishes systemic vascular resistance and spinal anesthesia is absolutely contraindicated due to the profound, uncontrolled autonomic blockade.

QLB is a posterior abdominal block that requires injection of local anesthetic into the thoracolumbar fascia. It is an exclusive ultrasound guided block, characterized by its rapid onset and prolonged duration.[1]

QLB-3 is thought to achieve analgesia through the craniocaudal spread of local anesthetic through the paravertebral space and the cutaneous branches of the thoraco-abdominal nerves, thus having the potential to grant visceral and somatic analgesia.[2] Although with some variation, this block has the potential to cover the dermatomes T4-L1.[3]

We believe that a QLB-3 block was the best anesthetic choice for this patient.

References:

1. Ultrasound-Guided Transversus Abdominis Plane and Quadratus Lumborum Nerve Blocks. Available from: https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/abdomen/ultrasound-guided-transversus-abdominis-plane-quadratus-lumborum-blocks/

2. The Pathway of Injectate Spread With the Transmuscular Quadratus Lumborum Block: A Cadaver Study. Anesth Analg. 2017 Jul;125(1):303-312.

3. Mcdonnell J. Tutorial 433 Quadratus Lumborum Blocks. 2020;(September):2–9

Learning points: All things considered, QLB-3 as primary anesthetic technique for inguinal hernia repair is effective and safe.

03AP05-05
Current status of ultrasound-guided regional anaesthesia training in university hospitals of Catalonia: an opinion survey for residents and supervisors

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Background: Regional Anaesthesia (RA) is a relatively new subspecialty, but of great importance in the current clinical practice of Anaesthesiology. However, not all residency programs in Catalonia and Spain have a specific rotation or a structured curricular program, which may lead to suboptimal training.
The aim of this study was to assess, through an opinion survey of residents and supervisors, the current status of ultrasound (US)-guided RA training across the major hospitals of Catalonia.
Materials and Methods: Two surveys were designed for residents and supervisors using the Red Cap software consisting of 20 and 16 questions respectively. Distribution was made through the Catalan Society of Anaesthesia (SCARTD) in two stages: October 2020 and March 2021. Residents were assessed on the quality and duration of training, hospital's infrastructures and perceived confidence on basic US-guided techniques (interscalene, axillary, femoral/saphenous and popliteal blocks). Supervisors were assessed on training quality perception, infrastructure and implications on current and future curriculum programs.
Results: 99 residents and 35 supervisors completed the survey. Though most of the residents deemed the quality of their training as good or excellent (68 residents, 69%), 31 residents (31%) consider it average or poor. In general, there is a negative perception regarding clinical exposure and infrastructure: 59 residents had no specific rotation and 36 had no exclusive US machines for regional blocks (59,6% and 36,4% respectively).
Regarding the basic techniques, an acceptable 70% mean confidence was reported for the axillary and lower extremity blocks, contrasting with 53% for the interscalene block. 18 supervisors (52,4%) deemed the training quality in their hospital as good, with a quality similar to other sub-specialties (60%). 15 supervisors (43%) said to have no specific rotation in RA in their hospital. Most supervisors (27 of them, 77,1%) agree that US-guided RA should be a core rotation of the Anaesthesia residency program.
Conclusions: Dissatisfaction of residents is related to limited clinical exposure, infrastructure deficits (no designated block area nor exclusive US equipment) and insufficient teaching through academic rounds. Improvement in educational quality should not only address these elemental issues, but adapt to evolving changes of our specialty, and incorporate new educational models to reflect the opinion of residents and supervisors.

03AP05-06
Effect of prophylactic ondansetron administration in preventing hypotension due to spinal anaesthesia, in ASA II and ASA III orthopaedic patients

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Background and Goal of Study: Prophylactic administration of ondansetron has been successfully used for hypotension treatment due to subarachnoid anaesthesia, in obstetric and non- obstretic patients. The aim of our study was to test the efficacy of prophylactic use of ondansetron in ASA II and ASA III orthopaedic patients for fracture repair, under spinal anaesthesia.
Materials and Methods: After approval from hospital's Ethics Committee, 46 consented patients (ASA II and ASA III) were included. They underwent orthopaedic operation for leg fracture repair under spinal anaesthesia. Patients' average age was 80 years old. Ropivacaine 0.75% 14-15mg and fentanyl 10μg were used for spinal anaesthesia.
Ondansetron (0.1 mg/kg, until 8 mg max dose) was given in 100 mL saline, either, 15-20 min prior to spinal anaesthesia or during the end of operation. Hypotension was defined as systolic blood pressure drop below 20% of patient's baseline. Phenylephrine (0.1 mg/mL) or ephedrine (5 mg/mL) were used as vasopressors, according to patient's heart rate.
Continuous monitoring of heart rate, non-invasive blood pressure and SpO_2 were established and measured arterial blood pressure (systolic, diastolic, mean) and heart rate were recorded every five minutes. Mann-Whitney test and chi square test were used in statistical analysis. STATA was used as method for statistical analysis.
Results and Discussion: From a total of 46 patients, 19 were ASA II and 27 were ASA III patients. In the group of prophylactic ondansetron use, 25 patients were included. Fifteen of them needed vasopressor administration. In the control group, 21 patients were included and 15 of them needed vasopressor administration, also. No statistically significant difference was observed between the two groups (p-value: 0.4). Patients included in the control group needed more phenylephrine (mean 0.84mg) than patients in the prophylactic ondansetron use group (mean 0.16mg). The difference was statistically significant (p-value: 0.01). There was no statistically significant difference between the two groups concerning ephedrine (p-value: 0.97).
Conclusion(s): Prophylactic use of ondansetron before spinal anaesthesia in ASA II and ASA III orthopaedic patients, reduces the need for intraoperative phenylephrine administration. Larger group of patients needs to be evaluated in order to establish this conclusion.
References: Mendonça FT, et al. Braz J Anesthesiol.2021 May-Jun;71(3):233-240

03AP05-07
Ultrasound-guided erector spinae plane block combined with dexmedetomidine for postoperative pain management in lumbar spine surgery: a case report

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Background: Ultrasound-guided erector spinae plane blocks (US-ESPB) can be valid resorts of simple and safe execution in a multimodal approach to postoperative pain management. [1]
A growing body of evidence supports adjuvant use of dexmedetomidine in locoregional anesthesia, owing to its great analgesic capacity with minimal side effects.
We hereby present a case of one patient who received bilateral US-ESB with ropivacaine, lidocaine and dexmedetomidine in lumbar spine surgery.
Case report: A 60 years old man underwent spinal decompression surgery. Following induction of general anesthesia with propofol, remifentanyl and rocuronium, and maintenance with sevorane and remifentanyl, bilateral US-ESPB were performed with injection of a 20 ml solution containing ropivacaine 75 mg, lidocaine 100 mg and dexmedetomidine 0.5 μg/kg.
Around 30 minutes before the end of surgery, he received paracetamol 1000 mg, ketorolac 30 mg, ondansetron 4 mg and dexamethasone 4 mg. Opiod consumption during and after the intervention was recorded, and pain was evaluated using NRS and OBAS scores at 6-12-24 hours following surgery.
Postoperative pain treatment included paracetamol 1000 mg every 8 hours, and ketorolac when needed up to 90 mg/day. Analgesic rescue therapy in case reported NRS were above 6 consisted of morphine 10 mg i.m. every 4 hours, titrated on age and weight.
At each time interval, the patient reported NRS values below 2 at rest and below 3 on movement, while OBAS scores lower than 5. We observed minimal opioid consumption over the first 24 hours and high level of satisfaction.
Discussion: To our knowledge, this is the first case-report illustrating the efficacy and safety of dexmedetomidine as adjuvant to local anesthetics in US-ESPB for lumbar spine surgery. Our preliminary experience suggests that US-ESPB with dexmedetomidine can be safely implemented in multimodal analgesic regimen after lumbar spine surgery.
References:
1. Liu MJ, et al Postoperative Analgesic Efficacy of Erector Spinae Plane Block in Patients Undergoing Lumbar Spinal Surgery: A Systematic Review and Meta-Analysis. Pain Ther**. 2021** Jun;10(1):333-347
Learning points: The observed results encourage further exploration of the analgesic and opioid sparing potential of dexmedetomidine, also in relation to chronic postoperative pain that frequently ensues these surgical approaches.

03AP05-09
Spinal anaesthesia for an adult patient with Wolf-Hirschhorn syndrome: a case report

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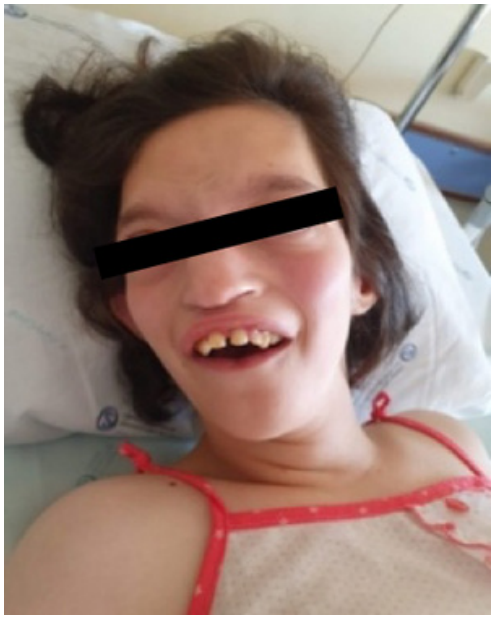
Background: Wolf-Hirschhorn syndrome (WHS) is a rare genetic disorder resulting from a partial deletion on the short arm of chromosome 4 (del(4p16.3)). Among other features, it is characterized by craniofacial abnormalities, mental retardation, muscle hypotonia, convulsions, scoliosis, kyphosis and talipes equinovarus. These abnormalities may present an anaesthetic challenge: possible difficulties in understanding and collaboration, airway management, unknown drug pharmacokinetics and pharmacodynamics, risk of seizures and malignant hyperthermia. Anaesthesia approach in WHS has been described in 9 articles since 1988: 3 malignant hyperthermia, 1 airway management and 5 anaesthetic considerations case reports.
Case Report: A 21-year-old woman with WHS underwent surgical Achilles tendon elongation under spinal anaesthesia with levobupivacaine and sedation with ketamine and midazolam. Standard ASA monitoring was used. Multimodal analgesia (paracetamol 1g, metamizole 2g, ketorolac 30mg), and triple postoperative nausea and vomiting prophylaxis were given.
Successful tendon elongation was performed, under an uneventful course of anaesthesia. The patient remained in the postanaesthesia care unit for 2 hours, with total motor block reversal confirmation. Hospital discharge occurred after 48 hours, without complications.



Discussion: Clinical evidence existing on general anaesthesia (GA) and WHS points out the risk of malignant hyperthermia and difficult airway. There are, at the moment, no spinal anaesthesia (SA) cases described in the literature – possible concerns are the lack of patient collaboration and anatomical difficulties. Considering the available options and its limitations, spinal anaesthesia in association with sedation was the chosen approach, with a successful outcome. SA could thus be a viable option for lower extremity surgery in WHS patients, not disregarding a careful airway evaluation and planned GA approach.

Learning points: WHS patients may be a challenge for the anaesthesiologist due to its malformation spectrum and lack of reassuring literature. SA may be a successful and safe approach for WHS patients in need of lower extremity surgery.

03AP05-11
Methemoglobinemia: a challenge for the anesthetist?

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Background: Methemoglobinemia presents as a high methemoglobin (MetHb) concentration, low oxyhemoglobin (HbO2) saturation and a low PaO2. If severe, it leads to hypoxia. Methemoglobinemia occurs when hemoglobin is oxidized becoming incapable of O2transport. Delivery of O2to the tissues may be compromised by the decreased HbO2concentration and by the shift of its dissociation curve to the left.[1]
Congenital form occurs due to a rare cytochrome-b5reductase deficiency which leads to accumulation of MetHb. Acquired form can arise after exposure to some local anesthetics (benzocaine, lidocaine and prilocaine), N2O and metoclopramide. As MetHb levels increase, tachycardia, confusion, coma and cardiopulmonary collapse may occur.[2]
Case report: A 45 years-old male patient, with a rare inherited cytochrome-b5 reductase deficiency, manifested as methemoglobinemia was scheduled to undergo an elective knee arthroscopic surgery. Preoperatively, the patient was asymptomatic with a mild lip cyanosis. Arterial blood gas test: Hb 19 g/dL, MetHb 17.8%, HbO2 73.7%, HbCO 1.1%, SatO2 90.9%, PaO2 46 mmHg, PaCO2 50 mmHg, pH 7.36. A neuraxial subarachnoid block was performed with 12.5 mg of hyperbaric bupivacaine 0.5% combined to an ultrasound guided femoral nerve single shot block with 150 mg of ropivacaine 0.75%. Continuous ASA standard monitoring was used. The patient remained hemodynamically stable, FiO2 37%, pulse oximetry saturation 92-96%, and no metabolic acidosis was found.
Perioperative O2 carrying capacity appeared to be adequate. The whole procedure went uneventful. Post-operative tests performed in PACU without alterations were consonant with no significant impairment of O2 delivery.
Discussion: Preoperative O2 supplementation, determination of MetHb and avoidance of oxidizing agents were fundamental in the anesthetic management of this patient. MetHb>15% frequently leads to cyanosis, which is consistent with this patient's case. When MetHb is <20% and oxygenation is adequate, conservative treatment could be applied. Symptoms generally appear with levels of MetHb>30%. When symptoms are present, other therapeutic strategies should be applied - administration of 100% oxygen, correction of metabolic acidosis, methylene blue, and exchange blood transfusion. Methylene blue use in congenital methemoglobinemia is still controversial.[3]
References:
1. SMJ 2011;104:757-61
2. JAMA Intern Med2013;173(9):771-776
3. Acta Anaesthesiol Taiwan 2009;47(3):143−146
Learning points: It is essential a thorough approach by a team with a good knowledge of this rare condition to a patient with methemoglobinemia.

03AP05-12
Unilateral transversus abdominis plane block reduced the dose of remifentanil during peritoneal dialysis catheter implantation

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Background and Goal of Study: Local analgesia under general anesthesia could reduce the dose of opioid during surgeries. Transversus abdominis plane block (TAPB) is one of popular techniques because of the easy, quick and effective procedures using ultrasound guidance. Usually, TAPB is applied on both sides of abdomen; however, unilateral block is enough and appropriate for the surgery of peritoneal dialysis catheter implantation (PDCI). We retrospectively studied the effect of supplemental TAPB on the required dose of remifentanil during general anesthesia for the PDCI.
Materials and Methods: Using retrospective cohort study design, we included the all cases underwent PDCI surgery with general anesthesia during 3-months observation period. 14 cases were analyzed. The use of TAPB depended on the medical resources including the ultrasound devices and the assistant staffs. General anesthesia was induced with propofol and fentanyl, and the patient's trachea was intubated after administration of rocuronium. Anesthesia was maintained by inhalation of desflurane and continuous intravenous infusion of remifentanil. In the TAPB group, the induction was followed by unilateral TAPB with 25 ml of 0.25% ropivacaine under ultrasound guidance. The results were compared by statistical analysis (unpaired t-test) and a p value less than 0.05 was considered as significant.
Results and Discussion: The patients' demographic characteristics were not different between two groups (Table).

	Groups	
	General	TAPB
Age (yr)	64.5 ± 13.6	73.3 ± 8.5
Sex (m / f)	7 / 1	5 / 1
Height (cm)	168.9 ± 9.8	163.3 ± 4.1
Weight (kg)	75.5 ± 26.7	63.2 ± 11.4
Duration of surgery (min)	96.6 ± 21.7	93.2 ± 16.8
Duration of anesthesia (min)	135.1 ± 23.2	136.7 ± 19.2
Fentanyl (Total dose) (μg)	138 ± 52	175 ± 41
Remifentanil (Total dose) (μg)	1888 ± 973	567 ± 33 *
Remifentanil (Dose / min) (μg/min)	19.2 ± 9.1	6.5 ± 3.8 *
Remifentanil (Dose / kg / min) (μg/kg/min)	0.26 ± 0.104	0.10 ± 0.058 *

General: general anesthesia alone, TAPB: general anesthesia with transversus abdominis plane block. Data was shown as mean ± SD. *: *P*<0.05 between groups

Table. The patients' characteristics and the results.

The total dose, the dose / min and the dose / body weight / min of remifentanil were significantly smaller in the TAPB group. Not only the duration of surgery but also the duration of anesthesia was not different between two groups. The unilateral block was more easy and quick procedure.
Conclusions: The combination of unilateral TAPB could reduce the required dose of remifentanil without the prolongation of anesthetic interventions. TAPB for PDCI might improve the cost performance, the management of operation rooms and the patients' safety.
References: Li J. et al. J Pain Res 2020; 13: 2279. Jiang XJ. et al. Trials 2021; 22: 266. Jiang HY. et al. Blood Purif 2020; 49: 426.

Obstetric Anaesthesiology

04AP01-01
Perfusion index to predict hypotension following subarachnoid block in lower segment caesarean section

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Background and goal of study: Subarachnoid block is the most popular route of anaesthesia in parturients undergoing caesarean section. Perfusion index is a non-invasive monitoring tool. However, there are limited studies on predicting hypotension using perfusion index.

The aim of this study was to determine the predictive ability in foreseeing hypotension using baseline perfusion index with a cut off value of 3.5 in caesarean section following subarachnoid block.

Materials and methods: In our prospective observational study, a total of 300 parturients were included. Along with the regular preoperative monitoring, baseline perfusion index was assessed. Subarachnoid block was obtained with 12mg hyperbaric 0.5% bupivacaine and a level of T6 was attained. Hemodynamic variables were monitored every minute for initial 10 minutes and then every 5 minutes during surgery after spinal anaesthesia. Hypotension was defined in the study as more than 20% decrease from the baseline mean arterial pressure. Receiver Operating Characteristic (ROC) graphs were plotted and the area under the curve was calculated to assess diagnostic accuracy of baseline perfusion index in detecting hypotension following spinal anaesthesia and to assess the optimal cut-off scores.

Results and discussion: The ROC analysis revealed that baseline perfusion index could predict hypotension following a subarachnoid block in caesarean section. A new cut off point of 3.6 was obtained for perfusion index with 81.2% sensitivity and 90.2% specificity. Area under the curve for baseline perfusion index in detecting hypotension following spinal anaesthesia was 0.906.

We also studied those 54 partuients with gestational hypertension/nonsevere preeclampsia to find a cut off value. ROC analysis showed an area under the curve of 0.775 and using Youden's index we attained a cut off value of 2.6 where the specificity is only 54%. Due to less number of study participants, this cut off value is not accurate and need a bigger study for further analysis.

Conclusion(s): We concluded that a baseline cut off value of perfusion index $\geq$ 3.6 has predictive value for hypotension after subarachnoid block in patients undergoing lower segment caesarean section. We generated hypothesis that the perfusion index cut off value $\geq$ 2.6 can be predictive of hypotension in patients with gestational hypertension/non severe preeclampsia. However, a larger study is needed with proper sample size.

04AP01-02
Rare case of Multiminicore Myopathy in a pregnant woman: importance of planning the anesthetic approach

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Background: Multiminicore Myopathy (MM) is a rare congenital disease and it's usually associated with muscle weakness, cardiorespiratory impairment and increased susceptibility to Malignant Hyperthermia (MH).[1]

The authors describe a rare case of a pregnant with MM and emphasize the importance of planning ahead the anesthetic approach involving the whole team.

Case report: A 42-year-old woman, was referred to anesthesia appointment at 36 weeks of gestation (WG) due to medical history of MM. Secondary to MM, the patient had chronic left ventricular dysfunction (LVEF 41%) and easy fatigue in carrying out daily tasks. Due to the possible risk of MH and/or decompensation of cardiac disease, the anesthesia team immediately started planning the analgesic/anesthetic approach.

The hospital pharmacy was contacted to assess the availability of dantrolene and contraindicated drugs were listed taking into account the risk of MH.

A plan was drawn up together with the obstetrics and nursing teams. This plan and the risks associated were explained to the pregnant.

At 41 WG, was admitted to the maternity in labor.

She presented pain 7 out of 10 (according to the Visual Analog Scale) and after carefully monitoring the parturient, an epidural catheter for delivery of local anesthesia (Ropivacaine) was placed in order to relief the pain. Five hours later, she gave birth, through vaginal delivery, with ventouse, without cardiac/myopathy-related complications.

Discussion: The susceptibility to MH makes it important to ensure that the avoidance of some drugs (volatile inhaled anesthetics, depolarizing muscle relaxants and magnesium sulfate) is implemented and that dantrolene is promptly accessible.

Regarding labor analgesia, local-regional techniques are considered the safest choice and the early placement of an epidural catheter for delivery of local anesthesia is a suitable approach since it can reduce labor' stress.

Although the best choice of local anesthetic is unclear, it is suggested that ropivacaine may have advantages over bupivacaine in patients with muscle weakness, as it causes less motor block, and is safer in terms of cardiovascular toxicity.[2]

References:

1. Obstet Gynecol.2014;123(2 Pt 2 Suppl 2):438-40
2. Janesth.2007;21(1):113

Learning points: The anesthetic approach of pregnant women with history of MM, with cardiac impairment, and risk of MH is complex so, preparation in advance for the delivery and involving the whole team is the best way to avoid complications.

04AP01-03
The use of thromboelastography (TEG) in obstetric anesthesiology: a retrospective study conducted in one university medical center

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Background and goal of study: Thromboelastography (TEG) is a non-invasive, commonly available quantitative test for measuring the ability of whole blood to form a clot. Since its introduction to clinical practice in 1948, the use of TEG has expanded as its clinical efficacy has been attained. Here we looked at reasons for using TEG in the peripartum period.

Materials and methods: A single-center, retrospective study was conducted, analyzing the electronic medical records (EMR) of 288 women who were admitted to the labor and delivery unit, and for which TEG was performed. The study duration was 5 years: 2015-2020. Data collected included platelet count, prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin time (aPTT), hemoglobin and fibrinogen level. Then we looked at TEG results, focusing on the maximum amplitude (MA) parameter. In addition we recorded the diagnoses given and anesthetic management for each participant during labor and delivery.

Results and discussion: All participants fit into one of the following 6 groups: gestational thrombocytopenia (n=41,14.24%), immune thrombocytopenic purpura (ITP) (n=33, 11.46%), preeclampsia (n=27, 9.38%), preexisting coagulopathy (n=14,4.86%), suspected coagulopathy (n=26,9.03%), massive bleeding (n=147, 51.04%). There were no major differences in the demographics of the participants. Platelet count was found to be significantly low in ITP and gestational thrombocytopenia, 73.55+/-22.98. TEG results: MA values were in normal range for the majority of participants in each category: gestational thrombocytopenia 87.8%, ITP 75.76%, Preeclampsia 88.88%, preexisting coagulopathy 78.57%, suspected coagulopathy 76.92%, massive bleeding 65.99%. Regional anesthesia was performed in all groups: gestational thrombocytopenia 73.17%, ITP 36.36%, preeclampsia 62.96%, basic coagulopathy 64.29%, suspected coagulopathy 53.85%, massive bleeding 65.46%.

Conclusion: We found two main reasons for performing TEG in the peripartum period:1. low platelets 2.massive bleeding. TEG and specifically the MA parameter are beneficial in peripartum management, specifically with the decision whether to perform neuraxial anesthesia in the presence of a low platelet count; and in guiding the administration of blood products in cases of massive bleeding.

References: 1.TEG and ROTEM: technology and clinical applications American Journal of Hematology David W., James A. 2014,p. 228-232

04AP01-04
Pheochromocytoma presenting as Takotsubo syndrome during cesarean section

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Background: Pheochromocytomas are tumors characterized by an imporant adrenergic stimulation. During pregnancy, the diagnosis is hard to perform, which can lead to severe complications.

Case report: A 35-year-old woman with no history of particular diseases, underwent a programmed cesarean section (CS). A spinal anesthesia was performed with 12.5 mg of Bupivacaine 0.5%. During CS, the parturient developped severe hypertension 205/130 mmhg, polypnea, and then a pulsed saturation of oxygen of 80%. She received non invasive ventilation while continuing CS and was transfered to ICU. Echocardiography showed left ventricular dysfunction, the ejection fraction (EF) was 35 % with an apical ballooning. Computed tomography confirmed pulmonary edema with right adrenal mass. Troponin I level was 0.89 ng/ml and the NT-proBNP dosage was 2992 pg/ml. Electrocardiogram revealed sinus tachycardia. We concluded to a pulmonary edema complicating Tako Tsubo Syndrome (TTS). The patient received furosemide and oxygen. Investigastions including MRI and urinary cathecolamines dosages confirmed the presence of pheochromocytoma.

In the seventh day, EF was 57% with persistance of mild apical hypokinesia. Troponin I level was normal. The patient was then transferred to surgery unit.

Discussion: Takotsubo cardiomyopathy is an acute stress-induced cardiomyopathy presenting as left ventricular apical ballooning, which is generally associated with a good prognosis [1], An identifiable emotionally or physically triggering event precipitates the syndrome, and TTS has been associated with conditions of catecholamine excess [2].

Our patient showed a transient left ventricular hypokinesia, presenting as apical ballooning. Pheochromocytoma had served as a trigger to TTS. Meanwhile, there was no evidence of infectious myocarditis or coronary disease. Our case meets with the international diagnostic criteria [2]. In asymptomatic pheochromocytoma, an increase in catecholamines may be precipitated by anesthesia or drug administration [3].

References:
1. Suzuki T et al. J Anesth. 2014;28: 121-4
2. Ghadri GR et al. Eur Heart J 2018;39:2032–46
3. Jóźwik-Plebanek K et al. Endocrine practice 2014;20:e233-6

Learning points: Peripartum TTS should be distinguished from peripartum cardiomyopathy. Early recognition and adequate management are essential to prevent complications of this syndrome. Meanwhile, this case emphasizes the high risk if pheochromocytoma is not diagnosed and treated during pregnancy.

04AP01-05
The effect of two different doses of ondansetron in preventing maternal hypotension after spinal anesthesia for cesarean section

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Background and goal of study: Although spinal anesthesia has been proven to be the most effective method for elective cesarean section, the resulting hypotension which might develop immediately after the sympathetic block has occasioned adverse effects for both the mother and the fetus. The purpose of this study is to compare the effects of two different doses of intravenous ondansetron in preventing hypotension following spinal anesthesia for elective cesarean section.

Materials and methods: One hundred and thirty-eight healthy primigravida parturiens, scheduled for elective cesarean section, were randomly assigned to three different groups. Participants in the first,

second, and control groups received 4 mg of ondansetron, 8 mg of ondansetron, and normal saline, respectively, 10 minutes before spinal anesthesia. Each parturient was preloaded with 500 ml of 6% hetastarch solution. Spinal anesthesia was then induced at L3-L4 interspinous space after 1,7 ml ropivacaine 0,75% was administered intrathecally via a 27 G pencil point needle. Blood pressure and heart rate were recorded upon arrival at the operating room, after preloading, at the time of spinal injection, and at one-minute intervals for 10 min thereafter. Blood pressure and heart rate values, total phenylephrine (μg) or/and ephedrine (mg) doses, neonatal pH and Apgar scores were recorded.

Results and discussion: The three groups were similar regarding demographic and somatometric parameters (p>0.05). The groups also did not differ in systolic or diastolic blood pressure (Figure 1, p=0.367 and p=0.634 respectively) and heart rate measurements (p=0.420). Total phenylephrine or ephedrine doses (Figure1, p=0.420), neonatal pH (p=0.733) and Apgar scores at 1 and 5 min (p=0.913 and p=0.881 respectively) where comparable within all three groups.

Group	Phenylephrine (μg)	Ephedrine (mg)
1	16.6 (43.2)	12.87 (13.05)
2	16.36 (36.66)	8.98 (11.33)
3	15.74 (48.80)	10.53 (13.40)
P	0.831	0.234

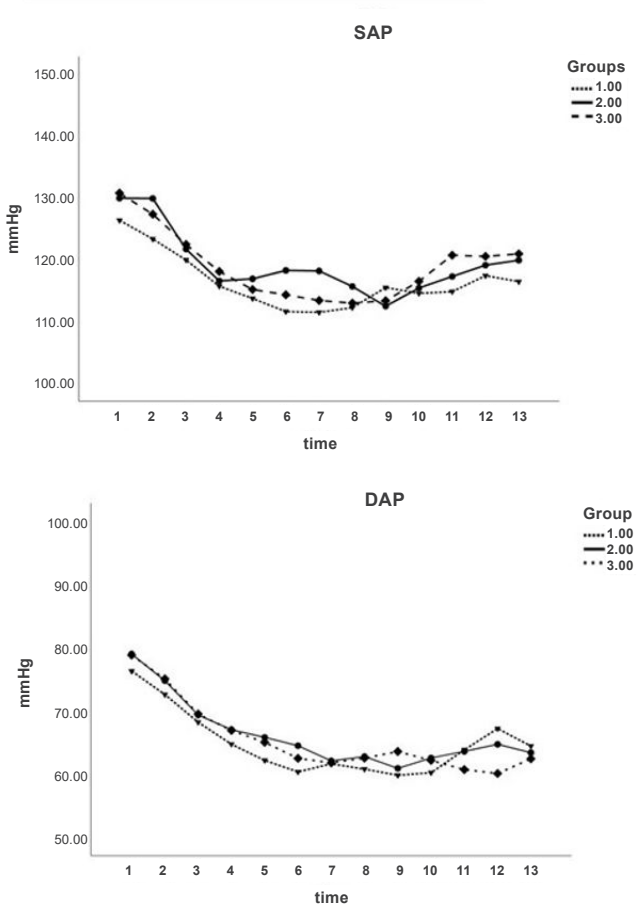

Figure 1:

Conclusion: Our results failed to demonstrate the significance of ondansetron in preventing maternal hypotension following spinal anesthesia for cesarian section.

04AP01-06
Diabetic ketoacidosis induced Takotsubo's cardiomyopathy in a pregnant patient

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Background: Diabetic ketoacidosis in pregnancy (DKP) is a maternal and fetal life-threatening complication with high fetal mortality. DKA is estimated to occur in 1-2% of pregnancies[(1)]. Takotsubo's cardiomyopathy (TCM) is a rare subtype of acute coronary syndrome (ACS)[(2)]. We report the first occurrence of TCM in the context of DKP, known to us.

Case report: A 35-year-old G3P2 at 30 weeks gestation presented with 24 hours of worsening confusion preceded by polydipsia and polyuria. Blood work was consistent with DKP[(1)].

Bedside ultrasonography confirmed intrauterine fetal demise. She developed anterolateral ST segment elevations with a troponin rise. An echocardiogram showed apical hypokinesis and a depressed left ventricular ejection fraction of 55%. Her coronary angiogram was normal. She was diagnosed with TCM. Her blood work confirmed resolution of her DKP within 12 hours and her mental status improved. She delivered a stillbirth via vaginal delivery, whose demise was felt secondary to DKP. All ventricular abnormalities resolved in two months with conservative management.

Discussion: TCM is a rare complication of either DKA or pregnancy[(2,3)]. TCM in the context of DKP is a phenomenon with no reports in the literature, and here we report the first case. Her presentation carried with it the characteristic imaging findings and troponin elevation, preceded by profound metabolic acidosis. Her heart recovered rapidly, a classic finding of TCM. Both conditions by themselves represent life-threatening entities to the mother and particularly the fetus, likely related to the profound acidemia.

We hope to increase clinician awareness to both TCM and DKP when approaching a pregnant patient with altered level of consciousness, acidemia and troponin elevation.

References:

1. Parker J, Conway D. Diabetic Ketoacidosis in Pregnancy. Obstetrics and Gynecology Clinics of North America. 2007;34(3):533-543.
2. Di Filippo C, Bacchi B, Di Mario C. Novel Aspects of Classification, Prognosis and Therapy in Takotsubo Syndrome. European Cardiology Review. 2019;14(3):191-196.
3. Yang W, et al. Clinical features differentiating Takotsubo cardiomyopathy in the peripartum period from peripartum cardiomyopathy. Heart and Vessels. 2019;35(5):665-671.

Learning points:

1. TCM can develop in the context of DKP or pregnancy.
2. The presence of DKA in pregnancies complicated by gestational diabetes is rare, and should prompt consideration for un-recognized pre-existing diabetes.

04AP01-07
Influence of epidural analgesia in labor on Apgar score and neonatal morbidity - a retrospective study

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Background and goal of study: Epidural analgesia (EA) is the metod of choise for labor pain relief, administered on patients demand and if there is an obstetric indication. The aim of the study was to determine the effect of EA on Apgar score and neonatal morbidity.

Materials and methods: The study was conducted at the Clinic for Gynecology and Obstetrics of the UCC of the Republic of Srpska from September to December 2018 by retrospective medical data review. The study included 100 in term newborns, born by vaginal delivery, from physiological pregnancies with spontaneous onset of labor and cephalic presentation of the fetus. Newborns were divided into two groups - group I, n = 50, infants whose mothers received EA and group II, n = 50, infants whose mothers did not receive EA.

Results and discussion: Median Apgar score in group I in the 1st minute was 9 (range 3-9), and in group II also 9 (range 6-10) - which is a statistically significant difference (U = 1059.0; p = 0.011). The median Apgar score in the 5th minute in group I was 10.0 (range 5.0-10.0), while in group II it was 10.0 (range 8.0-10.0) - which is not statistically significant difference (U = 1148.5; p = 0.179). Caput succedaneum had 4% of newborns in group I and 6% in group II, which is not a statistically significant difference. Cephalohematoma had 10% of newborns in group I and 8% in group II, which is not a statistically significant difference. Resuscitation was performed in 6% of newborns in group I and 2% in group II, which is not a statistically significant difference. There were no newborns in the I or II group with clavicle fractures or brachial plexus injuries.

Conclusion(s): The results of this study show that there is a statistically significant difference in 1-minute Apgar score, and there is no statistically significant difference in 5-minute Apgar score or in neonatal morbidity.

To be confirmed the statistically significant difference in Apgar score in the 1st minute, we believe that further research on a larger sample is needed. Despite the obtained results, EA is considered a safe procedure for both mothers and newborns.

References:

Ravelli CJA, Eskes M, et al. Intrapartum epidural analgesia and low Apgar score among singleton infants born at term: A propensity score matched study. Acta Obstet Gynecol Scand.2020 Sep;99(9):1155-1162.

04AP01-08
Neuraxial anaesthesia following thrombocyte transfusion in women with severe thrombocytopenia prior to a cesarean delivery: a retrospective study

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Background and goal of study: Caesarean delivery (CD) is one of the most common surgeries performed worldwide, with increasing yearly rates. Although neuraxial techniques remain the preferred anaesthesia method for CD, maternal thrombocytopenia remains a prominent contraindication[2].

Formation of spinal\epidural hematoma is extremely rare, however the minimal thrombocyte count required for safe neuraxial anaesthesia is still under debate. Although transfusion of thrombocytes for the purpose of neuraxial anaesthesia is still not recommended, patients with severe thrombocytopenia (less than 50'$10^3/\mu$L) are given thrombocyte transfusion for surgical hemostasis[3].

Materials and methods: A single center, retrospective cohort study was used to evaluate the anaesthetic approach to caesarean deliveries in patients with asymptomatic severe thrombocytopenia, who received thrombocyte transfusion for surgical hemostasis.

Results and discussion: A total of 6 cases were found, 5 of which were given spinal anaesthesia immediately following thrombocyte transfusion. 1 patient was denied spinal anaesthesia, as her thrombocyte count following transfusion failed to reach safe levels. All of our cases had no anaesthesia related complications recorded.

	Pathology	Thrombocytes before transfusion ($*10^3$/µl)	Thrombocyte units transfused	Thrombocytes after transfusion ($*10^3$/µl)	TEG	TEG maximum Amplitude (mm)	Spinal	Complications
1	HELLP	37	6	57	✓	61.5	✓	None
2	ITP	42	6	59	✓	61.3	✓	None
3	HELLP	47	6	104	✓	70	✓	None
4	ITP	8	12	40	✓	62	✕	None
5	Leukemia\ HELLP	44	6	42†	✓	62.3	✓	None
6	ITP	32	10	70	✓	66	✓	None

†Taken 4 hours post transfusion.

Table.

Conclusions: We examined the anaesthetic management in parturients with severe thrombocytopenia who were in need of Caesarean delivery and were transfused with thrombocytes for surgical hemostasis. In such cases, spinal anaesthesia may be considered, given the serious risks associated with general anaesthesia.

References:

1. Ioscovich A, *et al.* Anesthetic considerations for repeat cesarean section. Curr Opin Anaesthesiol. 2020 Jun;33(3):299-304.
2. Bauer ME, *et al.* The Society for Obstetric Anesthesia and Perinatology Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia. Anesth Analg. 2021 Jun 1;132(6):1531-1544.
3. ACOG Practice Bulletin No. 207: Thrombocytopenia in Pregnancy. Obstet Gynecol. 2019 Mar;133(3):e181-e193.

04AP01-09
Impact of maternal lateral tilt on cardiac output during Caesarean section under spinal anesthesia: a prospective observational study

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Background and goal of study: Left uterine displacement (LUD) has been questioned as an effective strategy to prevent aortocaval compression after spinal anesthesia (SA) for cesarean delivery (CD). We tested if LUD has a significant impact on cardiac output (CO) in patients undergoing CD under SA during continuous non-invasive hemodynamic monitoring.
Materials and methods: Forty-six patients were included in the final analysis. We considered 4 timepoints of 5 minutes each: T1=baseline with LUD; T2=baseline without LUD; T3=after SA with LUD; T4=after SA without LUD.

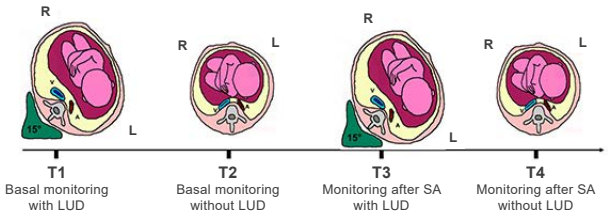

Figure 1. Description of timepoints for comparison of hemodynamic variables. V: vena cava; A: aorta; LUD: left uterine displacement; SA: spinal anesthesia. R=right; L=left.

LUD was then repositioned for CD. Primary outcome was to test if CO decreased from T3 to T4. We also compared CO between T1 and T2 and other hemodynamic variables: mean, systolic and diastolic blood pressure (respectively MAP, SAP and DAP), heart rate (HR), stroke volume (SV), stroke volume variation (SVV), pulse pressure variation (PPV), contractility (dP/dt), dynamic arterial elastance (Ea_{dyn}) at the different timepoints. Data on fetal Apgar scores and umbilical arterial and venous pH were collected. Trial registration: NCT05143684.
Results and discussion: CO did not vary from T3 to T4 [CO mean difference -0.02 L/min [95% CI -0.88 to 0.82; p=1]

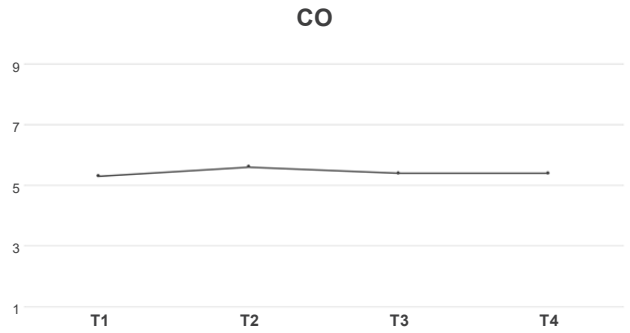

Figure 2. Mean values of CO at the single timepoints in ml/min. CO= cardiac output. T1= baseline with left uterine displacement (LUD); T2= baseline without LUD; T3= after spinal anesthesia (SA) with LUD; T4= after SA without LUD.

No significant variation was registered for any variable at any timepoint.

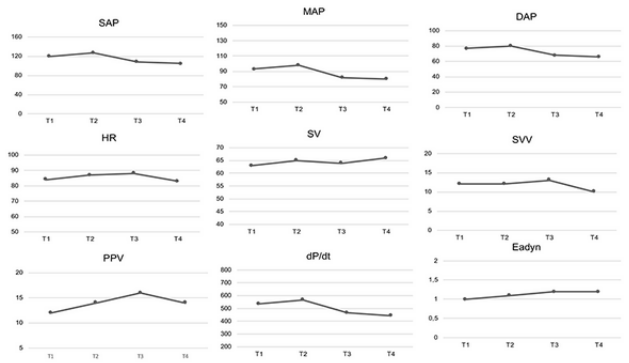

Figure 3. Mean values of main hemodynamic variables at the single timepoints: T1= baseline with left uterine displacement (LUD); T2= baseline without LUD; T3= after spinal anesthesia (SA) with LUD; T4= after SA without LUD. SAP= systolic arterial pressure in mmHg; MAP= mean arterial pressure in mmHg; DAP= diastolic arterial pressure in mmHg; HR= heart rate in bpm; SV= stroke volume in ml; SVV= stroke volume variation in %; PPV: pulse pressure variations in %; dP/dt: contractility in mmHg/sec; Ea_{dyn}= dynamic elastance.

Conclusion(s): LUD did not show a significant impact on CO during continuous hemodynamic monitoring after SA for CD.
References:
Lee Anesth&Analg 2017; Tsai EJA 2019; Chungsamarnyart J Clin Anesth 2020

04AP01-10
Anti-m antibody: an unexpected finding after universal blood transfusion in a parturient

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Background: The accurate testing of blood donations plays a vital role in safe blood transfusion. The ABO and D typing should be carried out on every blood transfusion. The ABO system is the most important but another blood systems were described and play an important role in transfusion therapy. Anti-M antibody is uncommon and a rare cause of hemolytic transfusion reactions. Signs and symptoms that can appear during an hemolytic transfusion reaction are: fever, respiratory distress, hypotension and hemoglobinuria.
The authors report a rare case of an anti-M antibody discovered during an universal blood transfusion in a parturient.
Case Report: A 40-year-old, primigravida, at 39 weeks of gestation in spontaneous labor. After an instrumented vaginal labor, the anesthetic team was called due to an important bleeding with maternal tachycardia, hypotension and dyspnea. Oxygenotherapy and active fluidotherapy was initiated.
Blood analysis revealed an hemoglobin of 8.3 g/dL. Since the urgency, one unit of universal red cells was transfused. When hemostase was achieved, parturient became hemodynamically more stable. During the blood transfusion, the immunohemotherapist contacted the team informing the patient had an anti-M antibody, with risk of hemolytic transfusion reaction.
Blood transfusion was stopped. 2 hours later, the parturient presented an hemolytic transfusion reaction: elevation of body temperature, shivers, dyspnea and hemoglobinuria. An analytic study was per-

formed with slight increase in bilirubin and decrease in haptoglobin. Another blood transfusion was made with a compatible blood unit. The parturient remained hemodynamically stable in postpartum period and the clinical signs of hemolytic transfusion reaction disappeared.

Discussion: The anti-M antibody is rare but can cause transfusions reactions and once present it is important to avoid universal blood transfusions (except in lifesaving cases, when risk should be balanced).

Blood transfusions are generally safe but is essential to know the existence of other blood systems and the associated risks.

References:

Transfus Med Rev. 2014 Jan;28(1):1-6
Hemolytic Transfusion Reaction. Updated 2021
Immunohematology. 2017 Dec;33(4):165-169

Learning points: The anti-M antibody is considered not to be clinical significance. Howerever, it is important to know that, rarely, its presence can cause an hemolytic transfusion reaction.

04AP01-11
Perioperative monitoring and control of core body temperature in obstetric theatre suites: are we doing enough?

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Background and Goal of Study: Inadvertent perioperative hypothermia is a common complication defined as core body temperature <36°[1]. It has been reported in up to 91% of patients undergoing a lower segment caesarean section (LSCS)[2]and has been associated with adverse maternal and neonatal outcomes[3]. At present, there are no distinct guidelines on temperature management for this cohort with current recommendations deemed impractical.

The aim of this study was to determine the incidence of hypothermia in our obstetric patients and the effect this has on surgical blood loss.

Materials and Methods: Patients who underwent Category 1-4 LSCS, Trial of forceps delivery, Repair of vaginal tears and Manual removal of placenta at Heartlands University Hospital between April 1-29th 2021 were included.

Results and Discussion: 105 cases were included in the study. 46% of these were elective LSCS. The average temperature in the operating theatres was 24.7°. All patients had their temperature measured preoperatively with intraoperative temperature measured in 38% of patients. Postoperative temperature was recorded in 94% of cases with no postoperative hypothermia documented. 96% of elective cases had a spinal anaesthetic. 73% of emergency cases had a spinal anaesthetic, 20% had an epidural and 7% underwent a general anaesthetic. The average temperature change for elective and emergency cases was a decrease of 0.44°and 0.21° respectively (P = 0.0125). Average blood loss in emergency and elective cases was 505ml and 463ml respectively. No patients had forced-air warming devices applied during anaesthesia with an average operating time >60 mins

Discussion: It is vital to maintain normal perioperative temperature and monitor this regularly. Our study found no incidence of hypothermia but demonstrated the difference in temperature drop between elective and emergency cases with poor documentation of intraoperative temperature.

Obstetric anaesthesia differs from other surgical groups predominantly due to the increased ambient temperature in theatre (24° vs 17°) and the haemodynamic state of the patients. This no doubt causes a decrease in heat loss due to radiation and perhaps negates the need for forced-air warming devices that are currently recommended for all cases lasting >30 minutes[1].

Conclusion(s): The incidence of inadvertent hypothermia has been documented to be astonishingly high[1], but this was not reflected in our study. There is a lack of clear guidelines for this patient group and no doubt more work is needed to assess the true severity of this problem and its implications.

References:

1: NICE, Perioperative hypothermia: the management of inadvertent perioperative hypothermia in adults. NICE Clinical Guideline 29.National Institute for Health and Clinical Excellence,London 2008
2: Cobb B, Cho Y, Hilton G, Ting V, Carvalho B. Active warming utilizing combined IV fluid and forced-air warming decreases hypothermia and improves maternal comfort during cesarean delivery: a randomized control trial. Anesth Analg. 2016;122:1490–1497
3: Brenda Baker, Robin Lawson. Maternal and Newborn Outcomes Related to Unplanned Hypothermia in Scheduled Low-Risk Cesarean Delivery Births, Newborn and Infant Nursing Reviews, Volume 12, Issue 2, 2012, 75-77

04AP01-12
Continuous spinal anaesthesia for urgent caesarean section in a woman with severe cardiac dysfunction: a case report

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Background: Advanced maternal age and associated high-risk pregnancies due to cardiac pathology are becoming increasingly common.

We present the rare case of a caesarean section in a pregnant woman with dilated cardiomyopathy and severe LV dysfunction successfully managed under continuous spinal anaesthesia.

Case Report: A 43-year-old pregnant woman was scheduled for elective caesarean section due to a relevant history of a previous hospital admission in the 3rd trimester for decompensated heart failure (dilated LV, LVEF 18%, diffuse hypokinesia) without defined aetiology.

She unexpectedly presented at 35 weeks gestation due to onset of spontaneous labour with 5cm dilation, maintained foetal well-being and maternal cardiovascular stability. Urgent caesarean was thus decided.

Echocardiographic evaluation confirmed dilated LV and identical LVEF.

Anaesthetic management consisting of continuous spinal anaesthesia was decided. Levobupivacaine 0.5% 2.5mg and sufentanyl 2.5mcg were administered, with sensory and motor blocks deemed adequate. Two additional top-ups of levobupivacaine 0.1% 1mg were needed throughout the procedure.

A norepinephrine infusion was pre-emptively started, reaching a maximum rate of 23 mcg/min.

The intrathecal catheter was removed at the end of the procedure and the remaining immediate postpartum period was uneventful.

Discussion: Like Dresner and Pinder (1), we have successfully used continuous spinal anaesthesia for caesarean section of a pregnant woman with dilated cardiomyopathy and severe LV dysfunction. Urgent indication for surgery in such patients poses additional challenges in regards to maintenance of maternal well-being as well as timely intervention for optimal foetal outcome.

With the use of this technique, we achieved perfect haemodynamic stability by effectively titrating the intrathecal anaesthetic agents, reducing the probability of unwanted abrupt hemodynamic effects and allowing time for adequate compensation (2).

References:

1. Dresner M, Pinder A. Anaesthesia for caesarean section in women with complex cardiac disease: 34 cases using the Braun Spinocath spinal catheter. Int J Obstet Anesth. 2009;18:131-136.

2. Palmer CM. Continuous spinal anesthesia and analgesia in obstetrics. Anesth Analg. 2010;111:1476-1479.

Learning points: Continuous spinal anaesthesia may be the ideal technique for pregnant women with severe cardiac pathology.

The need of vasopressor drugs should be anticipated during a caesarean section.

04AP02-01
Postpartum haemorrhage:minimum allowable haemoglobin level

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Background and goal of study: The aim of the study was to specify the minimum allowable haemoglobin level (Hb_{min}), which provides an adequate affinity between systemic oxygen delivery index (IDO_2), systemic oxygen consumption index (IVO_2), tissue oxygen extraction ratio (O_2ER) and the functional state of systemic haemodynamic in terms of massive postpartum haemorrhage.

Materials and methods: The study included 113 mothers in whom childbirth was complicated by blood loss. The average age of the parturient was 32.5 ± 6.4 years, the average weight was 76.5 ± 12.4 kg and the average gestational age was 39.5 ± 1.5 weeks.

Mean postpartum blood loss was 1830,5±622,7 ml. All haemorrhages were successfully treated according to the current guidelines.

Results and discussion: The calculation of Hb_{min} in women in blood loss was performed in the programming language R, using the integrated development environment RStudio [1].

For this purpose, we used linear regression with the calculation of coefficients by the least-squares method. The normality of the distribution of residues was checked by the Shapiro-Wilk method.

When calculating the dependence z = a0 + a1x1 + a2x2 + a3x3 + a4x4, analysis through the least squares method resulted in variable coefficients: a0 = 25.4850; a1 = 0.0001;a2 = 13.0202; a3 = -0.0222; a4 = 0.0557; a5 = -0.0327; a6 = -0.6172.

The summary equation is:

$Hb = 25.485 + 1e\text{-}04 * GPRI + 13.0202 * CI - 0.0222 * \Delta S + 0.0557 * IDO_2 - 0.0327 * IVO_2 - 0.6172 * O_2ER$, where

GPRI – index of general peripheral resistance; CI – cardiac index; ΔS – contractility index.

All the while the Adjusted R-squared coefficient was 0.9567.Next, we solved the linear regression equation taking into account the coefficients and minimum values of the dependent variables: CI = 3,5; GPRI = 2200; ΔS = 26; IDO_2 = 560; IVO_2 = 120 ;O_2ER = 25.

Thus, the equation with variables took the following form:

$Hb = 25.485 + 1e\text{-}04 * 2200 + 13.0202 * 3.5 - 0.0222 * 26 + 0.0557 * 560 - 0.0327 * 120 - 0.6172 * 25$

As a result, the following values were obtained Hb = 82,5365 gr/l.

Conclusion(s): The obtained values of Hb = 82.5365g / l can be considered as the minimum allowable value in terms of postpartum blood loss, in which the functional state of the heart and oxygen metabolism are at the minimum limit of a physiological rate.

References:

1. - https://www.r-project.org/; https://www.rstudio.com/

04AP02-02
Incidence and risk factors for need for supplemental analgesia or conversion to general anesthesia during elective cesarean delivery under spinal anesthesia

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Background and Goal of Study: A potential complication of spinal anesthesia (SA) for Cesarean Delivery (CD) is intraoperative pain. The Obstetric Anaesthetists Association states that need for intraoperative supplementation may occur in 5% of cases and conversion to general anesthesia (GA) in 2%, but it is unclear how this number was estimated and which women are at risk.

Therefore, we decided to examine incidence and risk factors for need for intraoperative analgesic supplementation or conversion to GA in elective CD under SA.

Materials and Methods: This retrospective study was approved by the Institutional Review Board. Information was retrieved from the automated information medical recording system. All women who underwent an elective CD under SA were eligible. Women who had emergency CD or had another neuraxial technique were excluded. All women had standard SA protocol (heavy bupivacaine 10-12 mg, fentanyl 20 μcg and morphine 0.1 mg). Primary outcome was either the need for supplemental intravenous analgesia (fentanyl, propofol, or ketamine) or conversion to GA.

We performed a univariable logistic regression using need for analgesia and/or conversion as the independent variable. A multivariable regression model was created including age, weight, number of previous CDs, gestational age, postpartum hemorrhage (PPH) (binary, yes/no), presence of adhesions, presence of placenta previa, presence of placental abruption, time of surgery (binary, cut-off 45 minutes) as dependent variables and need for analgesia and/or conversion as the independent variable.

Statistical analyses were conducted using R (version 4.1.0). Continuous variables are presented as median (Interquartile Range) and Odds ratios (95% Confidence Interval) are reported.

Results and Discussion: There were 2582 elective CD under SA between 1/1/2017-31/12/2020. Median heavy bupivacaine spinal dose was 11(10,12 mg).The rate for need for conversion to GA was 0.93% (24 women) while need for intraoperative supplementation was 4.4% (113 women).

Univariable risk factors for either supplementation or conversion were the presence of PPH (yes/no) OR 5.59 (1.2-18.2), p=0.01, surgery time (under/over 45 minutes) OR 2.08 (1.43-3), p<0.01 and previous number of CDs OR 1.23 (1.04-1.45) p<0.01.

In multivariable regression analysis, presence of PPH OR 5.07 (1.06-17.8) p<0.02 and surgery time (under/over 45 minutes) OR 1.73 (1.15-2.56) p=0.006.

Conclusion: There was a non-negligible rate of need for conversion to GA or need for intraoperative supplementation in elective CD under SA. Women having surgery lasting >45 minutes and women with PPH were at greater risk.

Conflict of interest: None declared.

04AP02-03
Resucitative endovascular aortic balloon plus viscoelastic tests to guide postpartum haemorrhage treatment for acretism. Anything to add? Our experience during the last 2 years

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Background and Goal of Study: Management of massive postpartum haemorrhage due to accretism has been described using endovascular intra-aortic balloon (REBOA), together with viscoelastic tests to reduce transfusion rate and achieve a better maternal outcome. The aim of this series of cases is to describe the use of both strategies in the management of accretism in a tertiary university hospital.

Materials and Methods: Description of consecutive cases of placental accretism scheduled for caesarean delivery (CD) for a 2-years period (September 2019-September 2021). Accretism had been diagnosed prenatally and CD scheduled according to local protocol. Placental invasion study was performed before surgery.

A multidisciplinary approach was planned before any case, (senior obstetricians, interventional radiologists, obstetric anaesthetists, urologists, neonatologists, haematologists and blood bank, nurses). Viscoelastic tests (ROTEM) were performed after 1500 mL of bleeding to guide haemotherapy and Cell-saver was also available.

Results and Discussion: 7 women were treated in this period. REBOA was inserted before the start of the procedure in the radiology suit, in 5 of 7 cases, and in 2 cases, under fluoroscopy in the obstetric operating theatre (OOT). In all patients, maternal monitoring included: 3 large bore peripheral vein catheters, arterial line, mini-invasive haemodynamic monitor (LIDCO-Rapid), and central temperature monitor.

The CD was performed combining a neuraxial block with general anaesthesia in 6/7 patients, and under neuraxial anaesthesia alone in 1/7 case. Once the baby was delivered, general anaesthesia was induced and REBOA balloon was inflated. Hysterectomy was performed in 4/7 (57%) cases. Intraoperative mean blood loss was 3228 mL $\pm$ 1606,87 mL. Transfusion was needed in all cases, but the need of RBC was < 2 units in 57% of cases (4/7), and the mean transfusión rate was of 5 units. Fibrinogen was needed in 29% of cases (2/7) and fresh frozen plasma in 43% (3/7).

The most common finding in ROTEM was FIBTEM an A5 <12 mm. All patients were extubated in OOT and transferred to ICU. REBOA was removed at the end of the procedure, leaving the introductor inserted in the femoral artery for 24 hours. No complications related to REBOA have been described. When used, the amount of blood transfused from cell-saver was < 300 mL.

Conclusion(s): REBOA combined with ROTEM seems a good strategy to reduce the amount of bleeding and the need for transfusion.

04AP02-04
Nonelective cesarean delivery under spinal anesthesia: Incidence and risk factors for need for supplemental analgesia or conversion to general anesthesia

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Background and Goal of Study: Spinal anesthesia (SA) is the preferred anesthesia for cesarean deliveries (CD) and is often performed in nonelective CDs. Whether SA is effective in these cases or associated with high rates of conversion to general anesthesia (GA) or need for intraoperative analgesic supplementation is unknown. Therefore, we decided to examine incidence and risk factors for need for intraoperative analgesic supplementation or conversion to GA in nonelective CD under SA.

Materials and Methods: This retrospective study was approved by the Institutional Review Board. Information was retrieved from a automated information medical recording system. All women who underwent a nonelective CD under SA were eligible. Women who had elective CD or had another neuraxial technique were excluded. All women had standard SA protocol (heavy bupivacaine 10-12 mg, fentanyl 20 μcg and morphine 0.1 mg). Primary outcome was either the need for supplemental intravenous analgesia (fentanyl, propofol, or ketamine) or conversion to GA.

We performed a univariable logistic regression using need for analgesia and/or conversion as the independent variable. A multivariable regression model was created including age, weight, number of previous CDs, gestational age, presence of postpartum hemorrhage, presence of adhesions, presence of placenta previa, presence of placental abruption, time of surgery (binary, cut-off 45 minutes) as dependent variables and need for supplemental analgesia and/or conversion as the independent variable. Statistical analyses were conducted using R (version 4.1.0).

Results and Discussion: There were 1783 non elective CD under SA between 1/1/2017-31/12/2020. Median heavy bupivacaine spinal dose was 11 (10, 12 mg). The rate of conversion to GA was 2.8% (24 women) while need for intraoperative anlagesic supplementation was 3.64% (63 women).

Univariable risk factors for either supplementation or conversion were the presence of PPH (yes/no) OR 19.35 (5.05- 79.20), p<0.0001, surgery time (under/over 45 minutes) OR 2.35 (1.58 - 3.46), p<0.0001.

In multivariable regression analysis, presence of PPH OR 14.47 (3.49 - 63.81), p=0.0002 and surgery time (under/over 45 minutes) OR 2.40 (1.53 - 3.73), p=0.0001.

Conclusion: In nonelective CD under SA, 2.8% had a conversion to GA and 3.64% required intraoperative supplementation for intraoperative pain. This data is important in tailoring an anesthetic plan and in the process of informed consent.

04AP02-05
Ultrasound-guided labor epidural analgesia

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Background: Labor analgesia can be challenging when there are spine abnormalities. The presence of spinal fixation devices is traditionally considered a contraindication for neuraxial blocks given the risk of infection, neurological damage and the anticipated difficulty of the technique.
Case report: A 33-year-old female, 40 weeks pregnant, ASA II, requested epidural analgesia for labor. She had a past history of juvenile idiopathic scoliosis, with posterior T2-L4 arthrodesis at 15 years of age and good correction of the deformity. Pregnancy follow-up had been uneventful.
After evaluation of CT scan and radiography, a preprocedural ultrasound scan was performed to evaluate the neuraxial anatomy, identify the optimal intervertebral space, determine the depth of the epidural space and preview needle trajectory. The L5-S1 epidural space was free of fixation devices and a catheter was inserted into it, 5 cm, cephalic. After a lidocaine test, intermittent bolus analgesia with ropivacaine was initiated, with partial pain relief. Pain intensity with uterine contractions was decreased, but the patient still felt perineal pain. Due to poor labor progress, cesarean section was decided. As analgesia proved to be insufficient, general anesthesia was induced without any events.
Discussion: In patients with scoliosis, because of the difficult anatomy, neuraxial blockade is often not attempted, with intravenous analgesia or elective cesarean section under general anesthesia being the main choices. The biggest challenges in these patients are the determination of midline; correct positioning for the technique; unusual ligament texture that alters the loss of resistance when entering the epidural space; adhesions and scars in the epidural space that can prevent the dispersion of anesthetics and compromise analgesia (1,2).
Ultrasound has been shown to be useful in identifying spaces without fixation devices and in locating the midline, reducing the number of attempts required for correct placement of the catheter and thus improving the chances effective analgesia. (1,2)
References:
1. Sharma M, McConachie I. Neuraxial blocks in parturients with scoliosis and after spinal surgery. J Obstet Anaesth Crit Care 2016;6:70
2. https://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/spinal-sonography-and-applications-of-ultrasound-for-central-neuraxial-blocks/

04AP02-06
Anesthetic management in acute fatty liver of pregnancy

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Background: Acute Fatty Liver of Pregnancy (AFLP) is a rare disease with a high mortality rate and a difficult diagnosis. It can result in coagulopathy, electrolyte abnormalities, hemodynamic instability, altered drug metabolism and multiple organ dysfunction syndrome.
Case report: A 33-year-old female, 37 weeks pregnant, ASA II, was admitted for delivery of a stillborn fetus. Her past medical history was irrelevant. The pregnancy follow-up had been uneventful. She presents with jaundice and general malaise. In the pre-operative blood tests, liver enzymes were increased (AST 190U, ALT 175U) and total bilirubin was 9.22 mg/dL; platelets were decreasing (from 101 000 to 70 000) and INR was 2.2.
Fibrinogen 2 gr and prothrombin complex concentrate 1000 U were administered before emergency c-section. General anesthesia induction was achieved with fentanyl 50 mcg and propofol 160 mg and sevoflurane was used for anesthetic maintenance. After induction, hypotension was treated with ephedrine. Due to surgical bleeding transfusion os two units of red blood cells was required.
At the end of the procedure the patient was transferred to the ICU, where she remained for 9 days. Initially, multiple organ dysfunction worsened and hepatic transplantation was considered. Support treatment improved the dysfunction and the patient was discharged with mild neurologic sequelae.
Discussion: The choice of anesthetic technique in cases of AFLP is most often determined by the coagulation status. Neuraxial anesthesia is not usually the choice when there is coagulopathy because the rapidly evolving condition does not allow for proper correction with transfusion of blood products.
General anesthesia has potential for increasing intra-cranial pressure and worsening hepatic dysfunction, besides the risk of airway management in a pregnant patient (1).
In this case, the presence of coagulopathy dictated the choice of general anesthesia. An early multidisciplinary approach involving obstetricians, anesthesiologist, ICU team and transplantation team allowed for a prompt diagnosis and positive outcome.
References:
1. Emily E. Naoum, Lisa R. Leffert, Hovig V. Chitilian, Kathryn J. Gray, Brian T. Bateman; Acute Fatty Liver of Pregnancy: Pathophysiology, Anesthetic Implications, and Obstetrical Management. Anesthesiology 2019; 130:446–461

04AP02-07
Airway management in obstetrics: can a supraglottic airway device be the first option? A national survey

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Background and goal of study: In obstetric anaesthesia, supraglottic devices (SGD) have been reserved for cases of failed intubation. However, some studies have recently evaluated its use as a first option for caesarean delivery.
We carried out a national survey to identify the strategies used to approach the airway in pregnant women and to identify current changes in SGD use in these patients.
Materials and methods: An online questionnaire was conducted and sent to the national hospitals with more than 2400 annual deliveries. A total of 504 anaesthesiologists and 185 anaesthesiology residents were eligible to answer the questionnaire, which was available from July to October 2021.
Results and discussion: A total of 104 responses were obtained (33% from anaesthesiology residents). Regarding the SGD use for elective c-section, 90.4% of the respondents replied that it is re-

served for situations of failed intubation (group A) and 9.6% consider its use as a first option depending on the maternal pathology (group B). None of the respondents agreed that 'SGD are always the first choice'. Considering group A, all the respondents claim to use pharmacological prophylaxis for aspiration.
However, none of them routinely assess gastric content with ultrasound. When using an SGD, 50% of respondents administer a dose of muscle relaxant lower than that recommended for a rapid sequential induction (RSI) and 10% use the RSI dose. The reasons pointed for SGD selection were higher incidence of difficult airway in pregnant women; ease and time of placement; and lower incidence of respiratory complications.
Considering group B, the reasons given for using SGD only for airway rescue included the risk of aspiration and the need for further studies to assess the risk/benefits of SGD in this context. We have also evaluated the use of SGD for nondelivery obstetric procedures and 53.8% of respondents use SGD in a 16-week pregnant and 59.6% answered that they do not use SGD in the first 48 hours after delivery.
Conclusion: Safe management of the obstetric airway requires knowledge of pregnancy-related anatomy and physiology, clinical ability to identify a difficult airway and proficiency with available airway devices.
The risk of aspiration of gastric contents and the use of SGD for airway approach in obstetric population do not seem to be consensual among anaesthesiologists neither for caesarean delivery nor for nondelivery obstetric procedures.

04AP02-09
Management of combined anesthesia for C-section for a COVID-19 positive patient under awake-ECMO

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Background: Data on C-Sections performed in pregnant patients under ECMO are limited, furthermore in patients on Awake-ECMO. The objective of this clinical case report is to present a possible approach for the anaesthetic management of these patients.
Case Report: A 35-year-old G2B1, 34 weeks pregnant, was proposed for C-section. She had been diagnosed with COVID-19 infection 15 days prior. The past medical history was only relevant for obesity class 1 and declined COVID-19 vaccination. Type 1 respiratory failure was diagnosed nine days after infection and transferred to the Intensive Care Unit (ICU), oxygen on high-flow nasal cannula (HFNC) was started.
On the same day, treatment was escalated to veno-venous Awake-ECMO. Intravenous perfusion of unfractionated heparin (IVUH) was started. The fetal evaluation was normal. Due to the patient clinical aggravation, C-section was performed on the fifth day of ICU admission. IVUH was stopped 6h before the delivery and the PTT checked for normal values.
An epidural catheter (EPC) was placed before anaesthetic induction, for intra and postoperative analgesia. Pre-oxygenation with HFNC was maintained and general anaesthesia was performed with opioid-free induction and rapid sequence intubation, keeping respiratory and hemodynamic stability.
After the birth, intravenous analgesia and epidural 0,2% ropivacaine were administered. The patient was transferred back to the ICU and immediately extubated without complications, maintaining HFNC and 0.2% ropivacaine bolus every 2h.
After 24h, patient controlled epidural analgesia (PCEA) was started with 0.1% ropivacaine and 0.2mcg/ml sufentanyl. Pain was successfully controlled the entire time. ECMO decannulation occurred on the 4th day after C-section and PCEA withdrawn on the 5th day.After suspension of IVUH and normal PTT, the EPC was retrieved. IVUH was restarted 6h after. No adverse events related to the EPC were reported. HFNC was weaned off gradually on the next days.
Discussion: Epidural analgesia is the most effective pain control strategy after a C-section. With a wise management and close monitoring of anticoagulants, it is a suitable option for COVID-19 patients under ECMO. It helps to maintain adequate respiratory dynamics, avoiding high respiratory rates and low pulmonary volumes due to pain.
Learning points: Regional anaesthesia is an important tool and should not be discarded for C-sections in patients under Awake-ECMO.

04AP02-10
Obstetric anaesthetic management of a patient with a peroxisome biogenesis disorders (PEX10)

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Background: PEX-10 is a rare mutation associated with peroxisomal biogenesis disorders causing altered metabolic pathways and organ dysfunction. The literature is limited in relation to pregnancy and obstetric anaesthesia management of this condition. This case report outlines the anaesthetic management of a patient with this condition in labour.
Case Report: A 34-year-old primiparous woman with PEX10 mutation presented for induction for post-dates. The primary concern was the unpredictable metabolism of drugs potentially required during the peripartum period. In fact, the side effects of 100 mg of IM pethidine (drowsiness and nausea) were noticeable eight hours post administration.
The woman was later consented for a lumbar epidural which was sited at L3/L4. A low concentration mix of bupivacaine and fentanyl infusion was started as per routine protocol. Good analgesia was achieved after 45 minutes with a bilateral block to T9. Later the patient developed sepsis, likely chorioamnionitis and the decision was made to perform a category two caesarean section due to foetal concerns secondary to maternal sepsis
An epidural top-up with bupivacaine 0.5% was used to anaesthetise due to significant tachycardia, to avoid mixtures containing adrenaline. The delayed onset of block using bupivacaine was rationalised to maintain cardiovascular stability. A slow top up, with a total of 20 ml was administered with block to T4 at 25minutes. The procedure was uncomplicated with a total estimated blood loss of 1 litre. The epidural top-up provided good analgesia throughout.
A dense epidural block remained for eight hours following delivery, by which point observations had normalised.
Discussion: This is the first case report outlining obstetric anaesthesia management of a patient with PEX-10, where unpredictability response to treatment was the main concern. The case was complicated by chorioamnionitis but the patient was successfully man-

aged during the perioperative period.This case demonstrates the prolonged response to drugs used in the peripartum period in a pregnant women with PEX10 mutation.

References: Waterham HR et Al. Human disorders of peroxisome metabolism and biogenesis. Biochim Biophys Acta. 2016 May;1863(5):922-33. doi: 10.1016/j.bbamcr.2015.11.015. Epub 2015 Nov 22. PMID: 26611709

Learning points: This case report demonstrates the safety and efficacy of epidural for labour then converted to provide anaesthesic block for caesarean section.

04AP02-12
Alpha-2 agonists instead of fentanyl as adjuvants for spinal anesthesia in elective cesarean section: a systematic review and meta-analysis

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Background and Goal of Study: The most common anaesthesiological approach for elective cesarean section (CS) is represented by spinal anesthesia (SA). Adjuvant drugs can be combined to local anesthetic (LA) in SA. We performed a systematic review and meta-analysis aimed at comparing the advantages of α-2 agonists to fentanyl during SA for cesarean section.

Materials and Methods: We screened PubMed and EMBASE for randomized controlled trials (RCTs) up to December 8th 2021. We calculated the mean difference (MD) for the continuous outcomes, and the relative risk (RR) for the dichotomous outcomes, using a random-effect model with 95% confidence interval (CI).

Meta-analysis was performed with separation in subgroups according to the alpha-2 agonist used (clonidine or dexmedetomidine). Trial Sequential Analysis (TSA) was performed assuming an alpha risk of 5% with a power of 80%.

Outcome	n. studies	RR/MD (CI)	P value	I^2	Subgroup differences
Time to 1st rescue dose	8	MD 59.48 [-6.35, 125.31]	0.08	99%	No
Onset of sensory block	7	MD 5.91 [-24.78, 36.59]	0.71	87%	No
Onset of motor block	6	MD 5.61 [-28.82, 40.04]	0.75	90%	No
Duration of sensory block	**7**	**MD 40.47 [20.21, 60.73]**	**<0.0001**	**99%**	**No**
Duration of motor block	7	MD 1.67 [-19.20, 22.54]	0.88	95%	No
Hypotension	7	RR 1.03 [0.84, 1.26]	0.76	0%	No
Respiratory depression	4	RR 0.48 [0.06, 3.59]	0.47	0%	No
Shivering	**7**	**RR 0.42 [0.24, 0.75]**	**0.003**	**0%**	**Yes (Significantly lower only with Dexmedetomidine)**
Nausea/Vomit	**8**	**RR 0.51 [0.28, 0.92]**	**0.03**	**62%**	**No**
Dose of efedrine	3	MD 1.38 [-2.61, 5.38]	0.5	92%	*Yes (1 vs 2 studies)*

Results and Discussion: Nine RCTs were included. Time to first rescue dose of analgesic was not statistically different when the alpha-2 agonists were compared to fentanyl (MD 59.5[95%CI -6.3,125.3];p=0.08). Duration of sensory block was significantly longer in the alpha-2 group (MD 40.5[95%CI 20.21,60.7];p<0.0001), while no differences were found for onset of sensory block and onset and duration of motor block.

Regarding safety aspects, both shivering and nausea/vomit were significantly lower in the alpha-2 agonist group, while risk of hypotension or respiratory depression were not different. The TSA on the time to first rescue analgesia showed a ratio of patient recruited/needed of 591/1931 suggesting the need of further research.

Conclusion(s): In CS with SA, the use of a-2 agonists as adjuvants to LA does not provide advantages over fentanyl in terms of analgesia. However, alpha-2 agonists may prolong the duration of sensory block, and may reduce the incidence of shivering and nausea/vomit. More research is needed to confirm these findings.

04AP03-02
Is a 0,5g Tranexamic acid less effective than a 1g dose at inhibiting hyperfibrinolysis in hemorrhagic caesarean section? Multicenter double–blind placebo-controlled dose-ranging (TRACES) ancillary study

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Background: Postpartum hemorrhage (PPH) is the leading cause of maternal death worldwide. 1g tranexamic acid (TXA) reduces maternal mortality due to bleeding when given before the 3rd hour after PPH onset.[1]

TRACES trial measure the effect of 0.5g or a 1g TXA compared to placebo on biological endpoints in women experiencing PPH.[2]

Design: TRACES ancillary-study is a double-blind, randomized, placebo-controlled, dose-ranging trial in 8 French hospitals

Method: After consent, patients with PPH > 800 mL during caesarean section were randomized to receive either TXA 0.5g (n=57), TXA 1g (n=58), or a placebo (n=60). Data collected at 8 time-points. Comparison by a linear mixed model.

Main outcome measures: D-dimers, plasmin-antiplasmin complexes (PAP).

Results: Compared to placebo, 1g TXA dose-regimen, but not 0.5g, inhibited hyperfibrinolysis as diagnosed by the % increase in D-dimers from injection to 120 min (93% [95%CI 68 to 118] vs 58% [95%CI 32 to 84] (p=0.06) vs 38% [95%CI 13 to 63] (p=0.003) and in PAP from injection to 30 min (56% [95%CI 25 to 87] vs 13% [95%CI 18 to 43] (p=0,051) vs -2% [95%CI -32 to 28] (p=0.009)) (fig 1).

Conclusions: In PPH, fibrinolysis inhibition was more sustained after 1g TA compared to 0.5g TA or a placebo. Further PK-PD modelling is needed.

Funding: PHRC 14-0032 and ANSM 15-003. NCT 02797119.

Ref: 1 Shakur H, et al Lancet. 2017;389:2105-16; 2 Bouthors AS et al Trials. 2018;19:149.

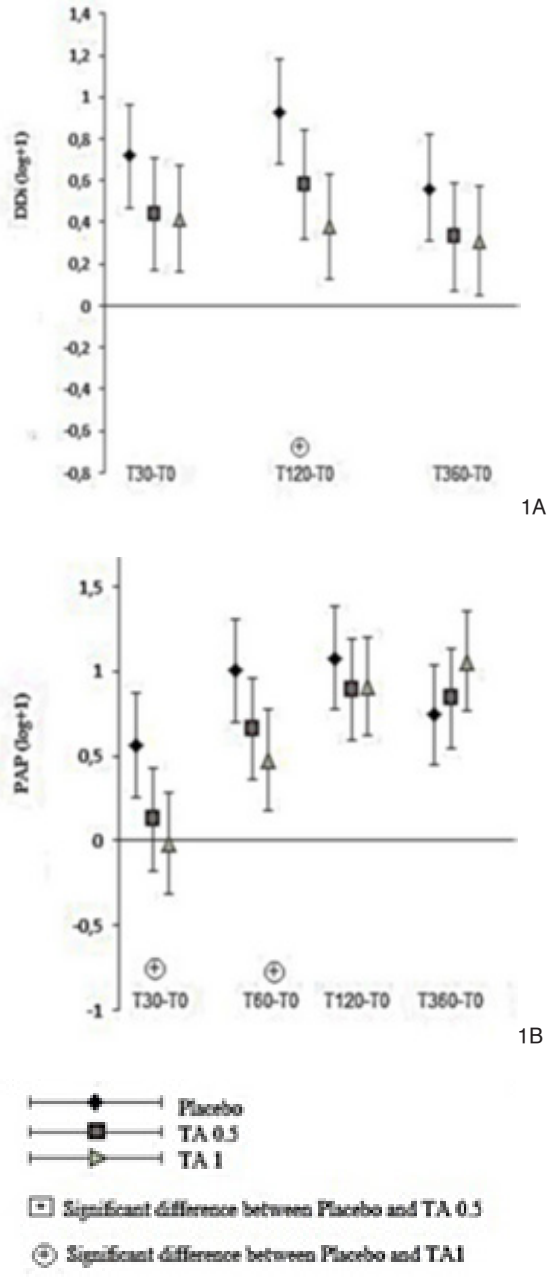

Fig 1 : Impact of 0,5g and 1 g TXA compared to placebo on % increase of D-dimers (1A) and PAP (1B) from baseline before injection to H6 after injection.

04AP03-03
The effect of anxiety, ovarian stimulation, and face mask ventilation on gastric antrum size: a prospective observational study

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Background: Pulmonary aspiration is a severe peri-operative event related to gastric size and contents. Several factors are thought to increase gastric size, while other peri-operative factors are less well studied in specific populations.

The primary outcome was the association between pre-operative anxiety levels on the initial antral cross-sectional area (CSA). Secondary outcomes were the association between the extent of ovarian stimulation and the effect of time of face mask ventilation (FMV) on the antral CSA delta.

Methods: This prospective observational study was conducted in Rabin Medical Center, Israel. We recruited 49 female patients undergoing ovarian stimulation and oocyte retrieval for in-vitro fertilization. They ranked the anxiety level on a visual numeric anxiety score (VNS). In addition, they underwent pre-and postoperative gastric ultrasound examinations in the operation room to measure the antral CSA *(Figure 1)*. Anaesthesia was induced intravenously, followed by FMV with a peak inspiratory pressure of 15 cm H_2O.

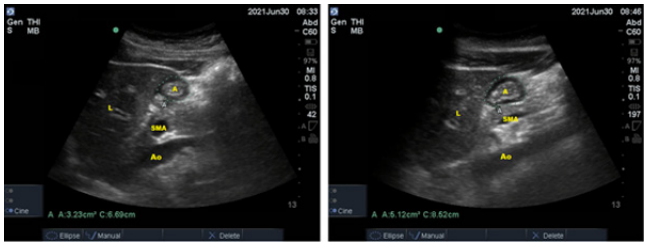

Figure 1. Left and right sonograms show a sagittal scan of an empty gastric antrum before and after the procedure, respectively.L, liver; A, gastric antrum; SMA, superior mesenteric artery; Ao, aorta; FMV, face mask ventilation.

Results: There was no substantial correlation between pre-operative VNS anxiety and antral CSA ($p=0.697$). At the end of the stimulation, the number of follicles, blood estradiol, and progesterone levels did not correlate with pre-operative antral CSA ($p=0.590$, $p=0.104$, and $p=0.511$, respectively). The median duration of FMV was 13 minutes [IQR 18 to 8.5] and did not correlate with the antral CSA delta ($p=0.312$).

Conclusions: Neither pre-operative anxiety nor extensive ovarian stimulation showed an association with gastric antral size. Moreover, prolonged FMV did not increase the gastric size by insufflation; these findings add to a growing body of literature on this topic and provide additional evidence that FMV is still safe even in relatively short procedures.

04AP03-04
Segmental spinal anesthesia for cesearean section in a parturient with severe COVID-19 ARDS , hyperemesis gravidarum unveiling cervical cord tumour in the postpartum period

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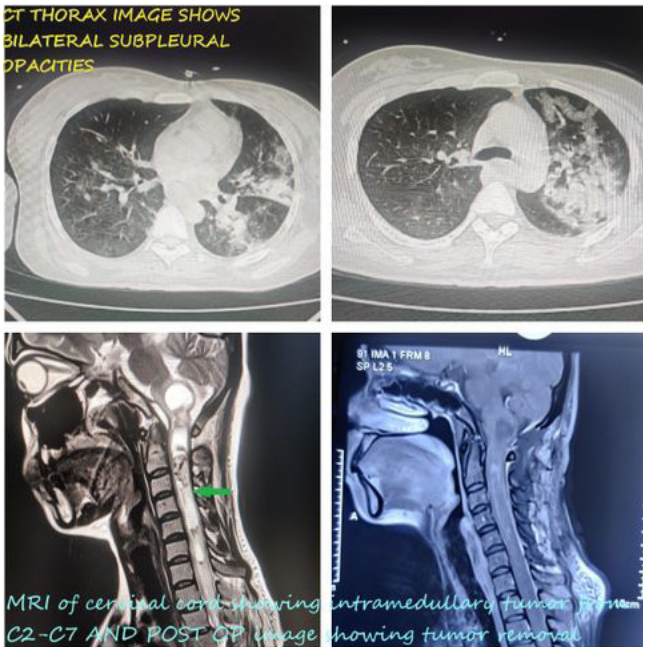
Background: A case of 33-year-old parturient had hyperemesis gravidarum until up to 36 weeks of gestation presented with Covid19 pneumonia requiring non-invasive ventilation. Caesarean section was performed under segmental spinal anesthesia with NIV support. Later, she presented with left upper weakness and diagnosed as Pilocytic astrocytoma of cervical cord. Tumor excision done under GA.

Case Report: 33-year-old parturient with severe hyperemesis gravidarum persisting till 36 weeks admitted for safe confinement. Treated with thiamine, pyridoxine, ondansetron, metoclopramide, IV fluids. Blood count, RFT, LFT, TSH, amylase, lipase was normal. Had generalized back pain with no localizing signs, papilledema.

She developed fever, dyspnea and SpO2- 79% in room air, tachypneic, pulse-150/MIN, BP-stable. Echo- good LV function, IVC- 0.3 cm and > 50% collapsing, RA RV normal. Initiated non-invasive ventilation with 60% Fio2, IV fluids. ABG shows P/F ratio of 150. CO-RADS-14/25. Inflammatory markers – grossly elevated. Caesarean done under thoracic segmental spinal anesthesia at T9-T10 space-ropivacaine 0.5% in with NIV support. O2 requirements decreased after delivery and was on remdesivir and steroids and discharged.

1 month later she came with scissoring gait and left upper limb weakness. MRI shown intramedullary contrast enhancing mass from C2-C7 ,syrinx from medulla to D11. Tumor excision- under GA-TIVA- propofol TCI, multimodal analgesia with IONM. Post-op she is ambulating without support.



Discussion: Neuraxial anesthesia is preferred in Covid-19 parturient unless contraindicated[1]. Thoracic spinal anesthesia is used in patients with severe lung disease owing to advantages in hemodynamics, respiration[2]. Invasive mechanical ventilation is associated with increased mortality in patients with Covid19.

IONM is standard of care in patients undergoing spine surgery. Propofol TCI is most suitable for IONM[3]. Biopsy revealed pilocytic astrocytoma.

Learning points: Segmental spinal anesthesia can be new horizon for high risk parturient.

MRI as screening tool for brain and spinal cord pathology in patients with hyperemesis gravidarum needs evaluation.

04AP03-05
With a little help from my friends: saving mothers lifes with placenta accreta spectrum disorders (PAS) with resuscitative endovascular ballon occlusion of the aorta (REBOA)

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Background: PAS present high morbimortality due to hemorrhagic complications and injuries to nearby organs.Previous uterine surgery is the main risk factor. Adequate prepartum assessment and multidisciplinary management is essential to reduce mortal complications, including endovascular procedures such as REBOA.

Case Report: We present the case of a 33-year-old pregnant woman with 2 previous c-sections who was diagnosed with placenta accreta in the 23rdweek. US was highly suspicious of bladder dome invasion.A c-section was scheduled for week 34. A specific protocol was developed between obstetricians,anesthesiologists,radiologists, nursing and blood bank staff. In the catheterization room and after monitoring including pulse oximetry in the lower limbs,sedation was performed for catheterization of both femoral arteries and placement of a deflated REBOA in the distal aorta,after which the patient underwent general anesthesia. After clamping the cord the balloon was inflated with a protocol of 15min of occlusion-1min of opening to avoid ischemia reperfusion syndrome(4 complete cycles). After closure of the uterine incision leaving the placenta inserted the hysterectomy was performed. Despite balloon inflation collateral circulation caused active bleeding which was surgically controlled.Serial tests were performed keeping Hb levels>9 g/dl and lactate<1. Estimated blood loss was 2760cc,administering2500ml of crystalloid,1packed red blood cell,1g of tranexamic acid and 2g of fibrinogen.

Discussion: Although rare PAS is a pathology that can present as hemorrhage in pregnant women and requires specialized care. Early diagnosis is essential: US and MRI are the most sensitive and specific imaging tests which will allow us to plan the intervention. Guidelines highlight the importance of an experienced multidisciplinary team in a tertiary hospital with the availability of a blood bank as key elements in reducing maternal mortality. Elective c-section with subsequent hysterectomy without placental extraction is the most frequent treatment when reproductive wishes have already been fulfilled. The use of REBOA is becoming widespread in elective c-section for PAS, proving to be safe and reducing the need for blood transfusion and complications.

Learning points: Prenatal diagnosis and multidisciplinary management with a specific protocol are key elements reducing morbimortality in patients with PAS.The use of REBOA to control bleeding should be assessed in elective c-section for PAS.

04AP03-06
HELLP THEM: HELLP syndrome in a twin pregnancy

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Background: HELLP syndrome diagnosis is based upon the presence of all of the laboratory abnormalities comprising its name in a pregnant/postpartum woman.
Case Report: A 21 year-old woman with a bicorionic/biamniotic twin pregnancy at 32 weeks+5 days, ASA-PS IV E, was diagnosed with HELLP syndrome (hemolytic anemia 9.1g/dL, thrombocytopenia 65,000/μL, and elevated liver enzymes). BP was 161/102mmHg and the patient reported pruritus and generalized edema. CTG showed decelerations. Hydralazine, ursodeoxycholic acid, beclomethasone, magnesium sulfate, and ampicillin were administered.
We performed a spinal anesthesia with 8mg levobupivacaine and 2.5μg sufentanil with a 27G pencil-point subarachnoid needle. After placenta delivery, due to excessive bleeding,1 platelet concentrated, and 10UI oxytocin and 0.5mg sulprostone were administered. The surgery proceeded without more complications and the patient was transferred to the ICU. At the ICU, for BP consistently higher than 182/99mmHg, 3.5mg/h hydralazine was started. Postoperative analgesia was accomplished with bilateral TAP block (80mg ropivacaine 0.2%).
Discussion: Regional anesthesia is preferred whenever possible, as it avoids the need for endotracheal intubation, which may be difficult in HELLP patients who are prone to edema and bleeding, the severe hypertension that may occur during induction and emergence, and the need for administration of NMBAs, which are potentiated by magnesium.
Nevertheless, thrombocytopenia and coagulation abnormalities may preclude neuraxial anesthesia for labor and delivery and it is not recommended if the platelet count is ≤50,000/μL. The drugs administered throughout the perioperative period must take into account the increased risk of bleeding, the liver disorders, and the possibility to develop complications.
References:
1-HELLP syndrome, Baha M Sibai, MD. Dec 2021. 2- Anesthesia for the patient with preeclampsia; Hawkins J., et al May 2021.
Learning points: The preanesthesia evaluation should focus on severity, airway examination, hemodynamic status, and coagulation parameters, all of which may change over time. Airway intervention can be challenging and regional anesthesia should be prioritized. Although it may be necessary, not only for general anesthesia, but also for airway protection if seizures occur, or in the setting of magnesium toxicity. Because of the potential maternal complications, these women should be managed at a tertiary care center.

04AP03-07
Placenta percreta and post-partum hemorrhage: the evolution in anaesthetic management

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Background: Placenta percreta is a life threatening complication of abnormal placentation during pregnancy in which the villi penetrate through the uterine serosa. This placental pathology may lead to invasion to adjacent organs and massive hemorrhage and coagulopathy during labor. Advances in perioperative bleeding management have modified anaesthetic practice.
Case Report: Case 1-2004: During elective caesarean section at 36th gestational week in a G2P1 parturient, placenta percreta with bladder invasion was diagnosed. Hysterectomy was performed, with bladder preservation. The woman was transfused with 16 PRBC, 23 FFP, 22 Cryoprecipitate and 12 PLTs units. Within the first 30 hours the patient returned twice to the operating theatre for hemorrhage control. During the first 72 hours in the ICU, she received 142 PRBC, 212 FFP, 92 Cryoprecipitate and 49 PLTs units. After 20 days of ICU stay, she was discharged in a good condition.
Case 2-2012: A parturient with diagnosed placenta percreta had elective caesarean section at 38th gestational week. Total blood loss was 10 liters. 11 PRBC & 12 FFP units were transfused. 2 g tranexamic acid, 6 g fibrinogen concentrate and 1500 IU Prothrombin Complex Concentrate were empirically administered. She was transferred to the ICU and had a good outcome.
Case 3-2019: A G2P1 parturient had an elective caesarean section at 34th gestational week due to placenta previa and percreta with bladder invasion. Before caesarean, ureteric stents were inserted.
After delivery, hysterectomy and bladder repair were performed. Total blood loss was 11 liters; 9 PRBC units were transfused. Under thromboelastometry (ROTEM®) guidance, 3 FFP and 8 PLTs units, 3 g tranexamic acid, 15 g fibrinogen concentrate and 2000 IU PCC was administered. After a 24 hr stay in the ICU, the woman was discharged to the ward.
Discussion: Multidisciplinary approach is essential for reducing maternal morbidity and mortality in cases of placenta percreta. Viscoelastic haemostatic assays like thromboelastometry facilitate early and individualized decision making .Tranexamic acid has been life-saving in cases of postpartum bleeding.
References:
Sivasankar C. Perioperative management of undiagnosed placenta percreta: case report and management strategies. Int J Womens Health. 2012;4:451-4.
Learning points: Viscoelastic haemostatic tests can guide therapeutic interventions in post partum hemorrhage and their availability in the labor ward should be mandatory.

04AP03-08
Peripartum cardiomyopathy: a differential diagnosis not to be forgotten

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Background: Peripartum cardiomyopathy (PPCM) is a rare cause of heart failure (HF) with left ventricular systolic dysfunction (LVSD) that affects women late in pregnancy or within 5 months following delivery.
Case report: A 34-year-old woman, 38 weeks pregnant, ASA-PS II, was admitted in labor. Additional medical history of an ectopic pregnancy, a feticide by chromossomopaty and anemia without etiological study. Blood transfusion by 7.9g/dL hemoglobin and epidural analgesia was started. Due to a cephalopelvic disproportion, a cesarean was decided and an epidural anesthesia was performed with 75mg ropivacaine and 10mcg sufentanil.
After delivery, 1mg sulprostone and 10UI oxytocin were administered. Due to adhesions, general surgeon collaboration was requested. At the end of the surgery, she developed dyspnea with desaturation, nausea and vomiting. Intubation was decided. CT angiography: negative for pulmonary embolism (PE), but revealed bilateral pulmonary edema. ECG: v1-v2 Q wave and T inverted, with no other signs of ischemia.
Transthoracic echocardiography: diffuse hypokinesis, decreased LVSD, and moderate mitral regurgitation. PPCM was admitted. The patient was transferred to the ICU under invasive mechanical ventilation for monitoring and support. Optimal medical therapy for HF was initiated. Bromocriptine was considered but not performed.
Discussion: PPCM risk factors include multiparity, black race, older age, and gestational hypertensive disorders. In this case, none were present.
PPCM is a diagnosis of exclusion. Clinical features include chest pain and symptoms of congestive HF, which are similar to the spectrum of peripartum and pregnancy comorbidities such as preeclampsia and eclampsia. In addition, some pre-existing cardiac lesions may manifest due to hemodynamic changes, and myocardial infarction is always a diagnosis to be considered.
Management recommendations are generally extrapolated from other forms of HF. Ongoing efforts will be needed to answer unresolved questions and define strategies.
References:
1 - Peripartum Cardiomyopathy: Case Reports. Wang M., MD. Perm J. 2009. 2 - Peripartum cardiomyopathy: Treatment and prognosis. Tsang W., MD, Lang R., MD. UpToDate 2020
Learning points: PPCM is underrecognized and the diagnosis is often delayed.
Clinicians should be aware that it's a differential diagnosis for peripartum dyspnea, and counseling all women on the potential risk of recurrence with future pregnancies.

04AP03-09
The comparison of caesarean section bleeding between volatile and total intravenous anaesthesia: instrumental variable analyses using a japanese nationwide database

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Background and goal of study: During caesarean section under general anaesthesia, volatile anaesthesia may increase blood loss because of the uterine relaxing effect of volatile anaesthetics. However, there has been a lack of human studies on this topic.
This study aimed to compare bleeding risk during caesarean section between volatile and total intravenous anaesthesia.
Materials and methods: We conducted a retrospective cohort study using the Diagnosis Procedure Combination database in Japan. We identified women who underwent caesarean section under general anaesthesia from 2012 to 2020. The women were divided into volatile and total intravenous anaesthesia groups.
We performed conventional regression analyses comparing the two groups for the volume of blood loss (primary outcome) and proportion of patients who needed blood transfusions (secondary outcome) to adjust for measured confounders.
We also performed instrumental variable analyses that can theoretically adjust for unmeasured confounders. As the instrumental variable, we used the proportion of volatile anaesthesia use during caesarean section under general anaesthesia at each hospital.
Results and discussion: We identified 26,585 women, including 19,320 in the volatile anaesthesia group (age = 32.9 ± 5.5 years, mean ± standard deviation) and 7,265 in the total intravenous anaesthesia group (age = 32.8 ± 5.5 years). The mean blood loss was 1113.0 ± 909.3 mL and 1136.1± 944.0 mL, and the proportions of blood transfusions were 14.7% and 16.0% in the volatile and total intravenous anaesthesia groups, respectively. With conventional regression analyses, volatile anaesthesia was associated with lower risk of bleeding (adjusted mean difference for blood loss -56.1 mL, 95% confidence interval (CI) -81.4 to -30.7 mL; adjusted odds ratio for blood transfusion 0.85, 95% CI 0.79 to 0.93).
However, in the instrumental variable analyses, volatile anaesthesia was associated with higher risk of bleeding (adjusted mean difference for blood loss 154.3 mL, 95% CI 112.4 to 196.3 mL; adjusted odds ratio for blood transfusion 1.38, 95% CI 1.20 to 1.59). The instrumental variable was considered to be valid (*F*-statistic = 12092.9), providing the results closer to the truth than the conventional regression analyses influenced by unmeasured confounders.
Conclusions: This large observational study with instrumental variable analyses identified potential increased bleeding risk associated with volatile anaesthesia.

04AP03-10
Anesthetic management of a high risk primigravida patient with Brugada syndrome

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Background: Brugada syndrome is an inherited sodium channelopathy with an increased risk of ventricular fibrillation and sudden cardiac death. The incidence is 1:2000. Given the devastating potential consequences, it is crucial for anesthesiologists to be familiar with the disease and provide a safe anesthetic plan.
Case report: A 20 year old G1P0 female at 28w4d gestation with twins and cervical insufficiency who was genetically diagnosed with Brugada syndrome at 14 years old after a syncopal episode. She had been asymptomatic since that time, was not on any medications, nor did she have an ICD. The patient presented for an unscheduled cesarean section because of vaginal bleeding due to prolapsed membranes and fetal malposition. A recent 12-lead ECG showed non-type 1 Brugada EKG pattern. A tetracaine spinal anesthetic was chosen as it has a reduced cardiotoxic profile when compared to bupivacaine.
Prior to the induction of anesthesia, defibrillation pads were applied along with standard ASA monitors. ACLS medications and isoproterenol were immediately available. She was maintained on a phenylephrine infusion to maintain blood pressure. The patient delivered male infants with APGARS of 5/7 and 9/9.
The remainder of her surgery was anesthetically uneventful. She was recovered in the high-risk unit with EKG monitoring throughout. She regained full motor and sensory function of her lower extremities eight hours after her spinal was placed.
Discussion: Although most general anesthetics have been shown to be safe to use[1], we opted for a tetracaine spinal anesthetic to avoid the known risks of general anesthesia in parturients. The safety of bupivacaine spinals is conflicted in Brugada patients,[2,3] thus we chose to avoid the bupivacaine risk altogether.
This case illustrates the anesthetic management of a high-risk patient with Brugada syndrome leading to an optimal patient outcome.
References:
1. Kloesel B, et al. Anesthetic management of patients with Brugada syndrome: a case series and literature review. Can J Anaesth. 2011 Sep;58(9):824-36.
2. Bramall J, et al. Caesarean section for twin pregnancy in a parturient with Brugada syndrome. Int J Obstet Anesth. 2011;20(2):181-184.
3. Aytuluk, HG. Cardiac arrest during spinal anaesthesia in a patient with undiagnosed Brugada syndrome. Eur J Anaesthesiol. 2018;35(9):711-714.
Learning points: Brugada patients are high risk for anesthesia and require a carefully thought-out anesthetic plan.

04AP03-11
Uncommon causes of postpartum hemorrhage. Diagnosis of congenital factor XI deficiency after obstetric hemorrhage

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Background: Factor XI deficiency is an inherited bleeding disorder characterized by a reduced level or activity of factor XI. Its deficiency results in an increased risk of bleeding. The most frequent situation is an unexpected severe bleeding during surgical procedures.
Therefore, pregnancy and childbirth are considered risk situations. We report a case of a patient diagnosed with factor XI deficiency after massive postpartum hemorrhage.
Case report: A 31 years old primiparous woman, in the 39 weeks gestational age, with no medical history. Forceps delivery was performed under sedation. The use of epidural analgesia was discarded because she presented a complete cervical dilatation. In the immediate puerperium, bleeding with anemia (Hb 10.5 to 5 g/dl) and hemodynamic instability was observed.
After revision of the birth canal, a laparotomy was performed showing retroperitoneal hematoma. Endovascular embolization was used to stop the bleeding (transfusions of 4 packed red blood cells, 600 ml of FFP and 2 g of fibrinogen were necessary).
After that, she was hemodynamically stable and there were no complications and no need for blood transfusion. Hematological test revealed a slight deficiency of factor XI. After 8 years, in the 38 weeks of gestational age. Hematology service recommended the administration of tranexamic acid prior to induction and the not use of neuraxial anesthesia if it was not possible to correct hemostasis (factor XI concentration were not available). She presented a eutocic delivery, without the need for administration of blood products.
Discussion: The unpredictable nature of this entity complicates management during pregnancy and childbirth. Neuraxial anesthesia is generally avoided due to concerns about the development of complications such as spinal hematoma.
In pregnant patients with severe deficiency or a history of hemorrhagic symptoms, factor XI concentrates or fresh frozen plasma can be administered. Antifibrinolytics are also used to reduce the risk of postpartum hemorrhage.
Learning points: Most women with FXI deficiency have uncomplicated pregnancies and deliveries requiring minimal hemostatic support. Multidisciplinary care by the hematology, anesthesiology and gynecology services is essential for proper management of these patients. If there is a hematology service assessment and the factor XI is available, neuraxial anesthesia could generally be administered safely in most cases.

04AP04-01
Israeli national survey of general anesthesia for cesarean delivery

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Background: Cesarean delivery is one of the most common surgeries performed worldwide and the rate of cesarean delivery has been increasing in the last years up to 50% in some countries. Given the unavoidable use of general anesthesia in some situations and the potential for associated complications, we performed a multi-center national survey, in order to investigate aspects related to use of general anesthesia for cesarean delivery.
Methods: This multi-center national survey questionnaire study was performed from October 2020 to March 2021. After Institutional Review Board waiver, we surveyed 25 eligible medical centers within the jurisdiction of the Israeli Ministry of Health with an active obstetric anesthesia unit. The survey included data on the medical centers and covered issues related to general anesthesia: preoperative management, personnel, induction, maintenance and emergence phases of anesthesia, intraoperative and postoperative pain management, protocol use, availability of difficult airway algorithm and complications that related to cesarean delivery under general anesthesia.
Results: A total of 113 participants among the 25 medical centers participated in the study. The median (range) of cesarean delivery rate was 18.5% (10–28%). Routine pharmacological aspiration prophylaxis use was reported by 100/113 (88.5%). Administration of opiates during induction before fetal delivery was in 16.8%. We found only 27/113 (23.9%) of respondents ventilate their patients during RSI. During the maintenance phase of anesthesia 66/111 (59.5%) of participants change inhalation anesthetic concentration after fetal delivery. Routine use of depth of anesthesia monitoring was reported by 21/113 (18.6%). Routine postoperative intravenous patient-controlled analgesia (IV-PCA) use with morphine was reported by 6/113 (5.3%) respondents. A difficult airway algorithm in the operating room was reportedly available for 27/113 (23.9%) participants.
Conclusions: In this national survey we emphasize the importance of the presence of highly qualified anesthesiology personnel during the surgery, benefits from use of short-acting opiates during induction, availability of video-laryngoscopes, ventilation of patient during RSI and availability of institutional difficult airway protocols. We observed underuse of intraoperative anesthesia-depth monitoring and poor postoperative pain control.

04AP04-02
Anaesthetic management of an unanticipated massive hemorrhage during a uterine sarcoma resection

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Background: Uterine sarcomas account less than 3% of all uterine malignancies. Rare complications presenting as an anaesthetic challenge are tumor rupture and hemoperitoneum.
Case report: A 52-year-old, ASA III woman with uterine sarcoma was admitted for total abdominal hysterectomy. Central venous and intra-arterial catheters were inserted as well as a second 16G peripheral vein catheter. A thermal blanket was used for hypothermia prevention. After laparotomy, hemoperitoneum was already evident, further complicated after accidental transection of the right iliac veins and the ipsilateral ureter, leading to hemorrhagic shock. The lowest hemoglobin was 1,9 g/dL in consecutive blood gas analyses. Because of the severity and the deteriorating patient situation additional anaesthetic stuff was summoned.
Vasoactive drugs administration was abundant (noradrenaline infusion and adrenaline boluses) while thromboelastometry (ROTEM®) indicated hyperfibrinolysis, hypofibrinogenemia and coagulation factors and platelets deficit (CT_{EXTEM}429sec, $A10_{EXTEM}$26mm, MCF_{EXTEM}26mm, CT_{FIBTEM}436sec, $A10_{FIBTEM}$2mm, MCF_{FIBTEM}3mm, CT_{INTEM}177sec).
Blood loss was calculated as of 19 L and transfusion consisted of 11 PRBC, 4 FFP, 8 PLTs units, 2 g tranexamic acid, 7 g fibrinogen concentrate and 1000IU Prothrombin Complex Concentrate. The patient was administered 15 L crystalloids and 1 L colloid solutions, through a fast infusion, fluid heating device. At the end of surgery, hemoglobin level and coagulation profile were improved (Hgb 11,7g/dL, CT_{EXTEM}68sec, $A10_{EXTEM}$45mm, MCF_{EXTEM}57mm, CT_{FIBTEM}73sec, $A10_{FIBTEM}$11mm, MCF_{FIBTEM}12mm). She was treated for 5 days in the Intensive Care Unit and 10 days later she was discharged from hospital.
Discussion: This case report highlights the need for vigilance and precautions in cases of uterine sarcomas, due to their surgical complexity. Basic measures just like extra available personnel, close communication with the surgical team, activation of massive transfusion protocols and temperature up to the more invasive hemodynamic monitoring, frequent blood gas analyses as well as haemostatic coagulation monitoring, are all important prerequisites for a successful outcome.
In anticipation of massive hemorrhage, good preparation for the worst case scenario is of outmost importance. Thromboelastometry facilitates individualized transfusion of blood products and factor concentrates.

04AP04-03
Anesthetic challenge: eclampsia and posterior reversible encephalopathy syndrome (PRES)

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Background: Eclampsia is a life-threatening event during the peripartum period, that pose significant challenges to the anesthesiologist.[1]
Case report: A pregnant woman, at 29 weeks, without any recent prepartum blood analysis, presented with eclampsia and emergent c-section was done under intravenous general anesthesia. Loading dose (4g) before the induction and maintenance dose (1 g/h) of magnesium sulfate were administered.
During the induction and the surgery, the patient maintaned hemodynamic instability, even with labetalol perfusion. An arterial line was placed and the first arterial blood gas analysis revealed pH 7,01, so sodium bicarbonate was administered. 10 units of oxytocin were administered after the birth.
The newborn (900g) was intubated in the operating room and transferred to the neonatology service. 700 cc of blood loss, 1500 cc of balanced solutions were administered and urine output was 60ml/h. In the end of the surgery, arterial blood gas analysis revealed pH 7,2 and pCO_2 55, so the anesthesiologist decided not to extubate the patient, to do a cranioencephalic computorized tomography (CE-CT scan), and after that, transport to an intensive care unit.[1]
Discussion: The CE-CT scan revelead distinctive parieto-occipital pattern with a symetric distribution of changes refleting vasogenic edema corresponding with posterior reversible encephalopathy syndrome. This was confirmed by magnetic ressonance imaging. The woman was under invasive ventilation for three days, with progressive improvement of hemodynamic instability, which allowed weaning of the sedoanalgesia. There were no changes in the neurological examination or alterations at the CE-CT scan performed at discharge from the hospital.[1]
References:
1. Fischer M, Schmutzhard E. Posterior reversible encephalopathy syndrome. J Neurol. 2017 Aug;264(8):1608-1616. doi: 10.1007/s00415-016-8377-8. Epub 2017 Jan 4. PMID: 28054130; PMCID: PMC5533845.

04AP04-04
"Airbrain" after epidural anaesthesia and a grand mal seizure during delivery– troublemaker or just a bystander?

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Background: Grand Mal seizures during pregnancy are rare and most often caused by eclampsia. We report a patient who developed seizures around her delivery and had a pneumocephalus on CCT-scan.
Case Report: We present a case of a 30 y.o. patient with uncomplicated pregnancy until hospital admission. An epidural catheter (EC) was placed with loss of resistance to air technique. Preeclampsia was suspected as blood pressure was 160/100 mmHg. EC was placed in second attempt, as during first an accidental dural puncture occurred.
After the third dose of 9 ml of 0,2% Ropinest, the patient developed a grand mal seizure. RSI and emergency C-section in general anaesthesia were performed and intravenous magnesium was administered.
The patient was extubated 10 minutes after delivery, EC was removed and the patient was transferred to the ICU, where she developed a second grand mal seizure and was reintubated. Laboratory findings of bilirubin 1,7; GOT 346; GPT 271; AP 197; LDH 972; thrombocytes 53 showed HELLP syndrome. A CCT scan was performed, which found intraventricular air.
Discussion: Seizures during pregnancy may be a sign of eclampsia and are followed by brain lesions like bleeding, ischaemia, or oedema in 72% of cases[1].
However a pneumocephalus was not described so far. The clinical presentation of pneumocephalus can range from headache to coma and usually does not cause seizures.
There are two possible ways how air can get into the ventricles in this case: First by direct application of air during the introduction of the EC, which is usually followed by a strong headache, which our patient did not report. A second mechanism might be the variations of intraabdominal pressure and intracranial pressure during contractions which can lead to a shift of air from epidural to dural space.
Following the described dynamics and the small volume of air found on the CCT, it is highly unlikely that the pneumoencephalon was the main trigger for seizures. We therefore think that the seizures were provoked by the HELLP syndrome, or alternatively by the bolus of ropivacaine.
References:
1. Brouh Y,et al. Brain lesions in eclampsia:*Indian J Crit Care Med*. 2016;20(3):178-181.
Learning points:
1. Loss of resistance technique with air can result in pneumoencephalon.
2. Seizures during delivery are most likely caused by eclampsia or in case of epidural anesthesia by local anesthetic toxicity.
3. Pneumocephalus does usually not cause seizure and was therefore probably a bystander.

04AP04-05
Baby-norepinephrine: a new alternative to manage hypotention induced by spinal anesthesia during caesarian delivery: a prospective randomized, double-blinded study

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Background and Goal of Study:A significant hypotension during C-section may jeopardize both mother and child. Vasopressors remain the mainstay of its management. The aim of our trial was to compare the effectiveness and safety of 3 vasopressors: Ephedrine, Phenylephrine and Baby-Norepinephrine to manage spinal-anesthesia induced hypotension during scheduled cesarean.

Materials and Methods: In a prospective randomized, double-blinded study, 90 patients scheduled for cesarean delivery under spinalanesthesia were included. Patients were randomized to receive bolus doses of either Ephedrine (6mg) or Phenylephrine (100ug) or diluted Norepinephrine (10ug) during post-spinalanesthesia-hypotension.
Our primary endpoint was the number of shots needed to regain normal BP, then the incidence of side effects as well as the neonatal impact (Apgar Score and fetal blood gas).
Results and Discussion: Demographic, anthropometric and obstetric data were similar. No significant difference in the parameters related to spinal anesthesia; sensory block level , nor in those related to surgery (Duration; Time from incision to fetal extraction).

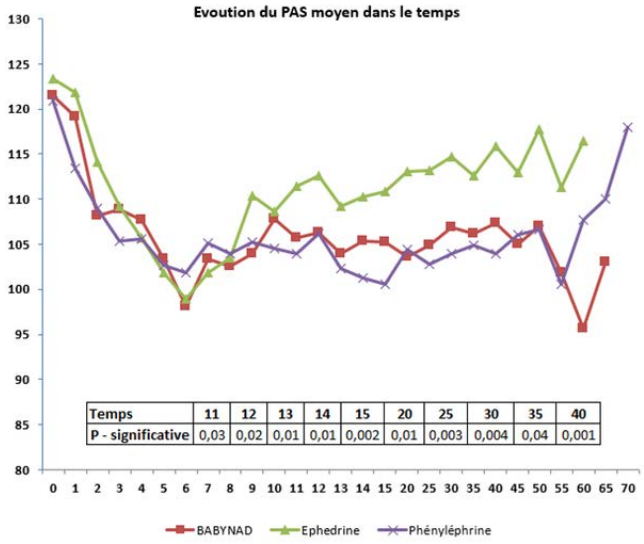

Figure.

Phenylephrine and Norepinephrine were comparable to maintain hemodynamic with a comparable shots number (p=0.120).Ephedrine (G1) was no less effective, but it was associated to the lowest APGAR scores,HCO3- values and the highest fetal lactates. we recorded more nausea in the Ephedrine group. The Incidence of other side-effects was similar.

	GROUP 1	*GROUP 2*	*GROUP 3*
PH	*7.24*	*7.28*	*7.26*
HCO3-	*20.73*	*22.58*	*21.47*
LACTATES	*2.89*	*2.12*	*2.55*

Table.

Conclusion(s): Noradrenaline, at the dilution and dose studied, was superior agent to Ephedrine with a better fetal acid-base profile and less maternal side-effects. It also was as safe and effective as Phenylephrine to manage spinalinduced hypotension during caesarean.
References:
1. Šklebar I all. Spinal anaesthesia-induced hypotension in obstetrics: prevention and therapy. Acta Clin Croat. 2019;58 Suppl 1:90-5.

04AP04-06
Perineural cyst decompression after epidural labour analgesia: a case report

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Background: Perineural or *Tarlov* cysts are a common incidental finding during lumbosacral magnetic resonance imaging (MRI). They are usually harmless lesions of the nerve roots located at the sacral level, of uncertain ethology. Most*Tarlov* cysts remain asymptomatic, with no clinical relevance and the usual symptoms include pain, radiculopathy or paresthesia.
This case was a healthy patient who presented with very intense, progressive sacral pain and then was diagnosed with a S2 Tarlov cyst and scheduled for surgical cyst decompression.
Case Report: A 35-year-old female with no relevant comorbidities had an epidural catheter placed in L3-L4 for labour analgesia, without intercurrences. It was administered a bolus of 20mg ropivacaine 0,2% and 10mcg sufentanil and, 2 hour later, she had a distocic delivery by vacuum, without complications.
Later, the patient was admitted in the orthopedic ward with a 17-month evolution severe sacral pain, without neurologic deficits associated. The pain had started shortly after her delivery. The investigation then revealed a bulky*Tarlov* cyst inside the spinal canal at the S2 level, in lumbosacral MRI. The patient was submitted to cyst decompression, with balanced general anesthesia, that was uneventfully.
Discussion: There are reported cases of successful and safe single shot spinal anesthesia for labour anesthesia, in patients with diagnosed *Tarlov* cyst. On the other hand, in the case of epidural block and due to the larger volumes of local anesthetics used in this technique, there is a greater risk of causing symptoms. Some authors claim that the volume effect or the prolonged analgesic effect entrapped on the nerve root must be the cause of the symptoms. Differential diagnosis with other neurologic conditions such as herniated disc, trauma or malignancy must be made.
References:
1. Ishiguro S., Akeda K., Tsujii M., Sudo A. (2013). Delayed diagnosis of cauda eqina syndrome with perineural cyst after combined spinal-epidural anesthesia in hemodialysis patient. Asian Spine J.7(3):232-235.
2. Pfund, N., Oh, A., & Cyna, A. (2018). Successful spinal anaesthesia in a patient with a Tarlov cyst. International Journal of Obstetric Anesthesia, 34, 96-98.
Learning points: We demonstrated a case of symptomatic perineural cyst, scheduled for cyst decompression, where the patient's symptoms were probably triggered by epidural technique, a rare complication of this analgesic procedure.

04AP04-07
Tonic-clonic seizure in pregnancy – a differential diagnosis regarding a case report

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Eclampsia is a convulsive state in pregnant women with preeclampsia or gestational hypertension[1]. It is considered a hypertensive emergency and as such must be rapidly diagnosed and treated[1]. We herein describe a case of a convulsive crisis in a pregnant woman and our clinical approach.

A 23-year-old pregnant woman, gestational age of 38 weeks, ASA physical status III due to a previous haemorrhagic stroke, is brought to the emergency room following a generalized tonic-clonic seizure. First responders administered 10mg diazepam.

On arrival she was admitted directly into the operating room for emergency cesarean delivery under general anaesthesia due to suspicion of eclampsia. Rapid sequence induction with propofol and rocuronium, followed by endotracheal intubation was performed and anaesthetic maintenance was ensured with sevoflurane. Intraoperatively a 4gr bolus of magnesium sulphate was administered for recurrent seizure prophylaxis. She maintained hemodynamically stable and normotensive throughout. As such, given the absence of focal signs, it was considered safe to extubate at the end of the procedure.

Considering the clinical presentation, normotensive profile and the presence of a recent cerebrovascular event, re-evaluation by neurosurgery was deemed necessary before the final diagnosis of eclampsia was established. A cranial CT-scan was requested and compared to previous exams, which revealed no additional lesions. Additionally, no analytical findings compatible with HELLP syndrome were found. As such, despite presenting with a tonic-clonic seizure, when taken into account all clinical signs and diagnostic exams, renewed intracranial bleed and eclampsia were unlikely diagnosis.

As no obvious diagnosis was apparent, a more detailed clinical history as ascertained, at which time the patient revealed she had elected to stop all medication 48h prior, including levetiracetam 500mg twice daily.

This case highlights the importance of an adequate differential even when an obvious diagnosis is apparent. This is true for all patients but particularly so in the most complex ones.

A pregnant woman in herself is always a challenged, more so when previous pathologies must be considered in addition to all physiological and pathological changes associated with pregnancy. The woman must be considered as a whole and the anaesthesiologist plays a crucial role in ensuring the best possible outcome for both patients.

Reference:

1. *Anesth Essays Res*. 2013;7(3):307-312.

04AP04-08
Evaluation of sonographic difficult airway predictors in patients undergoing caesarean section and their comparison with that of non-pregnant women: A prospective observational cohort study

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Background and Goal of Study: Changes in airway anatomy and physiology during pregnancy make the airway management more challenging in pregnant compared to non-pregnant females. A thorough preoperative airway assessment is required in order to accurately predict difficult airway. Recently, ultrasound (US) has been used as a tool for accurately predicting difficult airways in mixed population of patients, however, a very few literature is available of its use for comparing pregnant and non-pregnant women.

Materials and Methods: The present prospective, observational cohort study enrolled 82 pregnant females (Group 1) scheduled for elective lower segment caesarean section (LSCS) under neuraxial anaesthesia and age-matched 80 non-pregnant females (Group 2) scheduled for elective surgery after getting informed and written consent. Clinical airway assessment was done for both groups in the pre-operative area and airway US was done preoperatively in non-pregnant and post-operatively in pregnant patients by an experienced anaesthesiologist. The primary objective was to compare airway US parameters in both groups. Secondary objectives were to compare clinical airway assessment parameters, to establish relation between the clinical difficult airway predictor defined as modified Mallapati grade (MMG) ≥3 and patient related data and to find out the diagnostic accuracy of significant variables for predicting the difficult airway (MMG ≥ 3).

Results and Discussion: Among airway US parameters, pregnant patients had significantly higher hyomental distance, anterior soft tissue thickness at the level of hyoid and vocal cord, and oral cavity height while the tongue thickness and mandibular condylar movement were significantly lower compared to non-pregnant patients. Among clinical airway assessment parameters, pregnant patients had significantly higher MMG and upper lip bite test score, mentohyoid distance and neck circumference compared to non-pregnant patients. Pregnancy, Pre-E/E-VC and hyoid bone visibility were independent predictors of difficult airway.

Conclusion(s): Similar to the clinical airway assessment parameters, the airway US parameters also differ significantly in pregnant patients compared to non-pregnant patients. In female patients, pregnancy, hyoid bone visibility and Pre-E/E-VC ratio were predictors of the difficult airway. The significant airway US parameters had a moderate ability for predicting a difficult airway.

04AP04-09
The effect of bilateral erector spina plane block on postoperative analgesia in cesarean section under spinal anaesthesia

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Background: Acute pain after cesarean section (CS) can be variable. Untreated pain can affect patients' life quality. We aimed to evaluate the effects of bilateral erector spina plane block (ESPB) on postoperative pain, analgesic use and patient satisfaction in patients delivered by CS under spinal anesthesia.
Materials and methods: Spinal anesthesia was administered using 0.5% bupivacaine and fentanyl 12.5 mcg. At the end of the surgery, USG-guided ESPB with
10 ml 0.5% bupivacaine + 10 ml saline was applied in ESPB group at the level of T12. At the postoperative 2, 4, 12 and 24th hours, patients' rest, cough, movement, low back and headache VAS values, analgesic drug use, first analgesic use time and satisfaction were evaluated.
Results and discussion: 49 patients in ESPB group and 50 patients in the control group with similar demographics were included. Rest, movement and cough VAS values at 2, 4, 6 and 12 hours in the ESPB group were significantly lower than control group (Table 1).

Time		ESPB	Control	p value
	VAS rest	0,81±1,39	2,84±2,48	<0,001
2.hour	VAS movement	0,84±1,45	3,44±2,70	<0,001
	VAS cough	0,88±1,51	3,64±2,78	<0,001
	VAS rest	2,98±1,53	4,30±2,41	0,002
6.hour	VAS movement	3,53±1,68	5,22±2,39	<0,001
	VAS cough	3,53±1,79	5,40±2,48	<0,001
	VAS rest	2,71±1,80	3,78±2,49	0,025
12.hour	VAS movemet	3,12±1,83	4,76±2,57	0,001
	VAS cough	2,98±2,04	4,92±2,73	<0,001

Table 1: VAS values

The time to first analgesic use was longer in ESPB group (5.03±4.99 hours vs. 2.49±1.21 hours, respectively, p<0.001), and satisfaction was better.
Total diclofenac consumptionand need for rescue analgesic in the first 24 hours were higher in control group (128,80 ± 56,27mg vs.178,72 ± 61,67mg, p<0,001). A negative correlation was found between ESPB spread level and VAS values.
Conclusion(s): With ESPB, somatic and visceral components of acute pain after CS can be blocked together. With effective analgesia, patients' ability to take care of their newborn babies and move enough to breastfeed increases satisfaction. ESPB can be succesfully applied as a part of multimodal analgesia after CS.
References:
Hamed, M.A.,et al., *Analgesic efficacy of erector spinae plane block compared with intrathecal morphine after elective cesarean section: a prospective randomized controlled study.* J Pain Res,2020.**13**:p.597-604

04AP04-10
Analgesia Nociception Index as an objective pain index during labor and the effect of the parturient's emotional stress on it - a case report

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Background: Objective pain assessment during labor remains a challenge. The Analgesia Nociception Index (ANI) measures the patient's autonomous system activity, by analyzing heart rate variability due to respiratory sinus arrhythmia. ANI is a vagal tone index, although it was primary developed for pain evaluation in patients under general anesthesia.
Case Report: A 29 year old parturient in labor expressed the wish for epidural analgesia. After informed consent, an epidural catheter was placed and a Programmed Intermittent Epidural Boluses protocol was initiated. Pain scales and ANI confirmed adequate analgesia and patient's satisfaction was remarkable. An inconsistency related to pain in ANI recordings was noted for 20 minutes.
During that period although no pain was experienced, the parturient was under severe emotional stress because transient external fetal heart monitoring abnormalities were disclosed to her. ANI returned to normal with the amelioration of this situation.
Discussion: This is the first reported case of ANI in labor epidural analgesia with emotional stress interfering in the recordings. ANI provides a noninvasive window to the balance between parasympathetic and sympathetic system. High ANI values represent prevalent parasympathetic tone, whereas low values are typical of an increase in sympathetic outflow due to pain or other factors inducing stress. Even though awake individuals are exposed to external visual and auditory stimuli, thoughts and emotions, it has been showed that ANI has an inverse linear relationship with visual analogical pain scores in parturients without epidural analgesia(1).
In our case, the analgesic effect of lumbar epidural was clearly depicted in ANI. Moreover, the effect of the parturient's emotional stress on ANI was prominent, restating the results of a recent clinical trial concluding that ANI measures emotional status individual changes(2).
References:
1. Le Guen M, et al. The Analgesia Nociception Index: a pilot study to evaluation of a new pain parameter during labor. *Int J Obstet Anesth* 2012; 21:146-151.
2. Abdullayev R,et al. Analgesia Nociception Index: Heart Rate Variability Analysis of Emotional Status. *Cureus*2019; 11:e4365.
Learning points: Individual pain perception complicates pain assessment during labor. ANI reliably reflects adequate epidural analgesia in labor. Awareness must be raised for factors interfering with ANI in awake patients; hence further clinical exploration is essential.

04AP04-11
Hemodinamic diference in obstetric patients lead BU SAB l3-l4 betwen covid 19 PCR + (non or mild symptoms) and PCR - group

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Background and Goal of Study: During the Covid 19 pandemic our clinic take care of Covid 19 PCR+ mothers in our country , some of them ended up due to an obstetric indication by SC. The aim of this study is presumption that severity of the Covid 19 disease indicate the impact of inflammatory mediators on the cardiovascular stability in PCR+ pregnant women , with no symptoms or with mild clinical picture of the disease, during SC in the early stages of the disease. wich may change events.

Materials and methods. This survey study used data collected from the OT monitoring during the Covid 19 pandemic during 2021 of patients delivering with SC under SAB. The statistical data for testing the significance in the differences between the examined two groups were processed with Student-test.

In the first group was 13 patients with COVID 19 positive PCR test, done in a negative vacuum OT ,with all PP measures applied. They were at admission to the hospital without any symptoms , or with mild COVID 19-like symptoms which can be easily confused with normal pregnancy symptoms. Patients with moderate to severe clinical picture were excluded. and also with greater blood loss than 750 ml .

The second control group of 26 PCR - patients was randomly selected .

All was operated under SAB at L3-l4. Data collected during the SC in the OT included the initial systolic and diastolic pressure in both groups, systolic and diastolic pressure at the first drop below 30%. Consumption of the sympathomimetic was noticed during the operation and they was calculated for kg /bw in both groups.

Results and Discussion: Student Test between the first and the second group show that there was a significant difference in the value of the drop in systolic and diastolic pressure, difference in the drop in systolic pressure between the two groups p = 0.032 and the difference in the drop in systolic pressure p = 0.0059.

PCR +	7.16	21.3
PCR-	1.72	7.25
	Phenylephrine**µg** /kg/bw	Ephedrine **µg**/kg/bw

Table. Difference in the consumption of sympathomimetics in favor of the COVID19 PCR +

Conclusion: We assume that the inflammatory and cytokine mediators in COVID 19 PCR positive patients without or with a mild clinical picture impact the cardiovascular system even at an early stage of the disease when the clinical picture is not yet sufficiently manifested and contribute to a greater cardiovascular instability.

04AP04-12
McArdle disease and labor: an anesthesic challenge

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Background: McArdle disease or glycogen storage disease type V is a hereditary disorder secondary to mutations in the muscular phosphorylase (an enzyme related to glycogen metabolism). It is considered a rare disease causing symptoms such as early fatigue, myalgia, rhabdomyolysis and acute kidney injure (AKI).

Case report: A 36-years-old pregnant woman previously diagnosed with McArdle disease at age 17 with no other comorbidities was admitted to hospital in labor at week 39. A complete anamnesis was obtained: she referred exercise induced muscular fatigue and pain limiting her daily living activities. She needs help in tasks such as washing her hair, holding light weights and go upstairs. She presented episodes of choluria and occasional loss of consciousness with extenuating exercise.

Epidural analgesia – sought by the patient- was performed uneventfully after ruling out any contraindication and after obtaining the patient's consent. We administrated an initial bolus of 8ml of 0.25% bupivacaine and 50mcg of fentanyl following an epidural infusion of 0.1% bupivacaine with fentanyl 2mcg/ml. Delivery was uneventful and the patient remained asymptomatic.

Discussion: The documentation of labor and delivery of women with McArdle disease from an anesthetic point of view is quite scarce in literature. Myophosphorylase deficiency does not affect the uterine muscular activity. Although epidural analgesia is not contraindicated the risk of suffering an acute episode is increased due to an extenuating effort such as pushing during labor. This could lead to maternal rhabdomyolysis and AKI, compromising fetal well-being. If general anesthesia is preferred succinylcholine and volatile anesthetic agents should be avoided due to the risk of rhabdomyolysis. Additional considerations include avoiding fever and tremors. Some authors recommend administration of dextrose. These patients benefit from an appropriate preanesthetic evaluation as well as a multidisciplinary management including anesthesiologists, gynecologists and neonatologists.

Learning points: Although the complications risk does not appear to be increased in these patients,due to the lack of scientific quality studies, close monitoring of both mother and child must be considered.

We should not forget the potential risk of complications associated with pushing during labor and taking special care regarding specific anesthetic drugs. An adequate preanesthetic evaluation and multidisciplinary management are mandatory in these cases.

04AP05-01
Questionnaire survey study to investigate anesthesiologists' decisions regarding intravenous supplementation to neuraxial anesthesia during cesarean delivery

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Background and Goal of Study: Administration of general anesthesia (GA) or intravenous supplementation (IV-Spplm) for cesarean delivery (CD) may be considered failure of neuraxial anesthesia, (1) however the reasons for their administration have not been well investigated. We performed a survey study of the incidence of IV-Spplm to neuraxial anesthesia for CD, and secondary aims were to report the reasons and the timing of administration (before/after incision/delivery).

Materials and Methods: Following IRB approval, the duty or on-call anesthesiologist in the labor ward was contacted on a daily basis and asked to complete the Google Forms survey if a CD had been performed under GA, or IV-Spplm to neuraxial anesthesia had been administered. Hospital records were searched for the denominator of CDs performed under GA or IV-Spplm.

Results: According to our database, Aug 1 to Dec 31, among 936 CDs, 27(3.9%) were performed under GA, including 9 conversions after spinal and 4 after epidural anesthesia. IV-Spplm was administered to 194(20.7%) women. The survey was completed in 176/221 cases (79.6% response rate). From survey responses, GA was administered to 12 women, 3 after failed neuraxial anesthesia (1 spinal, 1 epidural augmentation, both identified prior to incision, and 1 after delivery due to prolonged surgery). IV-Spplm was administered to 164 women (Table).

Reasons for intravenous supplementation (women who did not receive general anesthesia) according to survey respondents	N=164
Patient discomfort	29
Patient hemodynamic instability	1
Intraoperative nausea and vomiting	31
Patient request	33
Surgeon request	1
Prolonged surgery	5
Pain	16
Anxiety	38
Shivering	1
Missing	9
Timing of intravenous supplementation (women who did not receive general anesthesia) according to survey respondents	**N=164**
After incision, before delivery	7
After delivery	129
Prior to incision	23
Missing	5

Table. Survey responses regarding reasons and timing of intravenous supplementation.

For 22/91(24.1%) spinals and 26/77(33.8%) epidurals the block was not checked prior to skin incision. For 7 women with an epidural catheter that the anesthesiologist considered was non-functional for labor analgesia; 2 received spinal and 5 had labor epidural augmentation, followed by IV-Spplm prior to the skin incision (n=2), after skin incision prior to delivery (n=2), after delivery (n=1). Preferred IV-Spplm after delivery was propofol; respiratory depression was the most common complication after IV-Spplm (n=17).

Conclusion(s): The block was not habitually tested prior to incision; even among women with effective neuraxial anesthesia, over 20% received IV-Spplm for anxiety, discomfort, pain, and maternal request. Future work involving patients is needed to enhance knowledge for IV-Spplm adminstration.

04AP05-02
Thoracic segmental spinal anesthesia for cesarean section in a parturient with severe COVID-19 acute respiratory distress syndrome

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Background: A case of 33 year old parturient had hyperemesis gravidarum until 36 weeks of gestation presented with severe covid-19 pneumonia requiring non-invasive ventilation(NIV). Cesarean section was done under segmental thoracic spinal anesthesia with NIV.

Case report: 33 year old parturient came with hyperemesis gravidarum persisting up to 36 weeks, admitted for safe confinement. Treated with thiamine, pyridoxine, ondansetron, IV fluids. Blood count, RFT, LFT, TSH, amylase, lipase was normal. Had generalized back pain with no localizing signs and papilledema.

Later, she had fever, dyspnea and SpO2 - 79% in room air, pulse-150/min, BP- stable, echo- no RWMA, RA,RV -normal, IVC-0.5cm, >50% collapsing. Treated with- NIV- Pressure support at 60%FiO2 with P/F ratio in ABG-150, IV fluids. CORADS-14/25, inflammatory markers-significantly elevated.

Cesarean section was performed in view of maternal ARDS under thoracic spinal anesthesia at T9-T10 interspace with 0.5% ropivacaine 8 mg with NIV support and noradrenaline infusion to mitigate hypotension. ASA standard monitors used. Hemodynamics were stable and oxygen requirements decreased after delivery of fetus and weaned off NIV in 12 h as P/F ratio improved. Was off oxygen support by 96 h under steroids and remdesivir, anticoagulants cover.

Discussion: Invasive mechanical ventilation was associated with increased rate of mortality in Covid. NIV can be used to treat patients with severe Covid-19 pneumonia provided they are monitored[1]. Our patient was assessed periodically and P/F ratio improved, tachypnea settled. Neuraxial anesthesia is preferred in Covid-19 parturient unless contraindicated[2].Segmental spinal anesthesia was used in severe lung disease patients who are high risk for GA owing to advantages in respiration and hemodynamics. MRI study confirms that spinal cord touches dura mater anteriorly in thoracic region providing the margin of safety to perform intrathecal injection[3]. Our patient was able to move her legs under thoracic spinal anesthesia and delivered a healthy child. Multidisciplinary team approach is of utmost importance in care for such patient.

References:

1. https://dx.doi.org/10.1183%2F13993003.04247-2020
2. doi: 10.1213/ANE.0000000000004831
3. DOI: 10.35248/2155-6148.20.11.953

Learning points: Segmental Spinal Anesthesia can be a new horizon in high risk parturient with maternal ARDS with future studies warranted.

NIV can be used in severe maternal COVID-19 ARDS with adequate monitoring.

04AP05-04
Anesthetic management of a patient with catecholaminergic polymorphic ventricular tachycardia for a caesarean section

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Background: Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT) is a rare congenital arrhythmogenic disorder induced by physical or emotional stress. Clinically, syncope associated with exercise or emotional stress is the most often described symptom, caused by a rapid polymorphic and bidirectional ventricular tachycardia, which may degenerate to cardiac arrest. It is *usually* diagnosed in children and adolescents.

We report a case of an anesthesia for a patient with CPVT.

Case report: 18-year-old female, 38 weeks pregnant, with CPVT diagnosed at the age of 15 after a cardiac arrest for which she had an implantable cardioverter defibrillator (ICD). Medicated with nadolol and flecainide. The pregnancy was uncomplicated and patient had been assigned to urgent caesarean section as she went into labour. After monitoring according to ASA standards, the procedure was carefully explained and a magnet placed to temporarily suspend ICD function. A combined spinal-epidural anaeshtesia was performed and 8 mg of bupivacaine and 2 mcg of sufentanil were injected in the subarachnoid space.

Throughout the surgery the cardiac rhythm remained sinus. Hypotension was successfully treated with fluids and 150 mcg of phenylephrine. Pain was carefully managed through epidural analgesia. She remained monitored at an high Dependency Unit and was discharged three days later after an uneventful recovery.

Discussion: The emotional stress and pain associated with labour in these patients can cause life-threatening arrhythmias. Anxiety usually is treated with adequate premedication but concerns about fetal respiratory depression and outcomes were raised in this case, thus the option for an adequate doctor-patient communication instead.

CPVT patients anesthetic goals include avoidance of endogenous catecholamine surges secondary to fear or inadequate levels of anesthesia, avoidance of extrinsic catecholamines, especially β-adrenergic agonists, maintenance of therapeutic levels of β-adrenergic blockade and treatment of dysrhythmias if they occur. Fluids are the first line treatment of hypotension. If required, an α-adrenergic agonist such as phenylephrine can be used. After the procedure an adequate pain management is important.

References:

Kim CW, et al. Catecholaminergic Polymorphic Ventricular Tachycardia. Cardiology in Review 2020;28: 325-331

Leenhardt A, et al. Catecholaminergic Polymorphic Ventricular Tachycardia. Circ Arrhythm Electrophysiol. 2012;5:1044-1052

04AP05-05
Anesthesia management for elective cesarean section in a patient with Three M syndrome

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Background: 3-M syndrome is an extremely rare recessive autosomal genetic disorder, with about 200 individuals described in the literature. It is characterized by pre and post-natal growth retardation, low birth weight, short stature (dwarfism), distinctive craniofacial and skeletal abnormalities and normal intelligence. Pregnancy in women with dwarfism is uncommon and cesarean section is generally indicated for delivery. There is lack of sufficient data and no definite recommendations regarding either general or regional anesthesia for cesarian section in this population.

Case report: A 41-year-old pregnant woman with 3-M Syndrome was scheduled for delivery by elective caesarean section at 39 weeks of gestation. The patient had a history of bone dysplasia, extremely short stature and was diagnosed in 2019, in the context of preconception genetic counselling. She had undergone several previous general anaesthesia and local anesthesia and there was no report of any anaesthetic problem. She didn't have any difficult airway predictor. Her vertebral column was short, with lumbar hyperlordosis, narrowed pelvis and the intervertebral lumbar spaces were easily palpable. The cesarian section was performed uneventfully under continuous spinal anaesthesia.

Discussion: To our knowledge, we report the first case of a pregnant woman with 3M syndrome submitted to a cesarian section under neuraxial anaesthesia. In our institution the practice of regional anesthesia for elective cesarian section is considered gold-standard. The patient showed personal preference for performance of this technique and continuous spinal anesthesia gave us the possibility to safely titrate sensitive and motor block, which happened uneventfully.

No complications were observed during the perioperative period or on the first 6 months of follow-up. This case report might have important implications regarding the anesthetic management of this extremely rare genetic disorder, providing regional anesthesia as an option for this population.

References:

1. Orphanestesia - Anesthesia recommendations for patients suffering from 3-M syndrome. https://www.orpha.net/data/patho/Ans/en/3-m-syndrome-1-EN.pdf

2. Galea M, Comara S, Anaesthesia for emergency caesarean section in a woman with 3M syndrome; Int J Obstet Anesth2008 Apr;17(2):197-8;doi: 10.1016/j.ijoa.2008.01.005

Learning points: Anesthetic management of pregnant women with Three M Syndrome

04AP05-06
When the mirror tells us all: Ballantyne syndrome, a case report

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Backround: Mirror syndrome, also called Ballantyne syndrome, is a rare and potentially life-threatening condition for both mother and fetus, characterized by a triad of fetal hydrops, placentomegaly and maternal edema. The pathophysiological mechanism remains unknown and multiple etiologies can lead to the syndrome[1]. An accurate diagnosis and prompt intervention can significantly impact fetal mortality and maternal morbidity[2].

Case report: A 38-year-old woman, in her second pregnancy at 30 weeks gestational age, with a late rhesus isoimmunization and fetal hydrops diagnosis, was admitted to the emergency department with hypertension and edema following an intrauterine blood transfusion. Acute renal injury, thrombocytopenia (48 x 10^9/L) and rapidly progressive hypertension motivated an emergent cesarean, under balanced general anesthesia. 1g Tranexamic acid, 2g fibrinogen and 2 platelets pools were administered. The estimated blood loss was 1000mL. A female newborn, Apgar score 5/7/8, 2540g, survived 4 hours and puerpera was transferred to the intensive care unit. Progression to hemorrhagic shock due to massive postpartum hemorrhage culminated with the need for a salvage hysterectomy hours later. A substantial recovery was observed, and the patient was discharged 14 days later.

Discussion: Diagnosis might be challenging and relies on the recognition of both fetal and maternal findings. Interventions that correct fetal hydrops and labor induction are associated with improved fetal survival and reversal of maternal symptoms usually occurs after delivery. Nonetheless, complications may occur and impact maternal morbidity such that the level of care and support must be adequate throughout the perioperative period[3].

References:

1. Mathias CR, Rizvi C. The diagnostic conundrum of maternal mirror syndrome progressing to pre-eclampsia - A case report. Case Rep Womens Health. 2019;23:e00122. Published 2019May14. doi:10.1016/j.crwh.2019.e00122

2. Braun T, Brauer M, Fuchs I, et al. Mirror syndrome: a systematic review of fetal associated conditions, maternal presentation and perinatal outcome. Fetal Diagn Ther. 2010;27(4):191-203. doi:10.1159/000305096

3. S. Allarakia, H.A. Khayat, M.M. Karami, et al., Characteristics and management of mirror syndrome: a systematic review (1956–2016), J. Perinat. Med. 45 (9)(2017) 1013–1021.

Learning points: An appropriate diagnosis and anesthetic management are essential to reduce morbimortality.

04AP05-07
Anesthetic management of haemorrhagic shock in a pregnant patient with COVID 19. Unsual cause of massive bleeding during pregnancy due to gastro-esophageal laceration (Mallory-Weiss syndrome): a case report

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Background: Massive bleeding in obstetric patients requires a multidisciplinary approach. The application of protocols decreased mortality. We describe a case of haemorrhagic shock due to an unusual cause of bleeding in an obstetric patient affected by COVID-19.

Case report: This 37-year-old pregnant women, had a personal medical history of anticardiolipin antibodies and previous caesarean delivery (CD). She was diagnosed of COVID-19 at 39.3 weeks of gestation (WG). At 40 WG, she was admitted at the emergency department for an episode of haematemesis.

After a stable phase, she presented a massive hematemesis with haemorrhagic shock, which justified her transfer to the ICU. Her haemoglobin level dropped from 11.8 to 4,9 g/dL. She was intubated and an urgent gastroscopy allowed to sclerose unknown Mallory-Weiss lesions. 5 red blood cells concentrates (RBC) and 2 fresh frozen plasmas were transfused, and an intravenous infusion of 0,2 mcg/kg/min noradrenalin was initiated.

Fetal tococardiographic recording showed a low foetal reactivity, so a category I CD was indicated. The patient was transferred to the obstetric OR. Surgery was performed without major complications. Intraoperative bleeding was 700mL. Uterus contraction was obtained after 3+3 ui oxytocin. A healthy male neonate was delivered.

In the OR, transfusion was guided by thromboelastogram: the patient received 6 gr of fibrinogen and 1g of tranexamic acid due to severe deficit of fibrinogen (FIBTEM A10 of 3 mm), and 2 more RBC. After CD, a gastroscopic control identified an oesogastric tear with arterial bleeding, so two endoclips were placed, which stopped the bleeding. Both general surgery and interventional radiology teams were alerted.

At the end of procedure, haemodynamic and metabolic situation was normalized, and the patient was transferred to the ICU. Vasopressor support could be rapidly withdrawn, and she was extubated.

The patient was discharged from the ICU on day 3 and from the hospital on day 6.

Discussion: Multidisciplinary and coordinated approach decrease mortality during haemorrhagic shock in obstetric patients, especially when the cause of the haemorrhage is not the uterus.

Unusual causes of bleeding in the context of COVID-19 make more indispensable the use of protocols to guide transfusion and correct coagulopathy.

References:

1. Spahn, D.R*Crit Care*23, 2019
2. WOMAN trial, Lancet. 2017
3. AAGBI, Anaesthesia 2010; 65
4. Collins PW, IJOA 2019;37
5. Mallaiah S, Anaesthesia 2015;70

04AP05-09
Spontaneous uterine rupture – a clinical case

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Background: Uterine rupture is a rare cause of major obstetric haemorrhage with an incidence of 0.2% among women with prior caesarean section[1]. This event is more uncommon prior to labour, with possible fatal outcomes to both mother and foetus[2].
Case report: A 35-year-old woman 25 weeks pregnant, with a previous caesarean delivery, presented to the emergency department with malaise and abdominal pain. She was pale, tachycardic and hypotensive with GCS of 11. We initiated fluid resuscitation. Arterial blood gas showed elevated lactate. Abdominal ultrasound revealed foetal death and placental abruption.
An emergent caesarean section was performed due to a presumptive haemorrhagic shock. Blood was taken to crossmatch, complete blood count, clotting and ROTEM®. We activated the major haemorrhage protocol and administered blood, fibrinogen and tranexamic acid. We performed a general anaesthesia and placed an arterial line. The surgical team observed a uterine rupture with hemoperitoneum, with an estimated blood loss of 3000 mL.
The patient required vasoactive treatment with ephedrine and noradrenaline perfusion. We administered further blood products according to point-of-care tests. At the end of the surgery, the patient was extubated and hemodynamically stable without vasopressors, with GCS of 15. Ongoing clinical and laboratorial assessment continued in the PACU.
The patient was discharged home after 4 days.
Discussion: Uterine rupture is a rare event, with a higher incidence among women with previous caesarean deliveries under trial of vaginal delivery[2]. Nonetheless, our patient was not in labour and presented with a spontaneous uterine rupture.
Firstly, this case proves the importance of an effective communication with the Obstetrics team to establish the likely aetiology and define a management plan.
Secondly, we highlight the life-saving relevance of an institutional major haemorrhage protocol, with further personalized blood management according to point-of-care tests.
References:
1. Incidence and outcomes of uterine rupture among women with prior caesarean section: WHO Multicountry Survey on Maternal and Newborn Health, 2017.
2. Anaesthetic Considerations for Vaginal Birth After Caesarean Delivery, ATOTW tutorials, 2021.
Learning points: Uterine rupture is a rare diagnosis that must be considered in the case of a pregnant woman with signs of shock. A major haemorrhage protocol and a clear communication with the Obstetrics teams can be life-saving.

04AP05-11
Impact of an interdisciplinary process to increase utilization of neuraxial anesthesia for cesarean delivery: a retrospective database analysis

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Introduction: Cesarean delivery (CD) is safer for mother when performed under neuraxial anesthesia, and the rate of general anesthesia CD in the UK and US is reportedly <8%. (1,2) Starting Jan 2018 we implemented educational and management strategies to decrease the rate of general anesthesia CD, that was >10% for unplanned cases.
Methods: In our tertiary medical center, currently 13,000 labors, 19% cesarean delivery, we instituted monthly anesthesia and interdisciplinary (anesthesia and obstetrician) educational meetings and daily bedside teaching for optimum safe anesthesia for CD. Through these meetings, and daily interdisciplinary hand-overs with the obstetricians, we emphasized the importance of proactive anesthesia and early updates regarding impending unplanned CD.
Additionally, from July 2018 we drew up a syringe with lignocaine 18 mL + bicarbonate 8.4% 2ml + 50 mcg epinephrine syringes, kept for 8 hours as per pharmacy recommendation, to be used for labor epidural analgesia augmentation. Following IRB approval we retrieved data from the hospital electronic record for mode of anesthesia, conversion of spinal or epidural to general anesthesia, supplementary intravenous medications for planned and unplanned CD per year, 2018 - 2021 to assess the impact of our educational strategies.
Results: During the study period, 2018 to 2021, there were 8,946 cesarean deliveries performed; 2,860 were unplanned. The overall rate of general anesthesia for CD decreased from 9.4 to 3.1%, and from 19.7 to 8.1% for unplanned cases. The rate of general anesthesia performed for women with labor epidural analgesia in place decreased, 4.5% to 1.5%. Supplementary intravenous medications were administered frequently for all cases.
Conclusion: This study demonstrates the utility of educational interventions to advance patient safety. It highlights the importance of proactive interdisciplinary labor management. Future investigations will investigate use of supplementary intravenous medications during CD.
References:
1. Bamber J. BJA 2020;125:580-587
2. D'Angelo R. Anesthesiology 2014;120:1505-12

04AP05-12
Retrospective database study to investigate the effect of phenylephrine infusion versus vasopressor boluses during cesarean delivery on neonatal acidosis

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Background: Maternal hypotension after spinal anesthesia is associated with neonatal acidosis, yet this is potentially modifiable through use of prophylactic vasopressor treatment.
Objective: To examine the relationship between the use of prophylactic phenylephrine infusion to avoid spinal hypotension and the occurrence of neonatal acidosis, in a planned cesarean delivery population.
Study design: We performed a retrospective analysis of women with singleton pregnancy undergoing spinal anesthesia for planned cesarean delivery with a retrievable neonatal pH, using electronic medical records. The period of interest during the cesarean delivery was from spinal anesthesia injection until neonatal delivery.
Occurrence of spinal hypotension (at least one measurement of systolic blood pressure < 100 mmHg) and use of prophylactic phenylephrine infusion (50 mcg/min) were the primary study variables. The primary outcome was neonatal acidosis (pH of < 7.1).
Results: We identified 4,503 women meeting inclusion criteria from Jan 2016 until May 2021. Overall, 1,726 (38.3%) women experienced at least 1 event of spinal hypotension, 1,811 (40.2%) received prophylactic phenylephrine infusion. Neonatal acidosis occurred in 70 (1.6%) cases. Neonatal acidosis occurred in 2.6% cases when spinal hypotension occurred and 1.2% cases when spinal hypotension did not occur, p=0.001.
The rate of spinal hypotension was 28.4%, lower, among women who received a prophylactic phenylephrine infusion, versus 49.0% among women treated with vasopressor boluses, p<0.001. Neonatal acidosis occurred in 1.9% cases when phenylephrine prophylaxis was used, and 1.7% cases with vasopressor boluses, p=0.556. In the multivariable regression model, the likelihood of neonatal acidosis when spinal hypotension occurred was OR 2.99; 95% CI, 1.42 to 3.9, p< 0.001 and when phenylephrine infusion was used, OR 0.77 (95% CI 0.47 to 1.27), p=0.301.
Conclusion: Despite the unsurprising finding that the use of prophylactic vasopressor infusions was associated with a lower frequency of spinal hypotension, they were not associated with decreased likelihood of neonatal acidosis. We plan to further investigate our cohort and to examine other variables associated with neonatal acidosis.
Reference:
Kinsella SM. Anaesthesia, 2018;73:71-92.

04AP05-13
Anesthetic management of a pregnant woman with systemic mastocytosis who develops severe preeclampsia prior to the indication for urgent cesarean section

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Background: The combination of Systemic mastocytosis(SM) and severe preeclampsia with new-onset thrombopenia represents an anesthetic challenge when an Emergent caesarean section(ECS) is indicated.
Case report: Female, 43 years-old, primiparous, with SM. After uneventful pregnancy, she went to the emergency room in her 38 weeks for a headache and hypogastralgia.
BP of up to 200/89mmHg, oligoanuria, edema, and erythematous lesions. Analytical: Hb 10.2gr/dl, platelets 69x10E9/L, LDH 280 IU/L, AST 40IU/L and Cr 0.9mg/dL with proteinuria.
A differential diagnosis was established between severe preeclampsia and incomplete HELLP syndrome.
Treatment with Nifedipine, Magnesium Sulfate and induction of labour with Oxytocin was started.
ECS due to prolonged induction and poor blood pressure control, after administration of corticosteroids, antihistamines and Montelukast. Platelets 67x10E9/L.
Procedure with intubated general anesthesia and rapid sequence (Etomidate + Rocuronium) without opiates. Requires clevidipine for blood pressure control.
She was admitted to the ICU intubated until spontaneous recovery of the neuromuscular blokade, clevidipine-dependent hypertensive. In postoperative hemogram, thrombopenia of 33x10E9/L with progressive improvement without transfusion. Discharge to plant at 72h after good evolution.
Discussion: SM does not contraindicate any anesthetic technique, although local-regional ones are the choice. In our case, we opted for general anesthesia due to the emergency and the progressive decrease in platelets. With his lower platelet count, spinal anesthesia could have been performed, although its course was unknown on induction. The safety limit is at 70-80x10E9/L, making an individual assessment between 50-70x10E9/L.
SM poses a difficulty due to the pharmacological limitation due to the risk of triggering a crisis (NSAIDs, opioids, α-β blockers and certain local anesthetics) and the lack of evidence(Sugammadex). Much more in case of an emergency and associated with severe preeclampsia, since labetalol is contraindicated. In this case, Clevidipine was useful in the fast and precise control of BP.
Despite the need to terminate the pregnancy, an immediate cesarean section is not required. Labor was induced, although due to the lack of progression and poor blood pressure control, an ECS was chosen.
References:
Pascale D.,Et al.Perioperative Management of Patients with Mastocytosis.Anesthesiology.2014.
Learning points: SM.Severe preeclampsia.ECS.

09AP05-11
Contraceptive failure due to Sugammadex: avoiding unplanned pregnancies

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Background and goal of study: Sugammadex is a modified gamma cyclodextrin, used clinically as a selective relaxant binding agent. Due to its interaction with progesterone, it may reduce the effectiveness of hormonal contraceptives, including the progesterone-only pill, Combined pill, vaginal rings, implants and intra-uterine devices [1].
The scale of this problem is unknown. Current guidance is to inform all women of childbearing age (WCBA) of the interaction between Sugammadex and hormonal contraception either ahead of anticipated use, or following administration [1].
The overall aim of this project is to ensure that WCBA can safely receive Sugammadex as part of an anaesthetic and has involved surveying clinicians, sampling compliance and seeking innovative solutions.
Materials and methods: A survey on Sugammadex (7 questions), enquiring about usage patterns and side effects, was sent to all anaesthetists. A retrospective audit was performed over a 6-week period across University College London Hospital sites. Patients' details were obtained from Sugammadex books. A WCBA was defined as a woman aged between 12-55 years. The medical notes were reviewed to determine if the women should have been given advice and whether there was documentation of advice having been given.
Results and discussion: The key survey findings, from 82 responses, were that 94% were aware of the risk of contraceptive failure but 70% did not discuss Sugammadex use with patients. During the audit, Sugammadex was administered to 234 patients, of which 28% were WCBA. Forty-eight should have received advice on the risks of contraceptive failure, but this was not documented.
Conclusion(s): It is concerning that we are seldom informing patients of the risk of contraceptive failure following Sugammadex use. We have a duty of care and are implementing a series of peri-operative innovations, as outlined in Figure 1, to safeguard women. Future use of Sugammadex is expected to rise as it becomes cheaper and therefore ensuring the safety of WCBA receiving Sugammadex must be a priority.

<table>
<tr><th>EDUCATION</th><th colspan="4">PERI-OPERATIVE</th></tr>
<tr><td rowspan="2">Training recovery staff and anaesthetists on interventions</td><td>Pre-operative</td><td>Intra-operative</td><td colspan="2">Post-operative</td></tr>
<tr><td>EPIC: Consent button for Sugammadex use</td><td>EPIC: Warning pop-up after drug prescribed</td><td>EPIC: Patient Letter</td><td>Patient Information leaflets</td></tr>
<tr><td>↓</td><td>↓</td><td>↓</td><td>↓</td><td>↓</td></tr>
<tr><td colspan="5">REAUDIT CLINICAL PRACTICE</td></tr>
</table>

Figure 1. Safety innovations

References:

1. Williams R and Bryant H 'Sugammadex advice for women of childbearing age' Anaesthesia 2018 73: 125-134

Paediatric Anaesthesiology

05AP01-01
Propofol sedation dose for MRI examination in Autistic children

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Background and goal of study: MRI examination is a standard procedure for all a patient with neurologic disorders. to perform this examination is important that doesn't move during the procedure, and for the children with autistic syndrome(AUT) sedation is required. We had a suspicion that children with AUT required a higher propofol dose than normal children.
Materials and methods: During eight years period 50 AUT children aged 3- 13 years received propofol infusion for brain MR. The control group of 50 patients of the same age and the same mid-time of MR examination was performed. The patients received an initial loading dose of propofol and after 3 min the sequential dose until the end of the procedure.
Results and discussion: Patient characteristics: 6.5± 3.5 years. Weight 22,3± 10.2 kg. MRI scanning time 17± 4 min. Comparison between two groups AUT vs Normal. Propofol loading dose in mg/kg (2,8 vs 2). Children requiring additional propofol (25 vs 6), Additional doses of propofol (3± 1 vs 1), The total dose of propofol mg/kg (4,5± 0,8 vs 3,6± 0,7). Recovery time min (7,5± 4,3 vs 9± 5,5).
The comparison between the two groups showed AUT patients required more propofol loading dose, additional doses, and total doses. Even recovery time was faster than in normal intellectual children. The difference for propofol needs may have some relation with the change of GABA A receptor subunit distribution during brain maturation because AUT patients have been reported to have abnormal GABA a receptor (1).
The differing response of AUT patients may also correlate with their hypersensitivity to acoustic stimuli and increased serum level of glutamate. AUT patients are more sensitive to noise (2) including the uncomfortable sound of MRI machine
Conclusion(s): Autistic patients require more propofol doses to achieve the desired level of anesthesia. All anesthesiologists should be aware, of such patients when using propofol anesthesia
References:
1. Shinohe a Hashimoto K, Nakamura K, Tujia M, Iwata Y, Tsuchiya KJ, et al. Increased serum levels of glutamate in adult patients with autism. Prog Neuropsychopharmacol,BiolPsychiatry 2006; 30:1472-1477
2. Gomot M, Giard MH, Adrien Jl, Barthelemy c, Bruneau n.Hypersensitivity to acoustic change in children with autism: electrophysiological evidence of left frontal cortex dysfunctioning. Psychophysiology 2002; 39:577-584

05AP01-02
Outcome of early and late arterial switch operation (ASO) for transposition of great arteries with intact ventricular septum (TGA-IVS) and transposition of great arteries with ventricular septal defect (TGA-VSD): a single-center retrospective analysis

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Background and goal of study: ASO for TGA-IVS is performed within 3 weeks of life to avoid deconditioning of left ventricle (LV) that postoperatively has to work against systemic resistance (Early ASO). Despite this theory studies have shown the feasibility of ASO with low mortality in those that undergo surgery beyond 3 weeks (Late ASO).[1]
The pathophysiology of TGA-VSD is different from TGA-IVS. We sought to compare in-hospital outcome of early (<=21days) and late (>21days)ASO for both groups.
Materials and methods: Analysis of patients' data undergoing ASO from January 2010-April 2019. Data are presented as P50 (P25-P75) and N (%). Mann-Whitney U-test and Chi squared or Fisher's exact test were used to compare early and late groups within each population.
Results and discussion: In total 102 patients were analyzed of whom 70 presenting TGA-IVS and 32 showing TGA-VSD. Table 1 and 2 show the respective data. LV was preoperatively deconditioned in 1,9% (1/54) and 31,3% (5/16) patients in early and late ASO for TGA-IVS (P=0,002). None of the TGA-VSD patients showed LV deconditioning.

	Early ASO (N=54)	Late ASO (N=16)	P
Age (d)	8(7-11)	55(45-71)	0,100
Weight (kg)	3,30 (2,96-3,59)	3,46 (3,21-3,96)	0,838
Bypass time (min)	154 (132-177)	134 (97-161)	0,307
Max postop serum lactate (mg/dL)	2,60 (1,90-3,30)	3,15 (2,35-4,70)	0,540
Duration ventilation (d)	2,5 (1,3-5,0)	5,4 (2,4-12,5)	0,610
Open chest	11 (20,3%)	12 (75,0%)	<0,001
ECMO	1 (1,9%)	4 (25,0%)	0,002
Postop pulmonary hypertension	3 (5,6%)	3 (18,8%)	0,098
LCOS	20 (37,0%)	12 (75,0%)	0,007
Mortality	1 (1,9%)	2 12,5%)	0,065

Table 1: Patients with TGA-IVS

	Early ASO (N=17)	Late ASO (N=15)	P
Age (d)	11(7-14)	162(70-285)	0,040
Weight (kg)	3,30 (3,10-3,57)	4,00 (3,56-6,53)	0,040
Bypass time (min)	172 (147-193)	188 (137-208)	0,558
Max postop serum lactate (mg/dL)	3,30 (2,60-4,60)	2,80 (1,85-3,35)	0,555
Duration ventilation (d)	7,0 (3,0-7,9)	6,9 (1,5-9,0)	0,142
Open chest	11 (64,7%)	7 (46,7%)	0,305
ECMO	1 (5,9%)	0	1,00
Postop pulmonary hypertension	3 (17,6%)	8 (53,3%)	0,034
LCOS	13 (76,5%)	10 (66,7%)	0,699
Mortality	1 (5,9%)	1 (6,7%)	0,927

Table 2: Patients with TGA-VSD

Conclusion(s): Our data confirm that late ASO can be proposed to patients with TGA-IVS at the expense of complicated postoperative course. Pulmonary hypertension is common in late ASO in TGA-VSD.

References:

1. Lo Rito M. 2020.

05AP01-03
The accuracy of Air Test as a non-invasive tool to detect atelectasis in the pediatric perioperative setting: a multi-centre prospective double-blind study

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Background: The incidence of perioperative atelectasis in children is high and closely related to intraoperative episodes of hypoxemia and postoperative pulmonary complications. During anesthetic preoxygenation with high FiO2, pulmonary atelectasis occur, especially in patients < 6 years old, where FRC and pulmonary closing volume may overlap. New borns and children <1 year old are especially vulnerable.

Goal of study: This study aims to determine the accuracy of pulse oximetry saturation (SpO_2), while breathing an FiO2 0.21 (the "Air-test"), in detecting intraoperative atelectasis in children under general anesthesia.

Materials and methods: We prospectively analyzed 72 anesthetized children in which the Air-test was performed just before extubation. This test consisted in an abrupt decrease in FiO_2 from 0.40 to 0.21 during 5 minutes.

A positive test was defined if SpO_2 decreased ≤ 96% or ≤ 2% from basal SpO2 measurment. Main end-points were SpO_2 and atelectasis diagnosed by lung ultrasound (LUS) by a blind experienced investigator.

The main outcome was assessment of the accuracy of the Air-test for diagnosing atelectasis compared with the reference LUS images.

Results: Results showed similar baseline pre-operative SpO_2 in patients with positive or negative tests (98.6±0.6 vs 98.9±0.6 %; p=0.051). SpO_2 decreased significantly at the end of the Air-Test in patients with positive tests (93.3±2.0 vs 97.9±0.7 %; p<0.0001). LUS diagnosed atelectasis in 66 of our 72 patients with a prevalence of 91.7%.

For all patients with atelectasis detected by LUS, 59 had positive Air-Test and 7 presented negative test. The ROC analysis showed that the Air-test has a sensitivity of 0.91% (95% CI 0.92-0.99), specificity of 0.98% (95% CI 0.92-0.99), and Area Under the Curve of 0.95 (95% CI 0.92-0.99) to detect atelectasis.

Discussion: This prospective analysis showed that the Air-Test is a simple, noninvasive and accurate method for detecting atelectasis in healthy anesthetized children. The test can be used as well in spontaneous breathing children treated with supplemental oxygen. The simplicity and noninvasive nature of the Air-Test conceives it as a screening tool to alert anesthesiologists about possible atelectasis formation, allowing them to tackle lung collapse. Further studies are needed to analyze the role of the Air-Test in children with pre-existing lung collapse.

Conclusion: Air-test is a simple and accurate method for diagnosing anesthesia-induced atelectasis in children.

05AP01-04
The effect of Dream Doctors in children undergoing digestive endoscopic procedures: physiological and biological assessment of emotional and cognitive consequences

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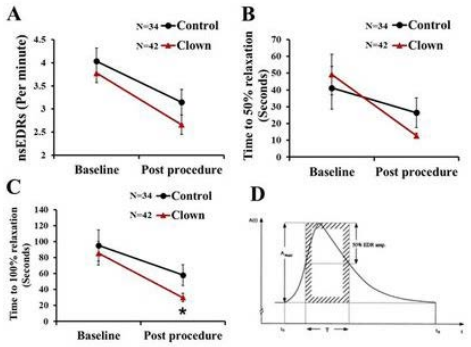
Background and goal of study: The Dream Doctors (DDs; Medical Clowns) are part of the multidisciplinary staff, principally but not only, in pediatric wards. Studies already proved that presence of medical clowns significantly reduces the level of anxiety during induction of anesthesia in children. In this study we evaluated the effect of DDs on children undergoing deep sedation for upper gastrointestinal endoscopy. We explore DD effects on attention and anxiety at baseline and post procedure.

Materials and methods: We introduced DDs to children undergoing deep sedation for upper gastrointestinal endoscopies and their parents. We explored the effects of DDs on anxiety and attention of children and their parents, undergoing gastroscopies by means of Electro Dermal Activity (EDA), startle response and pre-pulse inhibition (PPI) tests, questioners, as well as anxiety-related biologic indices.

Results and discussion: The sample included 99 children randomly assigned for two groups: DD exposed (n=52) and Controls (n=47). We found that DD significantly lowered the probability to generate startle as well as the startle amplitudes compared to controls measured using facial electromyography (EMG). Moreover, electrodermal activity (EDA) measured showed an enhanced relaxation ability as expressed in reduced non-specific electrodermal re-

sponse and the time reaching 50% and 100% EDA recovery. Finally, DD tended to lower the systolic and diastolic BP faster compared to controls. Age analysis revealed that the main effects were attributed and related only to the sub population of all children above the age of 8 years old, meaning that the effects of DDs work best at school age through adolescence.



Adults only (8-18 Years)
(A) There is general relaxation post procedure, however, Dream Doctors (Clown) only tend to enhance this ability.
(B) DD tend to enhance the latency toward 50% relaxation amplitude.
(C) DD significantly reduce the latency toward 100% relaxation post procedure
(D) Illustration for the relaxation latency measured

Conclusion(s): DDs have a significant role in the peri-operative pediatric anesthesia period, with a direct influence on the child or adolescence, but also on the parents and the medical team. In our study, DDs was shown to influence best at school age through adolescence.

05AP01-05
Central venous catheters in pediatric anesthesia and intensive care: prospective observational trial

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Background and goal of study: Securing the intravenous access is one of the fundamental interventions in paediatric anaesthesia and intensive care. Currently, the ultrasound-guided central venous catheter (CVC) insertion is recommended also in paediatric patients, however, the clinical practice may vary.
The primary aim of the study was to compare the overall success rate and the first success rate in ultrasound-guided CVC insertion versus anatomic-based CVC insertion in paediatric patients. The secondary aim was to determine the incidence of associated complications and the time from the first percutaneous puncture to the definite securing the CVC in place.
Materials and methods: Prospective observational trial was approved by the Ethics Committee by the University hospital Brno (date of approval 01/02/2020), registered on clinicaltrials.gov (identifier: NCT04211116). The trial was ongoing in the term from 03/2020 till 12/2020. Paediatric patients (28 days - 19 years old) undergoing general anaesthesia and patients admitted to pediatric intensive care indicated for CVC insertion were eligible for inclusion. The method of insertion (real-time ultrasound navigation versus anatomical-based CVC insertion) was on the operator's decision.
Results and discussion: We present data from 9 months of data collection. Overall 107 patients were included. In almost half of the patients (48.6 %) the percutaneous puncture was performed by real-time ultrasound navigation, in 51.4 % of the patients the puncture was performed by the classic (anatomical) method. The overall success rate was 100 % (n=52) in real-time ultrasound navigation group, 96.4 % 31/05/2021 2/2 (n=53) in anatomical-based insertion group. The first percutaneous puncture success rate was 57.7 % (n=30) in real-time ultrasound navigation group, 45.5 % (n=25) in anatomical-based insertion group.
Conclusions: The data show, there was no statistically significant difference between ultrasound-guided and anatomical-based CVC insertion in the overall success rate and the first success rate.
Acknowledgements: This work was supported by Specific University Research provided by MŠMT (MUNI/A/1153/2020, MUNI/A/1178/2020), supported by MH CZ - DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to the junior researcher (Jozef Klučka, Martina Kosinová, ROZV/28/LF/2020).

05AP01-06
Anesthesia management of a child with a huge Cavernous Lymphangioma - an unusual perioperative course

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Background: Cavernous Lymphangioma (CL), also known as cystic hygroma is one of the most common benign congenital lymphatic system malformations around the world. The most common location of CL is cervicofacial (70%-80%). It can also be located in other regions such as axillary, groin, mediastinum, retroperitoneum, etc[1].

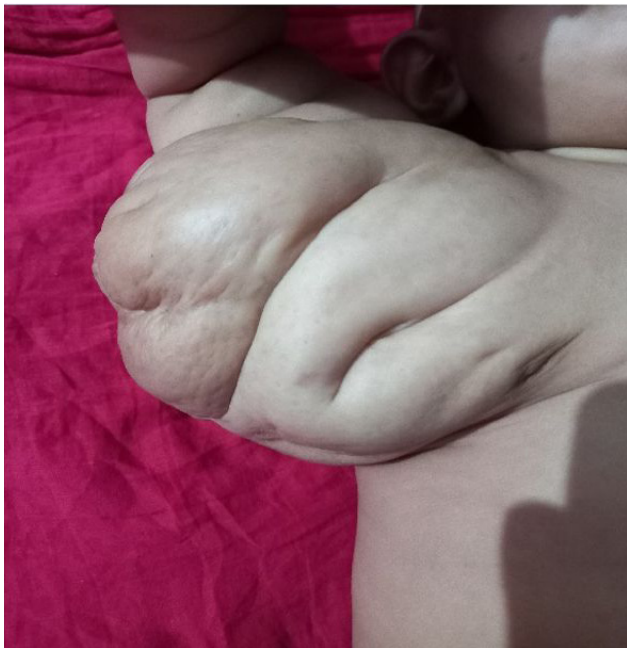

Figure. Image showing a huge cavernous hemangioma in right axillary region extending into right chest wall and right arm

Case Report: A 17 months old female child, weighing 9.8kg, presented in pediatrics out-patient department with a huge painless swelling in right axillary region. Ultrasonography and magnetic resonance imaging revealed a large cavernous lymphangioma measuring about 10×19×17 cm involving the soft tissues of right chest wall, axilla, proximal part of right arm and shoulder (encasing nerves and vessels).

The surgery was performed under general anesthesia. There was an unexpected massive blood loss intraoperatively because of opening of a venous channel, which required massive blood transfusion. The patient was shifted to PICU on elective mechanical ventilation and extubated the following day.

Discussion: Cavernous Lymphangioma surgeries are a great challenge to anesthesiologists because of difficult airway, difficult intubation, patients are prone to hypoxia, etc. To avoid and manage these potential complications, adequate knowledge of the nature of the tumor together with communication and coordination between the anesthesiologist, pediatrician, and pediatric surgeon as well as presence of an additional experienced anesthesiologist and nursing staff are required.

References:

1. Sayed ME, Touny M, Ibrahim N, Kasb I, Al-Azzawi Z. A rare case of cystic hygroma in neck and extending intothoracic cavity. International Journal of Surgery Case Reports, 2020;76:174–177.

Learning points: The anesthetist needs to consider not only induction and endobronchial intubation but also intra-operative management of the endobronchial intubation, accidental extubation, intraoperative blood loss, and anticipation of possible post-operative complications. Equally important is to not hurry extubation considering the potential for postoperative airway-related and systemic complications.

05AP01-07
Perioperative hypoxemia and postoperative respiratory events in infants with hypertrophic pyloric stenosis

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Background and goal of study: Normalization of metabolic alkalosis by intravenous fluid therapy is an important pillar in the treatment of infantile hypertrophic pyloric stenosis (IHPS) because it is thought that uncorrected metabolic alkalosis may lead to perioperative respiratory events. We aimed to study the incidence of perioperative hypoxemia and postoperative respiratory events in IHPS and the potential role of metabolic alkalosis.

Materials and methods: We retrospectively reviewed all patients undergoing pyloromyotomy between 2007-2017 in two paediatric surgical centres. All infants received intravenous fluids preoperatively to correct metabolic abnormalities close to normal. We assessed the incidence of perioperative hypoxemia (defined as SpO_2 <90% for >1min) and postoperative respiratory events. Additionally, the incidence of difficult intubations was evaluated. We performed a multivariate logistic regression analysis to evaluate the association between admission or preoperative serum pH values, bicarbonate or chloride and peri- and postoperative hypoxemia or respiratory events.

Results and discussion: The majority of 406 included infants was male (N=345, 85.0%). Median [IQR] age was 34 [19] days; 213 infants underwent laparoscopic pyloromyotomy (52.5%) and 193 infants open pyloromyotomy (47.5%).

In total, 208 infants (51%) developed ≥1 episode of hypoxemia during the perioperative period, of whom 130 (32%) during induction, 43 (11%) intraoperatively, and 112 (28%) during emergence. The attending pediatric anesthetist classified 25 out of 333 intubations (7.5%) as difficult and 17 infants required ≥3 attempts. We noticed 95 postoperative respiratory events, of whom three patients developed respiratory insufficiency.

We did not find a clinically meaningful association between admission or preoperative laboratory values reflecting metabolic alkalosis and respiratory events.

Conclusions: IHPS frequently leads to peri- and postoperative hypoxemia or respiratory events and high incidence of difficult tracheal intubations. Preoperative pH, bicarbonate and chloride are bad indicators for perioperative hypoxemic episodes.

05AP01-08
Duration of inhalation versus intravenous anaesthesia induction in paediatric patients: prospective observational trial

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Background and Goal of Study: In paediatric patients, apart from the standard intravenous anaesthesia induction, the inhalation anaesthesia induction could be used in specific situations, with the aim to avoid awake venipuncture. During the inhalation induction, the excitation stage of the general anaesthesia is variably manifested and may be accompanied by hemodynamic sympathoadrenal response.

The aim of this prospective observational trial was to compare the duration of inhalation and intravenous anaesthesia induction in paediatric patients undergoing elective surgical or diagnostic procedures in general anaesthesia.

Materials and Methods: The trial was registered on clinicaltrials.gov (identifier:NCT04527757) and designed as a prospective observational trial.

The primary aim was to compare the duration of inhalation and intravenous anaesthesia induction in paediatric patients. The duration of anaesthesia induction was defined as the time since the beginning of vital functions monitoring until the first $EtCO_2$wave (after securing the airway with a laryngeal mask or intubation). The secondary aim was the incidence of adverse events during anaesthesia induction.

Results and Discussion: Overall 512 patients (09/2020-06/2021) were included, the statistical analysis was performed on the data of 502 patients.
The median duration of inhalation induction was 6.3 min, the median duration of intravenous induction was 6.2 min, with no statistically significant difference between the groups ($P = 0.310$).
The incidence of adverse events during anaesthesia induction was higher in the inhalation induction (19.2%, $n = 66$) than in the intravenous induction (9.1%, $n = 14$, $P = 0.007$). The most common adverse events in the inhalation induction were tachycardia (83.0%, $n = 55$) and tachypnea (15.0%, $n = 10$). The most common adverse events in the intravenous induction were tachycardia and hypotension (21.0%, $n = 3$, for both).
Conclusions: The duration of inhalation and intravenous anaesthesia induction was comparable. The inhalation induction was associated with a higher number of adverse events during the anaesthesia induction, the most common was tachycardia.
Acknowledgements: Financial support and sponsorship: this work was supported by Specific University Research provided by MŠMT (MUNI/A/1166/2021, MUNI/A/1178/2021), supported by MH CZ - DRO (FNBr,65269705).

05AP01-09
Benefit of flow-controlled over pressure-regulated volume control ventilation in piglets with healthy and surfactant depleted lungs: an experimental investigation

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Background and Goal of Study: Flow-controlled ventilation (FCV) is characterized by a constant flow that is applied through an ultra-thin endotracheal tube during inspiration and expiration[1]. While the benefits of FCV on gas exchange have been demonstrated in pre-clinical and clinical studies, the value of this modality in a paediatric population is unknown. We compared the effects of FCV to pressure-regulated volume control ventilation (PRVC) on lung function in piglets before and after surfactant depletion.
Materials and Methods: Ten piglets (body weight: 10.4±0.2 kg) were anaesthetized and mechanically ventilated. Gas exchange, intrapulmonary shunt (Qs/Qt), airway resistance (Raw), respiratory tissue damping (G), tissue elastance (H) and lung aeration (by chest electrical impedance tomography (EIT)) were assessed before (BL) and after randomly assigning piglets to one-hour ventilation with FCV or PRVC. Following surfactant depletion by bronchoalveolar lavage and injurious ventilation, the measurements were repeated, using the same two ventilatory modes.
Results and Discussion: FCV maintained sufficient CO_2 elimination both in healthy and surfactant-depleted lungs (39.56±7.1 mmHg and 46.2±11.4 mmHg, respectively) with no difference with PRVC (36.0±4.1 and 39.5±4.9 mmHg, respectively for healthy and injured lungs). While a difference was detected in PaO_2/FiO_2 and Qs/Qt in healthy lungs during FCV compared to PRVC (413.7±27 vs. 469.7±16.1 for PaO_2/FiO_2 and 30.0±6.3% vs. 21.3±4.4% for Qs/Qt respectively $p<0.05$), no difference was found in PaO_2/FiO_2 or Qs/Qt after surfactant depletion. No differences in Raw, G and H values were evidenced between the modalities under any experimental conditions. Compared to PRVC, lung aeration was significantly elevated at the end of expiration during FCV ($p<0.05$), but this difference was not evidenced in injured lungs.
Conclusion(s): The effects of FCV on gas exchange, respiratory mechanics and lung aeration are comparable to those of PRVC both in healthy and injured lungs. Therefore, FCV may be a promising ventilation modality in children with injured lungs.
Furthermore, the ultra-thin endotracheal tube, may offer a unique solution in children with airway malformations.
References:
1. Johannes S et al. Eur J Anaesth. 2019 May; 36:327

05AP01-10
Ultrasound as a new tool in the assessment of pediatric difficult airway: an observational study

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Background and goal of study: This study aimed to evaluate the feasibility and accuracy of ultrasound measurements (tongue measurements, and anterior neck soft tissue thickness at the level of hyoid bone, thyrohyoid membrane, and thyroid cartilage) in predicting difficult laryngoscopy (DL) and difficult mask ventilation (DMV) in pediatrics undergoing elective surgery under general anesthesia.
Materials and methods:This prospective observational study included 584 pediatric patients aged one month–10years, ASA I or II, scheduled for elective surgery under general anesthesia. Patients were divided into 4 groups during analysis: Group A (1month-1Y), group B (1-2Y), group C (2-5Y), group D (5-10Y). The ultrasound measurements were: tongue thickness (TT), tongue thickness to skin distance (DST), tongue base width (TB), epiglottic width (EW), epiglottic thickness (ET), distance from the hyoid bone to skin surface (DSHB), the space between anterior surface of epiglottis to skin (DSE), and distance from skin to anterior commissure of the vocal cords (DSAC). (ClinicalTrials.gov identifier:NCT04361929)
Results and discussion: Among groups, the patients with DL and DMV in group A had the higher ultrasound-measured distances, with DSE being the higher when compared to the easy laryngoscopy (L) and easy mask ventilation (MV) patients. Mean (SD) of DSE in group A was 0.88 (0.33) cm in the easy-L, versus 1.64 (0.5) cm in DL patients with area under Receiver-operating characteristic curve (AUC) 0.956(95%confidence interval (CI):0.871-1). Whilst, the mean (SD) of DSE was 0.87 (0.33) cm in the easy-MV, versus 1.26 (0.52) cm in DMV patients with AUC 0.774 (95% CI:0.535-1).
Conclusion(s): Anterior soft tissues of the neck and tongue measurements as revealed by ultrasound are potential new predictors of DL and DMV in pediatrics that differ according to different age groups. In infants, longer distances from skin to larynx, appear to be most predictive of both DL and DMV, with DSE being better than other measurements.

05AP01-11
The role of the psycho-emotional factor during anesthesia at different stages of the treatment of traumatic disease in children

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The purpose of the research was to identify the difference in the patients' long-term outcome with the constant psychological support and without at all the stages of traumatic disease with the necessity of the multiple anaesthetic interventions.
From 2002 to 2021, 720 patients aged 3 to 17 years underwent multiple anaesthetic interventions (from 4 to 26). Some of the patients were observed repeatedly during hospitalization at the stages of treatment and rehabilitation of a traumatic illness within 1-2 years. 200 of them refused any professional psychological support. The outcomes were assessed according to the range of psychological tests, cognitive tests, visceral dysfunction scales, pain scales, somatic and physiological dysfunction tests. The results were compared in both groups.
Every patient was admitted in a serious condition with multiple concomitant trauma in need of intensive care and respiratory support. After stabilizing them the professional psychological support was provided to each of the patient for the whole time of hospitalization and rehabilitation. The findings of two compared groups found out that those children without the support had the tendency to require longer hospital stay and poorer outcomes. Nevertheless, 25% of children remain disabled with limited quality of life (10% higher in the group without the professional psychological support). Purulent-septic complications with manifestations of multiple organ dysfunction were observed in 35%. Extracorporeal methods required 15 children. And all patients had psychosomatic complications of traumatic illness of varying severity.
According to our research, children are shown to have better outcomes both at the early and late stages of post traumatic disease which proves the necessity of multidiscipline approach to their treatment not only in the ICU, but before and after multiple anaesthetic interventions.

05AP01-12
Use of continuous positive airway pressure during sevoflurane inhalational induction does not result in faster induction but increases sevoflurane consumption

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Background and goal of study: Inhalational induction of anaesthesia is more acceptable to children. Sevoflurane is inhalation anaesthetic agent of choice because of low pungency, a non-irritant odour and a low blood: gas partition coefficient. Continuous positive airway pressure (CPAP) refers to the delivery of a continuous level of positive airway pressure and is functionally similar to PEEP. CPAP prevents collapse of terminal bronchioles, increases FRC (functional residual capacity), increases the surface area of the alveolus and improves V/Q. Increase in FRC due to application of CPAP might cause significant enough difference in children to cause faster induction of anaesthesia. Using these two mechanisms of increased FRC and by preventing collapse of the smaller airways and increasing the surface area available for gas exchange, we hypothesized that, application of CPAP during induction will reduce the induction time.
Materials and methods: A prospective, randomized controlled trial was conducted at the All India Institute of Medical Sciences, New Delhi; India between May2020 and June 2021 after obtaining approval from the institutional ethics committee (IECPG-741/30.01.2020, RT-25/27.02.2020) and randomized 129 children between the ages of 1 to 5 years scheduled to undergo ophthalmic examination under anaesthesia into 3 groups: group Z (CPAP of 0 cm H2O) , group A (CPAP of 5 cm H2O) or group B (CPAP of 10 cm H2O).
Results and discussion: 62% of children randomized in to the study were males. Anthropometric measurements like weight, height, midarm, hip and waist circumference were similar across all three groups. No significant difference was reported in the time to induction and time to SGD insertion between the study groups.
There was a significant difference in sevoflurane consumption between the study groups with increasing consumption in with increasing CPAP levels. Median amount of sevoflurane consumption for GROUP A, B and Z was 8, 10 and 7 ml respectively with interquartile range of 8,9 for GROUP A, 9,10.3 for GROUP B and 7,7 for GROUP Z.
Conclusion: CPAP application (5 and 10 cm of H20) did not reduce induction time, or time to supraglottic device insertion but did result in an increase in sevoflurane consumption, we believe it is reasonable to NOT use CPAP during inhalational induction in all cases. It follows that CPAP should only be applied in cases where there is evident airway obstruction.

05AP02-01
The level of serum cortisol as a predictor of postoperative morbidity and mortality in neonates after cardiac surgery

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Background and Goal of Study: The role of cortisol in stress response during critical illness is well known. But few data exists regarding cortisol level correlation with postoperative morbidity and mortality after CPB cardiac surgery in children. The aim of this study was to investigate postoperative cortisol dynamics and its relation with clinical outcome in neonates with congenital heart disease, undergone complete surgical repair. Study approved by Jo Ann Medical Center ethical committee.
Materials and Methods: In this single center prospective observational study of 32 neonates, who undergone CPB cardiac surgery, three serial cortisol levels were measured: immediately after admission from OR (T_0), first and second postoperative mornings ($T_1$and T_2). Inclusion criteria were age$\leq$28 days, complete surgical repair of CHD, presence of three cortisol measurement results. Exclusion criteria: palliative cardiac procedures (including S1P of HLHS), weight < 2kg, use of steroids in pre- and early postoperative period, surgical residual lesions.

Outcome measures: length of stay in the ICU, duration of mechanical ventilation, in hospital mortality, highest inotropic score in first 24 hours. For statistical analysis we used Pearson's (P) correlation, data shown as median with SD

Results and Discussion:96 serum cortisol levels measured in this study. Median serum cortisol level fell from 9.75 mcg/dl (±5.1) at $T_0$to 4.23 (±4.8) at $T_1$and rise again up to 7.45 (±6.8) at T_2(not significant changes). Median ICU LOS was 8,1 (±5.43), median duration of M.V. was 106.9 hours (±122.4), median max. inotropic score in first 24 hours was 19.25 (±8.52), no correlations of these data with cortisol levels were found. One patient died - cortisol level in all three tests were in normal range (11.2, 7.5, 2.5).

In this relatively small study we have found:

1. Highest cortisol level observed at the admission from OR, with fall and consequent rise at postoperative mornings one and two (respectively);
2. Longer duration of M.V. and ICU days are less likely to be correlated with higher cortisol levels at any time points of this study;
3. The same observations regarding mortality and inotropic score were found.

Conclusion(s): In our study higher cortisol level is not associated with poor clinical outcome. We suggest that cortisol level cannot be a precise predictor of postoperative mortality and morbidity in neonates who undergone complete surgical repair of CHD.

05AP02-02
Anaesthesia management in a case of Crouzon syndrome for corrective rigid external distraction frame insertion

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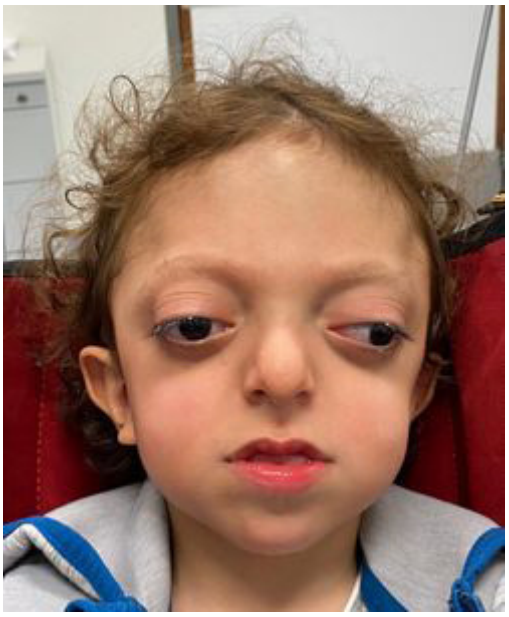
Background: Crouzon syndrome is rare a congenital disorder (1 in 65,000 births), characterized by premature closure of the coronal sutures. The challenges in anaesthetic management include the presence of a difficult airway, history of obstructive sleep apnea, congenital cardiac disorders, hypothermia, blood loss, and venous air embolism. It is important to report different successful approaches of rare clinical cases and uncommon procedures.

Case Report: A 4-year-old male child weighing 14 kg with Crouzon syndrome was referred to our institute for corrective surgery. The patient had delayed developmental milestones and protrusion of with abnormal skull growth. The parents gave a history of obstructive sleep apnea. Airway examination revealed large tongue and hypoplastic maxilla. All routine blood investigations were normal. On the day of surgery we prepared a C-MAC video laryngoscope and a paediatric fibreoptic bronchoscope anticipating a difficult airway. After preoxygenation, we administered fentanyl and a dose of propofol. We check the airway with the video laryngoscope and successfully visualized the vocal cords. After the depth of anaesthesia was deepened, we successfully performed an intubation. A femoral central venous line, additional peripheral line were inserted and vesical catheterization was performed. For the procedure we performed a total intravenous anaesthesia. Tranexamic acid and mannitol were administered to minimize blood loss and prevent cerebral oedema, respectively. Surgery lasted for 12 hours and the procedure was uneventful. After the surgery the patient was admitted to the intensive care unit.



Discussion: The perioperative concerns in such patients include potentially difficult airway, hypothermia, blood loss, venous air embolism, and long duration of surgery. Anticipation, patient counselling, complete difficult airway cart with alternative plans, and multidisciplinary approach goes a long way in managing such patients.

References:

Ajwa SJ, Gupta SK, Kaur J, Singh A, Parmar SS. Anaesthetic management of a patient with Crouzon syndrome: Case study. South Afr J Anaesth Analg 2012;18:270-2

05AP02-04
A retrospective review of the intraoperative analgesic management of paediatric adeno-tonsillectomies in a non-paediatric tertiary referral hospital in Melbourne

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Background and Goal of Study: Adeno-tonsillectomy is performed on children with sleep disordered breathing or recurrent tonsillitis. Anaesthetists are conflicted: aiming to provide effective analgesia against the risks of sedation and airway compromise. Significant heterogeneity exists in analgesic regimens. Research now shows no association between NSAID use and bleeding. The assessment and documentation of pain can be challenging. We aimed to review our practice to find areas for improvement.

Materials and Methods: We performed a retrospective chart review of 106 paediatric patients who underwent adeno-tonsillectomy over 12 months after obtaining ethics approval. Data collected included preoperative demographics and analgesia, intraoperative analgesia and management in recovery.

Results and Discussion: Our cohort ranged from 2-16 years of age (average 5.8 years). The indication for surgery was infective in 14.1% of cases, obstructive (34%) and both obstructive and infec-

tive (51.9%). Intraoperatively, fentanyl was used as the sole opiate in 66% of cases, 60% of these required fentanyl in recovery. 34% of cases had a long-acting opiate (morphine or oxycodone) +/- fentanyl, 50% of these cases required fentanyl in recovery. 27% of cases received a NSAID, 56% received paracetamol and 94% received dexamethasone. Other adjuvants included clonidine (28.3%), tramadol (25.4%) and ketamine (3.7%).

Children that received a long-acting opioid + NSAID had the best analgesia in recovery, 50% requiring no recovery opiate.

Children that received fentanyl + a NSAID had similar analgesia in recovery, 47% requiring no recovery opiate. 54% of surgeons used local anaesthetic. 22% of children developed airway obstruction in recovery: 14% associated with fentanyl, 36% with a long-acting opiate.

Very poor documentation of pain scores was noted. 100% of the children described as distressed in recovery had no long-acting opiate intraoperatively. 5.66% had a post-operative bleed, none of whom had received a NSAID.

Our results show that there is heterogeneity in our analgesic regimens, with poor outcomes. Gaps were identified in our non-opioid analgesic use. Educating our anaesthesia staff will promote improved patient care. The lack of pain score documentation suggests that further education in this area is essential.

Conclusion(s): It may be appropriate to implement a 'bundle of care' in our institution, to more uniformly care for our paediatric adeno-tonsillectomy patients.

05AP02-05
Use of nasal cannula for apnoeic oxygenation in children undergoing elective surgery under general anaesthesia - a randomized controlled study

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Background and Goal of Study: Apnoeic oxygenation is the provision of continuous oxygen flow during the apnoeic period of airway management. Children have a smaller functional residual capacity and higher rate of oxygen consumption making them more prone to develop hypoxemia after the onset of apnoea.

We aimed to assess the effectiveness of apnoeic oxygenation using a nasal cannula in preventing oxygen desaturation during laryngoscopy and intubation in children.

Materials and Methods: This randomized double blind controlled study included 120 ASA I children between ages 1-6 years undergoing elective surgery requiring general anaesthesia with endotracheal intubation. Patients were randomly allocated into 2 study groups, Group AO (apnoeic oxygenation) and Group C (control) each having 60 patients. After induction of anaesthesia, an appropriately sized paediatric soft nasal cannula was placed in all patients.

In Group AO, oxygen was given via the nasal cannula at 3 l/min. Patients in Group C did not receive any oxygen through the nasal cannula (placed for the purpose of blinding). Laryngoscopy and intubation was done by a trainee anaesthesiologist.

The primary outcome was the difference in lowest SpO_2 values between the two groups. Secondary outcomes were the number of children whose SpO_2 dropped till 95%, between 92-95% and below 92% and any incidence of bradycardia.

Clinical Parameters were presented in terms of Mean and SD for quantitative variables and frequency (%) for qualitative variables. Student's t-test was applied to compare the mean difference of continuous parameters. Level of statistical significance was taken as $p<0.05$.

Results and Discussion: The lowest SpO_2 value during laryngoscopy and intubation was 98.37±4.60% in Group C and 99.95±0.29% in Group AO ($p= 0.009$). There was no fall in SpO_2 in the 60 patients in Group AO compared to 43 patients in Group C ($p<0.001$). In Group C, fall in SpO_2 upto 95% occurred in 12 patients ($p=0.004$), fall to 92-95% occurred in 1 patient ($p=0.315$) and fall below 92% occurred in 4 patients ($p=0.038$). There was no incidence of bradycardia in any child.

Conclusion: Apnoeic oxygenation using a nasal cannula was effective in preventing oxygen desaturation during laryngoscopy and intubation in children. As effective preoxygenation is difficult in small children, apnoeic oxygenation can help to maintain oxygenation while securing the airway.

05AP02-06
A retrospective review of the postoperative analgesic management of paediatric adeno-tonsillectomies in a non-paediatric tertiary referral hospital in Melbourne

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Background and Goal of Study: Adeno-tonsillectomy is performed on children with sleep disordered breathing or recurrent tonsillitis. Postoperatively, these patients are monitored closely for signs of sedation and airway compromise. Ward staff are required to assess and treat pain swiftly and effectively to ensure patients recovery effectively, reinstitute oral intake and are safely discharged. We aimed to review our practice to find areas for improvement.

Materials and Methods: We performed a retrospective chart review of 106 paediatric patients who underwent adeno-tonsillectomy over 12 months. We obtained ethical approval from the Austin Health Ethics Board (Project Number: Audit/20/Austin/03). Data collected included preoperative demographics, intraoperative techniques and postoperative monitoring and management.

Results and Discussion: Our cohort ranged from 2-16 years of age (average 5.8 years). The indication for surgery was infective in 14.1% of cases, obstructive (34%) and both obstructive and infective (51.9%).

Postoperatively, paracetamol was charted for 99% of patients, although regularly charted in only 74%. A NSAID was charted for 85% of patients, but regularly charted in only 23.6%. Oral oxycodone was the primary opioid charted for postoperative rescue analgesia.

Only one child was charted PRN tramadol. A rescue opioid was charted for 85% of patients. Oxycodone use per hour of admission was highest for those patients who received intraoperative fentanyl without a NSAID (0.007mg/kg/hr) and lowest in those patients who received intraoperative long-acting opioid (morphine or oxycodone) +/- fentanyl plus a NSAID (0.004mg/kg/hr).

Very poor documentation of pain scores was noted at 6, 12 and 24 hours.

All nursing notes were reviewed: 4 patients were noted to have significant distress, all of whom received no long-acting intraoperative opioid and no NSAID.

Our results show significant gaps in the postoperative analgesia we provide to our paediatric patients, particularly related to NSAID use. Optimising our intraoperative analgesia can promote effective early postoperative pain management. The lack of pain score documentation suggests that further education in this area is essential.

Conclusion(s): It may be appropriate to implement a postoperative 'bundle of care' in our institution, to more uniformly care for our paediatric adeno-tonsillectomy patients.

05AP02-07
Incidence of massive transfusion during pediatric liver transplantation: a single-center report of 100 children

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Background and Goal of Study:Liver transplant (LT) is the lifesaving treatment for children suffering from end-stage liver disorder. However, bleeding remains a challenging issue due to highly vascular organ and coagulopathy resulting from the liver disease (1). Only few pediatric studies are available and records of massive transfusion (MT) incidence vary from 6 to 55% (2). In this study, we describe our experience on pediatric LT with a focus on our transfusion practice and we compared patients with MT and no-MT.

Materials and Methods:This is a retrospective analysis of LT performed between 2016 and 2019. Demographic data, intraoperative transfusion rate and outcome were analysed. MT was defined as intraoperative red blood cell (RBC) transfusion^{3}1 total blood volume.

Results and Discussion:One hundred children underwent LT during the study period. Main indications of LT were biliary atresia (60%), intrahepatic cholestatic disorder (14%) and metabolic liver diseases (13%). Eighty four percent of LT were living donor procedures. Transfusion of blood products occurred in 87% of the LT with respectively 87% of RBC, 46% of fresh frozen plasma and 23% of platelets concentrates. We reported 10% of MT. On the other hand, 13% of LT did not received any transfusion. Table 1 shows characteristics of MT vs no-MT groups.

	No-MT group (n=90) Median (P25-75)	**MT group (n=10)** Median (P25-75)	**p-Value** (Mann-Whitney U)
Age *(months)*	20 (10.7-37.5)	16 (9.2-46.7)	0.76
Weight *(kg)*	10.4 (8-14.5)	9.1 (8-14.4)	0.58
RBC *(ml/kg)*	25.1 (12.4-35)	95.6 (75.5-195.4)	<0.001
Platelets *(ml/kg)*	0 (0-0)	27.81 (18.1-50.1)	<0.001
Fresh frozen plasma *(ml/kg)*	0 (0-26.3)	62.3 (25.4-98.8)	<0.001
Length of stay ICU *(days)*	2 (2-6)	8 (6-18.5)	0.001
Length of stay in hospital *(days)*	21 (15-34)	37 (23-38)	0.15

Table 1

Conclusion(s):In our studied population, transfusion rate and incidence of MT were inferior than expected in the literature. A notable finding was the increase of transfusion-free LT. This could be explained by the high volume of pediatric LT in our centre allowing our team to gain experience.

References:

1. Kloesel et al. Pediatric Anesthesia.2017 (2) Villarreal JA et al. Pediatr Transplant. 2019

05AP02-08
A mysterious case of tracheoesophageal fistula with laryngeal atresia: managed using laryngeal mask airway and diagnosed by anaesthesiologists!

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Background: Neonatal airway is challenging even in experienced hands especially when the neonate doesn't cry and develops respiratory distress immediately after birth. We encountered one such mysterious case with multiple failed attempts at intubation, but ventilation could be achieved using laryngeal mask airway. We herein discuss the challenges, innovations to diagnose and management of this rare case.

Case report: A term neonate did not cry after birth and started to desaturate after umbilical cord clamping. After repeated failed attempts at intubation, the child could be ventilated using proseal LMA size 1.

Later, intubation was attempted under anaesthesia using c-mac blade size 0 of video laryngoscope by an experienced anaesthesiologist. Glottic opening could not be appreciated but vocal ridges were seen. Multiple attempts using uncuffed endotracheal tube(ETT) 3.0 mm internal diameter(ID), styleted uncuffed ETT of ID 2.5 mm and 3.0 mm were made, which failed as well.

An esophagoscopy was performed using ambuscope passed from the LMA using a modified connector assembly. The esophagus was kept distended by PEEP of 5 cm H_2O. An opening was found on the anterior wall of esophagus with no esophageal atresia. A diagnosis of H-type tracheoesophageal fistula(TEF) with laryngeal atresia was made. Tracheostomy with a size 3.5 mm ID tube was done.

Discussion: TEF results due to failure of the embryonic lung bud to proliferate[1]. The diagnosis of TEF with atretic esophagus is usually made when the child fails to swallow the breast milk or inability to pass Ryle's tube. However, H type is difficult to diagnose. A median delay of 14 days to it's diagnosis has been reported[2].

However, in our case, the diagnosis was made early due to associated laryngeal atresia. The ability to ventilate the child via LMA only in controlled ventilation with an absent glottic opening raised a possibility of TEF and led to esophagoscopy system innovation by the anesthesiologist thereby aiding in diagnosis.

References:

1. Crisera CA et al. Defective epithelial-mesenchymal interactions dictate the organogenesis of tracheoesophageal fistula. Pediatr Surg Int. 2000;16(4):256-61.

2. Ng J et al. Diagnostic difficulties in the management of H-type tracheoesophageal fistula. Acta Radiol. 2006 Oct;47(8):801-5.

Learning points: LMA serves as a rescue airway device. Vigilant anesthesiologist led to development of esophagoscopy system which helped in early diagnosis and management of this rare entity.

05AP02-10
A review of postoperative sleep disturbance in paediatric patients in a large metropolitan hospital in Melbourne

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Background: Negative behavioural change is a well-documented phenomenon in children after surgery and general anaesthesia. In particular, sleep disturbance is a recognised problem in the paediatric population which can cause distress to patients and their families and significantly impact recovery. We hypothesize that general anaesthesia may have short term effects on sleep in children.
The primary aim was to determine the incidence of postoperative sleep disturbance. The secondary aim was to identify any potential risk factors that may be associated with the problem.
Methods: After Ethics Committee approval, 56 children between 2-6 years of age who underwent surgery at Austin Health over a six-month timeframe (01/01/21 – 30/06/21) were included in this audit. A telephone survey was administered to primary carers of the children to identify the incidence of postoperative sleep disturbance.
Additional data such as patient demographics, type of surgery/procedure, nature of procedure (emergency vs elective), duration, history of behavioural issues, anaesthetic factors (use of premedication & type of induction) and presence of emergence delirium in recovery was collected from electronic medical records. Statistical analysis was performed using the Mann-Whitney U test.
Results and discussion: The incidence of postoperative sleep disturbance was 16.1%. Of those affected, the majority were preschool aged (77.7%) and female (77.8%). No sleep disturbance was reported for procedures less than 30 minutes.
There was an association between children having emergence delirium in recovery and those reported to have sleep disturbance ($p<0.0047$). There was no significant difference relating to the type of surgery, elective or emergency surgery, history of behavioural issues, type of anaesthetic induction or use of premedication.
One in six children were reported to have suffered from postoperative sleep disturbance. This highlights the importance of appropriate education and consent of caregivers for this potential risk as we routinely do so for other anaesthetic risks such as emergence delirium in the paediatric population.
Conclusion: Postoperative sleep disturbance occurs commonly in children. The association between emergence delirium and the occurrence of sleep disturbance has significant implications which warrants further research to identify any modifiable risk factors to prevent or minimise negative behavioural disturbances postoperatively in children.

05AP02-11
Difficult airway management in infant with pierre-robin sequence

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Background: Pierre Robin sequence (PRS) consists of a clinical triad of micrognathia, glossopthosis (backward displacement of the tongue) and airway compromise. Its prevalence is estimated to be 1 in every 10.000 births. Airway management in these infants entails a true challenge for the anaesthesiologist.
Case report: 29 days old infant with a body weight of 3 kg, who underwent mandibular distraction surgery due to isolated (PRS).
Vaginal delivery without incidence, with a gestational age of 37+1 weeks. She initially required oronasal CPAP because of subcostal retractions but eventually received home discharge.
14 days later she is admitted to Neonatology ICU with episodes of respiratory distress and desaturation. In that context, she is programmed for mandibular distraction surgery.
While inhalatory induction is being performed, upper airway collaps happens, solved by placing a laryngeal mask (Auragain #1). Intubation is performed through LM and guided by fiberoptic bronchoscopy. A 3 mm size endotracheal tube is used, without incidence.
After the procedure, on plastic surgeons and pediatricians request, we make an extubation attempt that fails due to upper airway obstruction. The patient is reintubated with the same technique.
48 hours after surgery, another extubation attempt is performed in Neonatology ICU requiring again reintubation.
After 10 days of programmed distractions and a cycle of corticosteroids administered, patient is taken to surgery room for a new extubation attempt. However, the previous upper airway obstruction reappears requiring again the placement of a LM. In this setting, we decide to reintubate the patient using fiberoptic bronchoscopy as we described above. We observe severe glottis edema (not present previously) that significantly hinders intubation despite collaboration of pediatrics ENT. Eventually, she is intubated using Airtraq videolaringoscopy with lateralization movements (Cormack IIa).
In urgent multidisciplinary consensus and with parents' consent, it is decided to perform an urgent tracheostomy with placing of pediatric cannula size 3 with balloon.
Discussion and learning points: When dealing with known difficult airway cases (as it is a Pierre Robin sequence) it is vital not only to plan extubation but also to choose carefully the righteous moment to do it. This is specially important in pediatric patients since it can prevent complications related both to repeated intubations and to extubation delay.

05AP03-01
Anaesthetic management of neonatal encephalocele

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Background: The encephalocele is a birth defect of the neural tube that results in protrusions of the brain and meninges through openings in the skull. Its prevalence is estimated to be 1 case in every 10.000 newborns. The most common type is the occipital encephalocele (OE) and it is usually associated with intracranial hypertension, Arnold-Chiari defect and hydrocephalus.
Case report: We bring the case of a newborn with prenatal ultrasound diagnosis of OE. In week 37 of pregnancy, a C-section was performed with delivery of a male baby weighting 3 kg, Apgar score 9/10. Inmediatly after stabilization, a skull MRI was done under sedation with inhaled sevofluorane through nasal cannula, maintaining spontaneous breathing. The MRI result was an atretic cephalocele of 4 cm. After multidisciplinary discussion between anaesthesiology, neurosurgery and radiology physicians, we decided to perform urgent surgery due to risk of complication.
We performed iv induction with fentanyl 2 mcg/kg; propofol 5 mg/kg and rocuronium 1mg/kg. After manual ventilation (Han I) he was intubated with a 3,5 mm size ET without balloon (Cormack I with direct laryngoscopy). During all the airway management procedure the defect was protected with a rounded pad placed under it. Maintenance anaesthesia with inhaled sevofluorane and iv fentanyl was used. The procedure was performed without incidence and the defect could be closed with a patch of dura. The patient was extubated and brought to neonatal ICU stable.
Discussion: The main challenge for the anaesthesiologist in these patients is airway control, since the defect can significantly hinder laryngoscopy and also handling must be done with most care to avoid the potential risk of breaking the sac. Although it is commonly accepted that surgery must be done in the neonatal period, there is no consensus on the exact moment, so individualization in every case is important.
References:
1. Markovic I et al. Occipital encephalocele: Cause, Incidence, Neuroimaging and Surgical Management. Curr Pediatr Rev.2020; 16(3):200-205.
2. Aranda Zamora EMB et al. Tratamiento anestésico de la corrección quirúrgica del encefalomielomeningocele en un neonato. Rev Esp Anest Reanim 2010 Aug-Sep; 57(7):461-3.
Learning points: In our patient, the surgery was performed 3 hours after birth with very good results, what improves neurologic recovery and prognosis. Airway management of these patients entails a true challenge and must be carefully performed.

05AP03-02
Locoregional anesthesia for paediatric ambulatory surgeries

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Background and goal of study: Revise the postoperative analgesic effectiveness at children ambulatory surgeries after the publication of ESPA Pain Management Ladder.
Material and methods: Retrospective data analysis of major ambulatory pediatric surgeries performed at a non-pediatric terciary hospital during two years.
Results and discussion: 240 scheduled surgeries performed in 237 patients aged amongst 2 and 18 years old, ASA I or II. The most practiced surgeries have been: postectomy, umbilical or inguinal herniorrhaphies, penile frenectomy, orchidopexia or lingual frenectomy. They were performed under general anesthesia in 189 cases or under sedation in 48. 197 procedures received local anesthetic (82,1%) as a multimodal analgesic approach.

LOCAL ANESTHETIC	*Nº procedures*		*Insufficient intraoperative analgesia*	*Insufficient postoperative analgesia*	
Subcutaneous infiltration	81	36,2%	0	18 (22%)	27,5%
Topic (intraoral)	6		0	2 (33%)	
Penile block	48		2	10 (21%)	
Ilioinguinal block	23		1	12 (52%)	
Transversus Abdominis planeblock	3	45,9%	0	0 (0%)	29,5%
Rectus sheath block	36		0	16 (44%)	
None	43	17,9%	0	11 (26%)	26%
TOTAL	240 (100%)		3 (1,25%)	69 (28%)	

If moderate pain, the analgesic rescue administered was single dose of either NSAID (ibuprofen 10 mg/kg) or weak opioid (tramadol 1 mg/kg).
The data report some unexpected results:
- The high rate of insufficient postoperative analgesia
- The addition of local anesthetic is not enough to assure satisfactory postoperative analgesia
- The high rate of insufficient postoperative analgesia even when nerve block was performed
- The difficulty to compare nerve block efficacy due to various surgery and consequently different pain levels.
- The analgesic rescue avoid unforeseen hospitalization for algesic control

Conclusion: The use of intraoperative analgesia (fentanyl 2-3 mcg/kg at the induction time plus paracetamol 15 mg/kg and metamizol 40 mg/kg) is not enough to assure an adequate postoperative analgesia in 25% of children.
The disparity of surgeries, the echographic performer experience and the lack of protocolized analgesia approach make it difficult to compare.
Although the high rate of analgesia rescue needs, the administration of an intravenous analgesic lowers pain to numerical pain rating scale <3.

05AP03-03
Sedative premedication in children undergoing general anaesthesia

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Background and Goal of Study: Approximately 500 elective Paediatric surgical procedures are performed annually at The Whittington Hospital in London.Covid-19 resulted in a further increase in Paediatric elective and emergency cases, as Paediatric services were diverted from 2 nearby hospitals. We estimate that 5-10% of these cases may require pre-operative sedation or anxiolysis. The increase in paediatric surgical admissions as well as emergency cases, lead to a need for guidelines to help Anaesthetists make decisions about drug selection for pre-operative sedation and anxiolysis, based on the desired time of onset and patient co-operation. We performed a literature search to assess protocols used by other hospital, particularly those who have a large volume of paediatric cases. We also sought evidence for the use of intranasal dexmedetomidine for Paediatric sedative premedication.

Materials and Methods: Having reviewed many existing sedative pre-medication guidelines currently in use at other hospitals in the UK, we created a clinical flowchart to help guide a clinician to choose an appropriate drug to use, based on the desired time of onset and patient co-operation levels. We also specifically sought to introduce the use of intranasal Dexmedetomidine, as this can be given quickly intranasally and without the need for compliance from the child.

Results and Discussion:

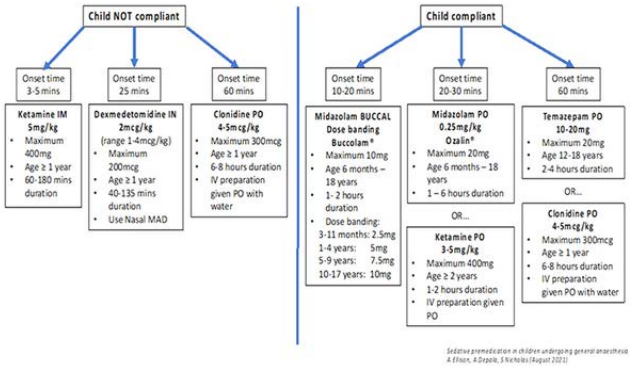

FIgure. Paediatric sedative pre-medication drug selection

Conclusion(s): We have created a guideline that incorporates the use of numerous drugs that have different onset times, administered via different routes and overcoming the requirement for patient compliance where necessary.

This guideline is awaiting formal approval by our local 'Drugs and Therapeutics' committee and we aim to formally implement its use as soon as possible thereafter.

References:

1. Dr Corrine Stannard, D. K. W., 2017. Paediatric Anaesthesia: sedative premedication prior to anaesthesia, London: Guy's and St Thomas' NHS Foundation Trust.

2. Jonathan Benger, K. B. A. F. A. I. G. L. A. M. A. M. L. M., 2016. Guideline for ketamine sedation of children in emergency departments, London: The Royal College of Emergency Medicine.

05AP03-04
Risk factors for intraoperative blood transfusion in pediatric liver transplantation: single-centre retrospective analysis

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Background and Goal of Study: Liver transplant (LT) is the lifesaving treatment for children suffering from end-stage liver disorder. However, intraoperative bleeding remains a challenging issue due to highly vascular organ and coagulopathy resulting from the liver disease (1).

In this study we aimed to analyse intraoperative red blood cell (RBC) transfusion rate and volume and assess possible predictive factors.

Materials and Methods: This is a retrospective analysis of LT performed between 2016 and 2019. Demographic data, intraoperative transfusion rate and bleeding volumes were collected. Gamma regression model analysis was performed to determine predictive risk factors associated with red blood cell (RBC) transfusion.

Results and Discussion: One hundred children underwent LT during the study period. Median age and weight were respectively 19 (10-38) months and 10 (8-14.3) kg. Main indications of LT were biliary atresia (60%), intrahepatic cholestasic disorder (14%) and metabolic liver diseases (13%). Eighty four percent of LT were living donor procedures. Transfusion of blood products occurred in 87% of LT with respectively 87% of RBC, 46% of fresh frozen plasma and 23% of platelets concentrates.

On the other hand, 13% of LT did not receive any transfusion. Median volume of RBC transfusion was 30.5 (17.9-51.3) ml/kg. Linear univariate analysis was performed to predict total RBC volume transfusion. After forward selection in a gamma regression model, low preoperative weight, low sodium and low plateletcount, high preoperative bilirubin blood level and surgical duration as well as deceased donor, prior hemorrhagic event and emergency LT independently increased transfusion volume. Median length of stay was 3 (2-7) days in intensive care and 21 (15-37) days in hospital. One year survival rate was 88%.

Conclusion(s): Bleeding and transfusion remain an issue in LT. In our study, we determined predictive factors for transfusion of RBC during pediatric LT. These findings can provide information to improve perioperative bleeding management in this high-risk population.

References: (1) Elisofon SA et al.Pediatr Transplant. 2020

05AP03-05
Correlation between adult and child behavioral interaction with preoperative anxiety and emergence delirium: an observational study

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Background and goal of study: A child's temperament, sociability, and cognitive skills are related to the level of preoperative anxiety. Preoperative anxiety could be a risk factor for emergence delirium (ED). Also, an examination of interactions between parents, their children, and healthcare providers reveals that negative interactions and coping are correlated with a higher incidence of ED.
We aimed to analyze the correlation between preoperative anxiety, parents and child interaction, and ED.
Materials and methods: This study is part of an umbrella project (ClinicalTrials.gov NCT03787849). The local IRB approved the study. We recruited children submitted to ambulatory endoscopic procedures. After informed consent, all children were assessed for preoperative anxiety through the modified Yale Preoperative Anxiety Scale (mYPAS).
In the preoperative waiting area and during anesthesia induction, the interaction between children and adults was assessed using the Perioperative Adult and Child Behavioral Interaction Scale (PACBIS). PACIBS assesses four domains: child coping, child distress, parent negative, and parent positive. A score of 2 for each domain was considered a worse behavior. All children received inhalation induction through a facial mask with increasing doses of sevoflurane. The anesthesia maintenance was either inhalation or intravenous.
After awakening, the child was assessed for ED through the Pediatric Anesthesia Emergence Delirium (PAED) scale until the 15th minute.
Results and discussion: We included 164 children, with a mean (SD) age of 6.2 (3.3). 52% were male. 38.8% presented mYPAS score greater than 30. Children presented worse scores for PACBIS domain child coping (0 vs.2) presented greater scores of mYPAS (27.58 ± 7.85 vs. 39.59 ± 20.12; $p < 0.001$).
Children who presented worse scores for PACBIS domain child distress (0 vs. 2) also presented greater scores of mYPAS (29.26 ± 9.28 vs. 37.78 ± 21.00; $p=0.012$). There was no difference regarding the parents' domains. Children presented worse PACBIS scores (score 2) for a child coping, and child distress presented greater scores for ED ($p < 0.01$). There was no difference regarding the parents' domains.
Conclusion: Children with increased preoperative anxiety seem to cope worse and present greater distress. They also tend to present greater scores of ED. However, the parents' negative or positive behaviors seemnot to influence the children's behaviors.

05AP03-06
Postoperative behavioral changes in children submitted to ambulatory endoscopic procedures: a randomized clinical trial

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Background and goal of study: Perioperative behavioral disturbance is common in children. Negative behavior changes may be seen during anesthesia induction, recovery, and discharge home. We aimed to compare whether sevoflurane or propofol-based anesthesia is related to negative behavioral changes after endoscopic procedures.
Materials and methods: This study is part of an umbrella project (ClinicalTrials.gov NCT03787849). The local IRB approved the study. We recruited children from 1 to 12 yo, ASA physical status I-III, submitted to ambulatory endoscopic procedures.
No children received pre-anesthetic medication. Preoperative anxiety was evaluated through the modified Yale Preoperative Anxiety Scale (mYPAS). All children were submitted to facial mask inhalation induction with sevoflurane in concentrations up to 8%. After a peripheral line in place, the child was allocated to sevoflurane or propofol-based maintenance.
After completing the exam and awakening, emergence delirium (ED) was evaluated through the Pediatric Anesthesia Emergence Delirium (PAED) scale until the 15thminute after awakening. The child was discharged home, and, on the 1st, 7th, and 14thday post-procedure, behavioral changes were assessed through the Post-Hospitalization Behavior Questionnaire for Ambulatory Surgery (PHBQ-AS). Scores of 4 and 5 were considered negative behavior.
Results and discussion: We enrolled 164 children. There was no difference between sex and mYPAS scores. Children in the group sevoflurane were younger than the group propofol (mean 5.6±3.5 vs. 6.9±3.2 yo). ED scores were greater in the sevoflurane group measured in the 1stand 5thminute compared to the propofol group (median 3.0 IQR 0.0; 14.0; $p < 0.001$ and median 0.0 IQR 0.0; 8.0; $p = 0.015$).
On 1stday after the procedure, 57 children presented at least one negative behavior. On the 7th and 14thday, 49 and 44 children presented at least one negative behavior, respectively.
The median number of negative behaviors was similar between groups assessed on the 1st, 7th, and 14thday post-procedure.
We considered 1 SD above the mean of the number of negative behaviors as behavioral changes. There was no difference between the two groups in the three assessment days.
Conclusion: Although the propofol group presented less ED (only during the 5 first minutes), there was no difference regarding poshospitalization behavioral changes. However, the number of negative behaviors was high until the 14thday post-procedure.

05AP03-07
Comperative study between ultrasound-guided supraclavicular block versus general anaethesia with opioids on intraoperative and postoperative pain control after upper limb fractures in children

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Background and goal of study: The most common fractures in childhood are on the radius, followed by humerus. The ultrasound-guided supraclavicular block (US-SCB) is also known as "spinal in the arm" due to its wide use for upper extremity surgery but performing regional anesthesia in pediatric patients is still challenge.
The goal of our study is to optimize the perioperative and postoperative pain control of pediatric patients with upper limb fractures and to evaluate the clinical efficacy of postoperative analgesia in patients with supraclavicular block compared with conventional opioid-based analgesia
Materials and methods: 60 patients: 2-18 years old, ASA I-II, randomly classify into 2 groups: A group with US-SCB (n=30) and B group with opioid-based analgesia(n=30). All patients were premedicated with midazolam 0.5mg/kg (max. 10 mg) p.o.
In A group the children were sedated by Propofol on infusion (0,1-0,3mg/kg/min) during the operation or sedated with Midazolam 1-3mg i.v. according to their assistance. We used ultrasound machine for the block with linear tranduser 2.5-12MHz, needle 22Gx50 mm and Lidocaine1%+Ropivicaiane0,5% in volume 0,3-0,5 ml/kg without exceeding the maximum allowable dose per kilogram weight.
In B group we used propofol for induction (3-5mg/kg), I-gel mask for breathing airways, sevoflurane inhalation maintenance, fentanyl 2-3mcg/kg/h and paracetamol(15mg/kg) and tramadol(2mg/kg) for postoperative pain relief. We recorded intraoperatively hemodynamics to evaluate the pain control and postoperatively pain intensity via Visual-analogue scale (VAS), Numeric ratio Scale (NRS), behavioral pain assessment scale (FLACC), adverse effects, needs of additional analgesics.
Results and discussion: Ultrasound imaging of the supraclavicular brachial plexus was possible in all children.
In A group**:** none received any additional analgesics in the recovery room. For the 24-hour postoperative period in A group received less additional analgesics as well as pain intensity was less than in B group (2-3p compared to 6p via VAS,3-4p vs 7p via NRS; 3-4p vs 7p via FLACC).
3 children were registered with nausea and vomiting in B group. There were no complications related to the procedure.
Conclusion: The US-SCB is successful, safe procedure, reducing opioid needs and provide good pain relief for upper extremity surgery in children. The use of ultrasound helps accurate verification of the needle and avoid complications of the supraclavicular block.

05AP03-08
The diriment role of electromyography in the diagnosis of a single case of child botulism

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Background: We report the diriment role of ElectroMyoGraphy in the diagnosis of a case of infant botulism admitted to the Children's Hospital "Giovanni XXIII", Bari, Italy.
Case report: After a week of constipation, hypotonia, lethargy, ptosis, reduction of suction and cry, a 2-month-old infant male, born at term with no neurodevelopmental delay, was referred to our children's hospital for an undiagnosed progressive worsening of awareness. He was intubated for bradypnea and desaturation. The toxicologic panel, cerebrospinal fluid exam, radiological imaging and laboratory results were negative.
Later, we found a normal EEG but a positive EMG. In association with the history of raw honey intake (revealed only later by his mother), we were allowed to define the hypothesis of infant botulism earlier than the confirmation of the standard mouse bioassay. Botulism ImmuneGlobulin – IntraVenous IgG over 3 hours in a recommended dose of 0.1 mL/kg/min was injected. The infant showed a gradual improvement and after 10 days he was extubated.
The Preterm Oral Feeding Readiness*Scale* showed an improvement through the rehabilitation program with physiotherapy and parents' stimuli. After one month he was discharged.
Discussion: Infant botulism is not the first hypothesis but it's the result of a strict differentiation from other diseases characterized by hypotonia such as sepsis, infectious, genetic, autoimmune or metabolic diseases through the use of history, laboratory tests and radiological imaging. Diagnosis is always by exclusion.
Toxin detection can be useful for early diagnosis. In the later stages, the neurological instrumental support can help the clinician to elucidate the cause of muscle weakness because the EEG and the EMG could be positive, when toxins are unlikely to be detectable in the serum and other data are negative.
The neurological analysis should include motor and sensory nerve conduction velocity in, at least, one arm and one leg, 2-Hz nerve stimulation of two distal muscles and needle EMG with sufficient sampling.
References: Bernardor J, et al. Infant botulism: Two case reports and electroneuromyogram findings. Archives de Pediatrie (2018).
Learning points: We suggest that the neurological instrumental support can help the clinician to elucidate the cause of muscle weakness, in particular in the later stages.
Most of the cases continue to have a positive history of exposure to honey, therefore honey should not be given to children under one year.

05AP03-09
A case of extensive subcutaneous emphysema combined with pneumomediastinum, pneumothorax and pneumorachis C1-Th9 after tonsillectomy in a 14-year-old: case report

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Background: Even though tonsillectomy is regarded to be a safe surgery, there are some incidents illustrating following complications: pneumothorax, pneumomediastinum and subcutaneous emphysema, which, without timely recognition and proper care, might appear life-threatening in children.
Case report: We experienced a case of extensive subcutaneous emphysema combined with pneumomediastinum, pneumothorax and pneumorachis C1-Th9 after tonsillectomy. A 14-year-old patient, who had been diagnosed with chronic tonsilitis, underwent planned tonsillectomy under general anaesthesia.
Pre-operative general examinations revealed no abnormalities. The adhesions between the tonsils and the surrounding tissues were moderate, so bi-lateral tonsils were easily removed. The recovery period was uneventful.
Later that day he felt shortness of breath and general fatigue as well as the palpating pain in his back. The crepitation appeared at the left mandibular angle. CT showed extensive subcutaneous emphysema of the neck, chest wall, axillary region and upper limbs combined with pneumothorax and pneumorachis C1-Th9. There were no signs of airway obstructions or deformities.
The conclusion was that the main traumatic factor was surgical rather than anaesthetic. The patient was taken under the surveillance to ICU, was prescribed antibiotics and non-steroid anti-inflammatory agents. The pleural drainage was inserted, albeit there was no necessity for the oxygen therapy.
After two days he was transferred to the ENT department and in a week he was discharged without any sign of symptoms.
Discussion: Even though the extensive subcutaneous emphysema with pneumorachis is a rare complication, in order to avoid them, it is recommended to separate tonsil from the fossa along the tonsilar capsule. In case of a deeper than usual mucosal cut, the air can transit the pharyngeal wall to the parapharyngeal, retropharyngeal and prevertebral spaces.
However, in our case no big mucous tear or rupture was noticed. In other similar cases the possibilities of the anaesthetic care were assumed to be the reason of emphysema. However, no evidential support of hypothesis has ever been found.

05AP03-10
Elective postectomy procedure in a child with sickle cell disease: case report and anaesthetic management

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Background: Sickle cell disease is an inherited disorder, with multisystemic complications due to vaso-occlusive crises and chronic haemolysis. Anesthetic management implies a structured plan to avoid morbimortality.
Case report: A 8-year-old male child, ASA III, was presented for elective postectomy surgery. His past-medical history included Hemoglobin SS disease, with five hospitalar admissions in the last two years due to vaso-occlusive crises. The surgical history included a Duhamel plasty due to priapism.
Previous to surgical procedure, the patient clinical status was managed with the support of a specialized pediatrics team, that performed an exsanguination-transfusion technique in order to diminish peri-operative vaso-occlusion crisis risk.
Following strict recommendations, such as adequate oxygenation during the anesthetic period, adequate multimodal and regional analgesia and avoidance of hypothermia, and other measures, we managed to sucesfully ensure homeostasis.
The surgical procedure was uneventful and the child was discharged in the second post-operative day without any intercurrence.
Discussion: This case recalls fundamental features of Sickle Cell Disease and reviews the appropriate anesthetic management, including the pre-operative role of exsanguination-transfusion. Perioperative medicine leads a crucial role, with specific recommendations in the pre, intra and post-operative periods.
References:
BJA Educ. 2018 Nov;18(11):331-336;
Acta Pediátrica Portuguesa. 46. 10.25754/pjp.2015.6310.
Learning points: Anesthesiology and Pediatrics teamwork is essencial for improving safety and outcome in patients with Sickle Cell Disease, in order to reduce morbimortality.

05AP04-01
Importance of anaesthetic protocol in interdisciplinary care in order to optimise outcomes in patients with adolescent idiopathic scoliosis

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Background and goal of study: Different types of interdisciplinary care in combination with the enhanced recovery after surgery (ERAS) protocol in children who undergo posterior spinal fusion for adolescent idiopathic scoliosis (AIS) already exist.

This study assessed whether the defined anaesthetic protocol as a part of interdisciplinary care provided by the 'Scoliosis team' may improve patient outcomes.

Materials and methods: We conducted a retrospective observational before-and-after study. A total of 81 patients were evaluated. The non-protocol group (41 patients, 9 men, mean age 15 years ± 1,8) was operated on in 2018-2019. As an intervention, the local protocol based on defined anaesthetic strategies was developed and introduced. The education plan was performed by using the feedback loop: interdisciplinary communication-training-motivation-data analysis-feedback.

The protocolized group (40 patients, 5 men, mean age 15 years ±1,7) was operated on in 2020-2021. For both groups the results were compared for: age, sex, length of stay in hospital, duration of the operation, total hypotension time defined as a mean arterial pressure <65mmHg, intraoperative blood loss, red cell and fresh frozen plasma transfusion, intraoperative neuromonitoring disturbances, neurological and cardiac complications. The orthopaedic protocol was the same in both groups.

Results and discussion: The age, sex, duration of the operation, intraoperative blood loss, and red cell transfusion was comparable among the groups. The length of stay in hospital, the transfusion of the fresh frozen plasma and total duration of hypotension showed a significant reduction in the protocolized group ($p<0,001$; $p<0,001$; $p<0,001$ respectively). IONM disturbances, transitional neurological and cardiac complications were seen in both groups.

Conclusion(s): The defined anaesthetic protocol as a part of interdisciplinary care may shorten the length of stay in hospital, the total rate of fresh frozen plasma transfusion and reduce total hypotension time which may improve patient outcomes.

05AP04-02
Effect of video distraction on preoperative anxiety scores in paediatric patients undergoing general anaesthesia in ophthalmic daycare procedures: a randomized controlled trial

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Background: Parental separation, fear and exposure to operating room environment lead to stress and anxiety in paediatric patients. This study aims to identify the research gaps in the effect of video distraction on paediatric patients of Indian origin. We hypothesized that video distraction along with parental presence will have reduced preoperative anxiety in paediatric patients undergoing ophthalmic procedures under general anaesthesia compared to parental presence alone.

Materials and methods: This prospective randomized controlled study was carried out in children aged 2-8 years undergoing ophthalmic procedures under general anaesthesia. 138 patients were randomized into 2 groups with 69 patients in each: Group V (video distraction with parental presence) and Group C (parental presence). Our primary objective was to compare preoperative anxiety using mYPAS and heart rate (HR) while the secondary objectives were assessment of Child fear scale(CFS), emergence delirium using Watcha score (WS) and parental satisfaction using parental satisfaction score. All measurements were done at 3 timepoints- preoperative holding area, transport to operating room and mask introduction.

Results: There was statistically significant increase in HR on mask introduction in Group C compared to Group V but no significant difference between both groups in holding area and transport. The increase in HR across timepoints was significant in both groups with it being lower in Group V. Significant differences were also noted in mYPAS at all timepoints between both the groups with lower scores in Group V. mYPAS also increased significantly across all timepoints in Group C but not in Group V. CFS was comparable between both groups in holding area but significantly increased in Group C during transport and mask introduction. Statistically significant improvement in parental satisfaction was noted in Group V across all timepoints. Emergence delirium was comparable between the two groups.

Conclusion: Video distraction along with parental presence compared to parental presence alone reduces preoperative anxiety, fear and increases parental satisfaction during anaesthesia induction in age group 2-8 years but has no effect on emergence delirium. Hence, video distraction should be employed as a low cost, easily available, portable and effective means to alleviate stress and anxiety in paediatric patients undergoing general anaesthesia, especially where there is high turnover of cases.

05AP04-05
Postoperative nausea, vomiting and delirium incidence after otorhinolaryngological surgery in pediatric patients in a non-pediatric hospital

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Background and goal of study: Our goal is to analyze and quantify postoperative complications such as nausea/vomiting and delirium in pediatric otorhinolaryngology surgical population in our non-pediatric hospital.

Materials and methods: We made a retrospective survey analyzing the aboved mentioned complications during the postoperative period in children over 3 years old with an American Society of Anesthesiology status (ASA) I or II registered from November 2019 to May 2021.

Results and discussion: A total of 113 children were operated in this period. 48% of patients were ASA I and 52% ASA II. 25% of surgeries were myringotomy or myringoplasty and 43% included adenotonsillectomy. All the procedures except one were held under general anesthesia. 6 children had postoperative nausea or vomits (PONV), 3 of them after tympanic surgery and the other 3 after adenotonsillectomy. 2 patients presented delirium after eduction. There was an anesthesia resident in 35% of surgeries, it was a first year anesthesia resident in 50% of procedures where patients presented one of the analyzed complications. We had an overall 5% incidence of POVN after otorhinolaryngological procedures and a 6% incidence after adenotonsillectomy.

Conclusion(s): In literature the incidence of PONV after adenotonsillectomy in children is between 7-15%[1]. Our results of 6% of incidence shows that our protocol of nausea and vomiting prevention in children is working but it could be optimized to reach a lower incidence.

References: [1]Kovac, A.L. Postoperative Nausea and Vomiting in Pediatric Patients.*Pediatr Drugs 23,*11–37 (2021)

05AP04-06
Total intravenous anesthesia for child with Timothy syndrome: a case report

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Background: Timothy syndrome is a rare autosomal dominant disorder. It was first described in 2004 and is characterized by prolonged QT interval and syndactyly of the hands and feet. Herein, we describe the case of a child with Timothy syndrome who underwent hiatus hernia repair surgery.
Case Report: A 1-year-old boy diagnosed with Timothy syndrome underwent laparoscopic hiatal hernia repair. We selected total intravenous anesthesia as the technique for manually controlled infusion (MCI). He underwent venous induction with remifentanil infusion at 0.5 μg.kg-1.min-1 and a bolus of 1.8 mg of midazolam, followed by 20 mg of rocuronium. Midazolam and remifentanil infusion were maintained at 460 μg.kg-1.h-1 and 0.5 μg.kg-1.min-1, respectively, with minor adjustments. There were no complications during the intraoperative period.
Discussion: Timothy syndrome is associated with the mutation of chromosome 12, in addition to an alteration of Ca(v)1.2 type calcium channels, termed CACNAC1C.[1,2,3]
We opted for midazolam and remifentanil since they did not increase the QT interval or alter the electrical dispersion by the myocardium. Minto had confirmed the use of remifentanil in patients aged ≥15 years through target-controlled infusion (TCI) using a pharmacokinetic model. However, there are few reports on remifentanil use in the pediatric population.
References:
1. O'Hare M, Maldonado Y, Munro J et al, Perioperative management of patients with congenital or acquired disorders of the QT interval. Br J Anaesth. 2018;120:629-644.
2. Napolitano C, Splawski I, Timothy KW et al. Timothy Syndrome. In: Adam MP, Ardinger HH, Pagon RA et al, editors. 15 GeneReviews® Seattle (WA): University of Washington, Seattle; 2006.
3. Walsh MA, Turner C, Timonthy KW et al. A multicentre study of patients with Timothy syndrome. Europace. 2018;20:377-385.
Learning points: Timothy syndrome is a rare disease that presents with QT interval prolongation as its primary clinical symptom, with few reports of this disease in literature.
Inhalation anesthetics and propofol are not safe for use in these patients because of their respective effects on the myocardium.
Despite fewer studies on the use of MCI midazolam in the pediatric population during the intraoperative period, it was identified a viable and safe option in this case. To our knowledge this case report is the first in the literature describing the use of midazolam in MCI for a patient with Timothy syndrome.

05AP04-07
Deep learning-based prediction of intraoperative hypoxaemia for paediatric patients

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Background: Reducing the duration of intraoperative hypoxaemia in pediatric patient through rapid detection and early intervention is an important role for clinicians. We aimed to develop and validate a machine learning model that can predict intraoperative hypoxaemia events within 1 min in children undergoing general anaesthesia.
Methods: This retrospective study used prospectively collected intraoperative vital sign and parameters from the anesthesia ventilator machine extracted every 2 s of paediatric patients undergoing surgery under general anaesthesia between January 2019 and October 2020 in a tertiary academic hospital. Intraoperative hypoxaemia was defined as the gradual decrease in oxygen saturation to <95% at any point during surgery.
Three common machine learning techniques were employed to develop models using the training dataset: gradient-boosting machine, long short-term memory, and transformer. The performances of the models were compared using the area under the receiver operating characteristic curve using the randomly assigned testing dataset.
Results: In total, 13,130 patient records were included. Intraoperative hypoxaemia occurred in 1,540 (11.73%) patients with 2,367 episodes. Among the models developed, the gradient-boosting machine model had the highest area under the curve of 0.904 (95% confidence interval, 0.902-0.906), which was significantly higher than that of the long short-term memory model (0.843, 95% confidence interval, 0.840-0.846 $P<.001$) and the transformer model (0.885, 95% CI, 0.882-0.887,$P<.001$).

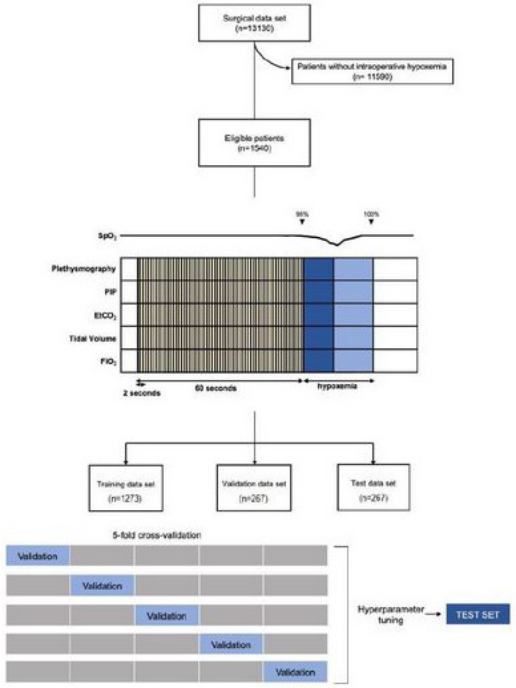

Figure 1. Flow chart presenting patient selection and analysis.
PIP, Peak Inspiratory Pressure; $EtCO_2$ End tidal CO_2; FiO_2, Fraction of inspired oxygen

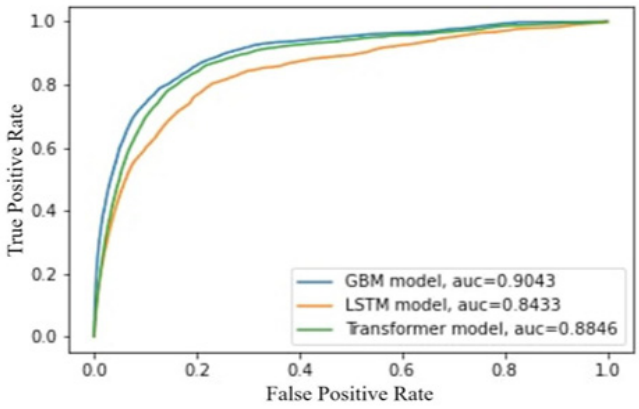

Figure 2. Comparison of area under the receiver operating characteristic curves for the machine learning models for predicting intraoperative hypoxaemia in paediatric patients.
GBM, Gradient-boosting model; LSTM, Long short-term memory; AUC, Area under the curve

Conclusions: Machine learning models can be used to predict upcoming intraoperative hypoxaemia in real-time based on the biosignals acquired by patient monitors, which can be useful for clinicians to predict and proactively treat hypoxaemia in the intraoperative setting.

05AP04-09
Postoperative urinary catheterization in children treated with or without epidural analgesia after orthopedic surgery: a retrospective review of practice

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Background and goal of study: Epidural analgesia is effective and a well-accepted treatment for postoperative pain in adults and children. Urinary retention is a known complication; but its description is mostly in the adult literature. Enhanced recovery after pediatric surgery supports implementation of regional analgesia and minimal time with drains of any sort.
The goal of this study was to examine urinary catheter (UC) management, placement and timing of removal in children undergoing lower extremity orthopedic surgery under general anesthesia with or without epidural analgesia.
Materials and methods: This is a single-center, retrospective observational study. Children who underwent orthopedic surgery with and without epidural analgesia between 1/2019 and 6/2021 were studied to determine management of UC. We recorded if a UC was placed in the operating room (OR).
How long the epidural catheter and UC were left in place and what was the incidence of UC placement or replacement after a trial without a catheter on the ward after surgery.
Results and discussion: A total of 239 children were included, of which epidural analgesia was used in 57 (23.8%). This cohort was significantly younger, weighed less, had longer surgeries, administered more IV fluid and had higher prevalence of neuromuscular disease.
In total, UC's were placed in the OR in 75 children, on the ward in an additional 9 children, and replaced on the ward in 7. UC placement in the epidural group was more common (93% vs. 17%, $p<0.001$) and with longer duration (median 3 vs. 1 day, $p=0.01$) compared with the non-epidural group. Ward placement of UC to non-previously catheterized children was more common among the epidural cohort (60% vs 1.9%, $p=0.007$) as was UC replacement after removal (5.3% vs 2.2%) albeit, the latter with no statistical significance. Placement of a UC in the OR was more common in children with NMD as compared to children without NMD (61.4% vs 22.2%, $p<0.001$) as was ward replacement after catheter removal (17.1% vs 2.5%, $p=0.001$).
Conclusion(s): Ward UC placement was frequent in children with epidurals justifying routine placement of intraoperative UC in this population. Failure of trial without a catheter is more common in children with NMD, suggesting increased caution before early UC removal in these children.

05AP04-10
Neurologic disorders during surgical process in paediatric patients

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Background and goal of study: Evaluate the efficacy of anxiolytic measures to prevent preoperative anxiety and emergence delirium related to perioperative process in children.
Determinate if neurodevelopmental disorders could have an impact on perioperative neurological disorders.
Material and methods: Retrospective analysis of perioperative neurological disorders happened at a non-paediatric terciary hospital during two years in 239 children between 2 and 18 years old submitted to major ambulatory surgery.
Results and discussion:

	Previous NRL/ PSQ disorders	Non-previous NRL/ PSQ disorders	
Preoperative anxiety YES	1	5	6 (2,5%)
Preoperative anxiety NO	12	221	233
	13	226	239

Our data yield the next results:
- Anxiety occurs in 7,7% of the children with neurodevelopmental disorders and 2,21% of non- diagnosed children.
- Being diagnosed of neurodevelopmental disorders rises the risk of suffering preoperative anxiety around 3,68 times.

	Previous NRL/ PSQ disorders	Non previous NRL/ PSQ disorders	
Emergence delirium YES	2	5	7 (2,9%)
Emergence delirium NO	12	220	232
	14	225	239

The results show that:

- Emergence delirium occurs in 14,28% of the children with neurodevelopmental disorders and 2,22% of non-diagnosed children.
- Being diagnosed of neurodevelopmental disorders rises the risk of suffering emergence delirium around 7,33 times.

Two children presented both anxiety and emergence delirium.

Conclusions: Neurodevelopmental disorders are highly rising worldwide. These pathologies imply a challenge when those kids need a surgery.

The prophylactic measures (premedication with oral midazolam 0,5 mg/kg; parental presence at induction and postanesthetic care unit and environmental adequacy of the waiting room) diminish the rate of preoperative anxiety to 2,5% of the children, being the published median around 50 to 70%[1].

We should detect preoperatively the children who have been diagnosed of neurodevelopmental disorders because that rises either their risk of suffering preoperative anxiety 3,68 times and the risk of experimenting emergence delirium 7,33 times respect the non-diagnosed.

05AP04-11
AuraGain® laryngeal mask (LM) and flexible fiberoptic bronchoscopy as therapeutic approach of airway foreign body (AFB) in pediatrics: a case report

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Background: AFB is a life-threatening condition. Clinical presentation is unspecific and imaging studies are rarely decisive. High suspicion is reason enough to perform a fiberoptic bronchoscopy (FBO). In many institutions, the gold standard of management is rigid bronchoscopy[1].

We bring a case from our hospital where pediatric surgeons have vast experience with flexible bronchoscopy as a primary diagnostic and therapeutic approach, using the AuraGain® LM to control airway.

Case Report: A 30-month-old girl, without medical history, developed cardiorespiratory arrest at home due to probable choking, with successful basic cardiopulmonary resuscitation and extraction of a metallic foreign body from the mouth. She was admitted to the hospital with no neurological deficit, hemodynamically and respiratory stable with normal chest X-ray.

On the third day after admission, she lost consciousness, with perioral cyanosis, generalized rigidity, supraversion of the eyes, bradycardia and desaturation, being resuscitated with a self-inflating bag, with hypoventilation in the left lung, and normal chest X-ray.

A FBO (diameter 6 mm, working channel 3.2 mm) was performed under general anesthesia with AuraGain® nº 2 LM, extracting a 5 mm plastic bead from the left main bronchus, without hemodynamic or respiratory alterations. The patient evolved favorably.

Discussion: In the diagnostic and therapeutic management of AFB many centers have replaced rigid bronchoscope by FBO without an increase in the complication rate or postoperative mortality[2].

FBO is less invasive, enables distal airway access, and has a growing arsenal of therapeutic tools. There are many advantages with the use of AuraGain® LM: it allows the use of thicker FBO, facilitates visualization of the supraglottic compartment and ensures continuity in airway ventilation throughout the procedure, without having to extubate the patient if the FB is bigger than the diameter of the fiberoptic bronchoscope used.

References:

1. Management of foreign body removal in children by flexible bronchoscopy; T. Tenenbaum et al. J Bronchol Intervent Pulmonol 2017; 24:21-28.
2. Anesthesia in diagnostic and therapeutic Pediatric Bronchoscopy; A. Londino et al. Otolaryngol Clin N Am 2019 1037-1048.

Learning points:

- Multidisciplinary approach including pediatricians, surgeons and anesthesiologists is the key to optimal patient management.
- AuraGain® LM allows AFB removal with less ventilatory interruptions and excellent clinical results.

Neuroanaesthesiology

06AP01-01
Preoperative baseline EEG may help to identify patients at risk for a postoperative neurocognitive disorder

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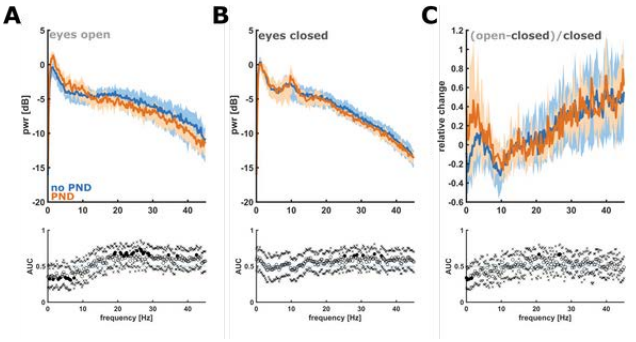

06AP01-02
Cerebral hemodynamics duringsustained intra-operative hypotension

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Background and goal of study: Static cerebral autoregulation (CA) maintains steady-state cerebral blood flow (CBF) relatively constant above a mean arterial blood pressure (BP_{mean}) of 60-65 mmHg. Below this lower limit of the CA (LLCA), CBF declines along with BP_{mean}. Data are lacking that describe how CA reacts to sustained hypotension, because this situation is usually avoided by anesthesiologists.

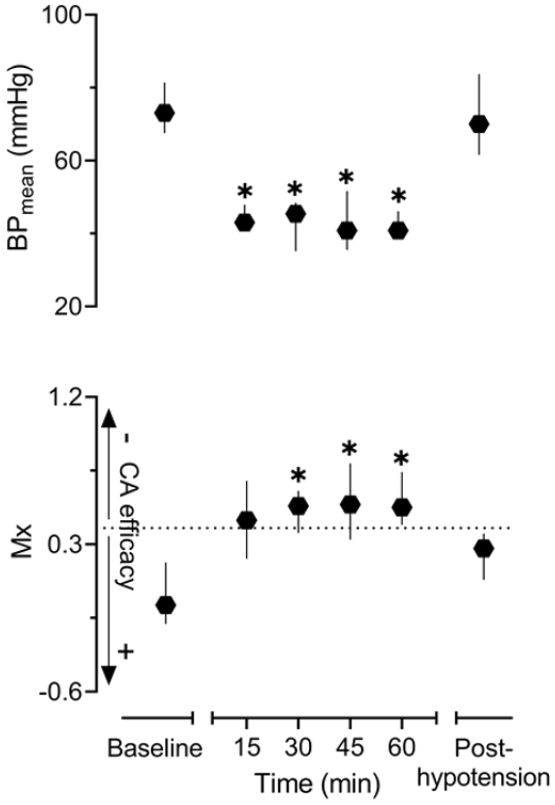
In this study, we took advantage of a procedure that required a one-hour period of deep hypotension to monitor transcranial Doppler derived CBF velocity to calculate dynamic CA, which counter short-term blood pressure variations. With these data, we were able to analyze the reaction of dynamic CA to longstanding hypotension and blood pressure restoration after the procedure.

Materials and methods: Continuous radial arterial blood pressure and middle cerebral artery blood flow velocity ($MCAV_{mean}$) were monitored in 23 patients that required deep intra-operative hypotension. The LLCA was determined for every patient individually. BP_{mean} below the LLCA was classified as hypotension.

Dynamic CA was quantified using the correlation index (Mx), which is the correlation coefficient between 3-minute moving averages of BP_{mean} and $MCAV_{mean}$, after induction of general anesthesia (baseline) and every 15 minutes during, and after one hour of intra-operative hypotension.

Functioning dynamic CA is defined as Mx <0.4. Differences in Mx between baseline and overall hypotension were assessed with the Cochran's Q test, and during hypotension with McNemar's test. Data are expressed as median (IQR).

Results and discussion: The LLCA was located at 56 (47-74) mmHg. Mx was -0.07 (-0.18-0.19) at baseline and 0.54 (0.37-0.69) during hypotension ($p<0.01$, Figure, $n=12$), with no appreciable change over time. After BP was restored, Mx returned to a functioning state (0.28 (0.08-0.37)).



Conclusions: Dynamic CA remained impaired during the entire one-hour period of hypotension, and returned to baseline immediately when BP_{mean} was restored. This completely reversible situation suggests no ischemic hyperemia occurs and also renders an adaptation mechanism unlikely during sustained hypotension.

06AP01-03
Can awake craniotomy with intraoperative magnetic resonance imaging preserve patients' neurological function?

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Background and goal of study: Awake craniotomy is the gold standard when the pathological lesions are in or adjacent to the eloquent area. Intraoperative magnetic resonance imaging (iMRI) achieves more accurate resection by compensating for brain shifts caused by surgical intervention. Therefore, combining these modalities is considered to provide the maximal surgical resection with minimal risk of postoperative neurological deficits.

In terms of anaesthesia, concurrent use of iMRI for awake craniotomy is clinically acceptable, providing potential intraoperative complications can be controlled, even if an awake patient keeps a natural airway, as we have reported[1].

The aim of this study is to evaluate the efficacy of awake craniotomy with iMRI on the postoperative physiological status. We hypothesise that this novel technique does not negatively affect the patients' performance.

Materials and methods: After the local ethics committee's approval (3320-R), we conducted a retrospective case review of awake craniotomies for glioma resection that was carried out at Tokyo Women's Medical University between Nov 1999 and Dec 2015. We excluded patients who were not evaluated with Karnofsky Performance Status (KPS) preoperatively or 3-month postoperatively or who were operated on without iMRI. Multivariate logistic regression analysis was used to explore the relationships between KPS 3-month after surgery and patient characteristics. Statistical significance was considered as $p<0.05$.

Results and discussion: A total of 358 glioma patients underwent awake craniotomies during the study period, of which 216 patients (age of 39 ± 12 years old; 138 male, 78 female) were analysed. Seven patients whose operations were without iMRI and 137 patients without KPS evaluation were excluded.

Univariate analyses showed a significant correlation between the KPS 3-month after surgery and WHO Grade ($p<0.001$) and preoperative KPS ($p<0.001$) while age ($p=0.118$), sex ($p=0.481$), and tumour removal rate ($p=0.669$) did not.

Similarly, multivariate analysis with the logistic regression model showed that the KPS 3-month after surgery was significantly correlated with the preoperative KPS ($p<0.001$).

Conclusion: Provided preoperative physiological status is well-maintained, awake craniotomy with iMRI should be the first choice because it can preserve the postoperative physiological performance of glioma patients.

Reference:

1. Kamata K, et al. J Neurosurg Anesthesiol 2019; 31: 62-9.

06AP01-04
Inflammatory response in patients with spontaneous intracranial hemorrhages

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Background: In recent decades much attention has been paid to neuroinflammation as a typical response to brain damage. The aim of the study was to investigate the inflammatory response to spontaneous intracranial hemorrhage.

Materials and methods: The study included 59 patients aged from 18 to 72 years (48±6) after episodes of spontaneous intracranial hemorrhage (SICH) or after a elective surgical interventions complicated by a ruptured arterial aneurysm or arteriovenous malformation.

All the patients were devided into 4 groups.1 group (n=9) - patients with aneurysmal SAH with a favorable outcome, 2 group (n=33) - patients with aneurysmal SAH with an unfavorable outcome, 3 group (n=6) - patients with hypertonic SICH or due to AVM rupture with a favorable outcome, 4 group (n=11) - patients with hypertonic SICH or due to AVM rupture with an unfavorable outcome.

Blood plasma levels of interleukins (IL): 6, 8, 10, TNF-α, C-reactive protein (CRP), blood leukocytes (Leu), procalcitonin (PCT) were studied. In the cerebrospinal fluid (CSF), the following markers were evaluated: cytosis, protein, glucose, lactate, cytokines (IL: 6, 8, 10, TNF-α).

Results and discussion: At first, procalcitonin levels were < 0.5 ng / ml. Then the PCT level rose at least once above 0.5 ng / ml in 3 patients (33%) of group 1, in 12 patients (36%) of group 2, in 1 patient (17%) of group 3, 4 (36%) of group 4.

CRP decreased over time in groups with a favorable outcome, in patients with an unfavorable outcome it increased.

IL-6 decreased over time in all groups, IL-8 was increased in all groups , IL-10 decreased in patients of group 1 and increased in group 3, TNF-α was increased in the 2 and 4 groups.

In patients with a favorable outcome the levels of IL-6, IL-8, TNF-α, IL-10 was lower than in cases of unfavorable outcome (2 and 4 groups).

The levels of IL-6, IL-8 and IL-10 in CSF in patients of 2 and 4 groups were higher than in plasma.

Conclusion(s):

1. A significant increase in the level of pro-inflammatory cytokines, leukocytosis from the first day of the disease is associated with an aseptic inflammatory response.
2. The most pronounced response is formed by glial brain cells, which is confirmed by extremely high levels of cytokines in CSF, hundreds and thousands of times higher than the levels of cytokines in the blood.
3. The levels of pro-inflammatory interleukins: 6, 8 and anti-inflammatory interleukin 10 in blood plasma can act as predictors of the outcome of the disease.

06AP01-05
Predicting postoperative delirium from the heart rate variability of patients in elective cardiac surgery

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Background and goal of study: The complication of postoperative delirium is directly linked to prognosis, leading to an extension of hospital stay and an increase in mortality. Since no effective treatment has been found for delirium, prevention of its onset is important, and the development of tools that can be detected early is valuable. From the 5 min electrocardiogram analysis a day before surgery, we found that the high frequency (HF) component was significantly reduced in patients with postoperative delirium in patients for esophageal cancer surgery (1).
The HF component is said to reflect parasympathetic function. This time, we tested the hypothesis that parasympathetic nerve activity is low in the resting heart rate variability the night before surgery in patients with postoperative delirium. This time, we recorded resting heart rate variability in patients scheduled for cardiac surgery the night before surgery. We analyzed heart rate variability in patients with and without delirium in the postoperative intensive care unit (ICU). The Confusion Assessment Method for the ICU (CAM-ICU) was used to diagnose delirium.
Materials and methods: This is a prospective observational study that included elective cardiac surgery patients aged 65 years and older after approval by the institutional review board. The day before surgery, a Mini-Mental State Examination (MMSE) was performed. The electrocardiogram was measured for 5 min.
All patients were transferred to the ICU after surgery, and CAM-ICU was measured every 8 h until ICU discharge, and positive patients were diagnosed with delirium. The electrocardiogram was analyzed using MemCalc.
Results and discussion: During this study 14 patients with delirium and 22 patients without delirium were included in the analysis. The average MMSE score was 27.4, with no patients diagnosed with preoperative dementia. In the analysis of heart rate variability, the HF component was significantly lower in the group with delirium than in that with delirium (Mann–Whitney U test, $p < 0.05$).
Conclusions: Heart rate variability was measured in elective cardiac surgery patients aged 65 years or older. In patients with scheduled postoperative delirium, the activity of parasympathetic nerves was lower than before surgery, and it was considered possible to predict the onset of postoperative delirium from preoperative electrocardiogram measurement.
References:
1. Echizen M, Satomoto M, et al. Ann Med Surg. 2021;70:102856.

06AP01-06
Correlation of pre-operative hippocampal volume measured with magnetic resonance imaging and duration of emergence from general anaesthesia in patients undergoing elective spine surgeries

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Background and goal of study: The study objectives were to evaluate correlations of pre-operative hippocampal volume(HV) measured using magnetic resonance imaging(MRI) & functional reserve index(FRI) with duration & pattern of emergence from general anaesthesia(GA) in patients undergoing elective spine surgeries.
Materials and methods: Patients aged over 18 years scheduled for elective spine surgeries under GA were included. Patients with Glasgow Coma Scale(GCS)<15 & those requiring intra operative neuro monitoring were excluded. HVs were measured preoperatively using MRI brain. A questionnaire was used to examine number of years of education, years of employment, years of leisure activities of patients before surgery to determine their FRI. GA was induced by propofol, fentanyl & vecuronium,& maintained by sevoflurane, air & oxygen mixture titrated to Bispectral Index of 40-60.
At the end of surgery, mean alveolar concentration value was noted & neuromuscular blockade was reversed once train of four count≥3. Sevoflurane was turned off & fresh gas flow of 6 litres/min was set allowing patients to wake up using a “no contact technique”. Time duration from the point of turning off sevoflurane till the onset of different phases of emergence were measured. The pattern of emergence was assessed using GCS & Riker Sedation Agitation Scale every 5 minutes for first 30 minutes & every 10 minutes for next 60minutes from the point of turning off sevoflurane.
Results and discussion: A total of 25 patients were recruited into the prospective cohort. There were no significant correlation between average bilateral standardized hippocampal volumes & dominant side standardized hippocampal volumes with time to onset of different phases & patterns of emergence. FRI education negatively correlated with the time for gaining orientation ($r=-0.484$; $P=0.014$), transferring time to post anaesthesia care unit ($r=-0.482$) ($P=0.015$) & proportion of time the patients remained in Riker scale ≤3 ($r=-0.408$) ($P=0.043$) during emergence. FRI working negatively correlated with proportion of time the patients remained in GCS ≤8 ($r=-0.412$) ($P=0.041$) during emergence.
Conclusion(s): In patients undergoing elective spine surgeries, though there wasn’t any correlation between HVs & emergence, knowing patient’s educational status would assist to anticipate the duration & pattern of emergence from GA. The study mandates further analysis to look for correlations with other deep grey matter implicated in emergence.

06AP01-07
Treatment of craniosynostosis

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Background: Female patient, 6 months old, 7 kg, ASA I, with craniosynostosis, who underwent surgery to correct the deformity. During the perioperative period, she remained stable, and blood transfusion was performed with serial blood gas analysis. Patient sent to the ICU intubated and sedated at the option of the surgical anesthetic team. After 36 hours, the patient died.

Case report: Female patient, 6 months old, 7 kg, with craniosynostosis (scaphocephaly). She underwent corrective surgery under general anesthesia. After Hb 7.0 g/dl induction, the first blood transfusion was performed. After craniotomies, metabolic acidosis and a drop in Hb (8.4 g/dl) were observed. At the end, persistence of metabolic acidosis and improvement in Hb levels of 9 .4 g/dl. Patient sent to the ICU intubated and sedated.

After 12 hours, the patient presented a preserved neurological examination, performed CBT with satisfactory evolution.

After 18 hours, there was a significant drop in Hb 6.1 g/dl, a new blood transfusion was performed, evolving with changes in the pulmonary condition, drop in O2 saturation and requiring the use of vasoactive drugs. Evolving with 2 PCR, being reanimated without success.

Discussion:

a) Optimization of hematocrit.

b) Investigation of congenital heart defects.

c) Otimization of blood volume.

d) Reduce losses such as the use of antifibrinolytic agents.

e) Avoid excessive replacement of hemoconcentrates and consequently their complications.

References:

1. Anesthetic Considerations for Pediatric Craniofacial Surgery , Nicholas Meir Anesthesiology Clin 39 (2021) 53-70

2. Machine Learning Applied to Registry Data:Development of a Patient-Specific Prediction Model forBlood Transfusion Requirements During Craniofacial Surgery Using the Pediatric Craniofacial Perioperative Registry Dataset, Ali Jalali et al. Anesthesia analgesia; Jan 2021 . Vol 132 . Number 1

3. Incidence of venous air embolism during craniectomy for craniosynostosis repair. Anesthesiology ; 92 (1) :20-3.

Learning points:

a) Investigation of pre-existing diseases and genetic syndromes, aiming at the diagnosis of congenital heart defects (1).

b) Hematocrit optimization.

c) Improvement of approach techniques aiming at less trauma.

d) Review of the need for specific and non-invasive monitoring for air embolism using precordial Doppler (1) and monitoring and predictability of bleeding (2).

06AP01-08
Efficacy of continuous wound infiltration of ropivacaine for postoperative pain control after spine surgery: a case series

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Background and goal of study: Pain is the most common reported complication after spinal surgery. A system that offers continuous wound infiltration of local anesthetic may prolong the benefits of local anesthetics and decrease the requirements of opioids postoperatively for at least 48 hours. To this context, we evaluated the efficacy of an elastomeric pump which deliver local anesthetic via a catheter within the wound for 48 hours in 40 patients after spinal surgery.

Materials and methods: 40 patients undergoing spine surgery were enrolled. A standard anesthetic technique was used. Anesthesia induction was by using target-controlled infusion (TCI) of Remifentanil at blood concentration 4ng/ml, TCI of Propofol at blood concentration 6-7μg/ml, rocuronium 1mg/kg and the trachea will be intubated after 90sec of manual ventilation with 100% O_2.

Anesthesia was maintained using TCI of Propofol at blood concentration 2-3μg/ml and TCI of remifentanil at blood concentration 4-5ng/ml with a goal of Patient State index 25-50. Mechanical ventilation was volume-control using 50% air and 50% oxygen. For postoperative analgesia, we were administered intraoperatively 2gr paracetamol as well as 0,1-0,2mg/kg morphine.

Furthermore, at the end of the surgery the surgeon placed, bilateral to the incision, two catheters with multiple and laterally aligned holes, which was connected to an elastomeric pump filled with local anesthetic ropivacaine in concentration 0,27% at a rate 5ml/h for 48 hours. The first catheter was positioned under the paravertebral muscles and the second catheter was positioned above the deep fascia. Each catheter was primed with 5ml of local anesthetic before attachment of the tubing from the elastomeric pump

Results and discussion: 40 ASA I-III patients were studied (mean age 61,15±14,33 years). Mean operative time of surgery was 324,74±100,59 minutes. Intraoperative hemodynamics remained stable and SpO_2in normal levels. Mean VAS score were 2,46 at the day of the surgery, 2,43 at 24hours and 2,51 at 48 hours.

Tramadol was given in 5 patients in PACU for VAS scores of 5 and one patient needed PCA of morphine to manage the pain. No nausea, vomiting or itching were recorded.

Conclusion(s): Continuous wound infusion of ropivacaine for the control of pain after spinal surgery provided high levels of postoperative analgesia and reduced the requirements of opioids without totally excluding them.

06AP01-09
Osmotic diuresis for brain tumor resection: a retrospective study of quality of our current practice

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Background and goal of study: Osmotherapy is a corner stone of the brain tumor resection management not only to make easier surgical approach but also to prevent secondary brain damage. The resulting osmotic diuresis is nevertheless poorly discussed in the literature despite the interest regarding the patient impact.
To assess the quality of this kind of anaesthetic management, we studied the norms and standards of effective osmotic diuresis after mannitol in our current practice.
Materials and methods: A retrospective study was conducted in 1024 scheduled brain tumour resection in 885 adult pts (Jan 2014 to Dec 2018). Methodological rules ant diuretic treatments are summarized in the Tab.1, allowing the patients to be divided into "IN_RANGE" (matching for SHR) and "OUT_RANGE" (corresponding to PHR) 2. Regarding cerebral circulation physiology; EtCO2, MAP, HR & temperature (Temp) were maintained in normal or recommended ranges. Finally we analyzed 733pts (385M/348F).
Results and discussion: In the 733 pts, 669 (91.27%) were IN_RANGE, while 64 (8.73%) were OUT_RANGE. Not only demographics, but also several physiologics (EtCO2, HR & Temp) does not demonstrate any statistically significant difference (Tab.2). Alternatively, MAP was significantly different (<0.001) with 75.99(9.80) mmHg in IN_RANGE *vs* 80.63(9.15)mmHg in OUT_RANGE (Tab.2). Fig 1A depicts the hourly diuresis in the global effective and the two different considered groups. Furthermore, a linear regression between hourly diuresis and hyperdiuresis flow allows to demonstrate a strong statistically significant correlation between the two different parameters (Fig 1B). The PHR (Tab.1) threshold corresponds to 16.5ml.kg^{-1}.h^{-1} validating the preliminary rule/definition (15.5ml.kg^{-1}.h^{-1}).

Furosémide iv dose (CSF limitation)	**0.20-0.30mg.kg^{-1}**
Mannitol iv dose	1g.kg^{-1}
"Secondary hyperdiuresis" rule (SHR) = IN_RANGE	>1.5ml.kg^{-1}.h^{-1}and <15.5ml.kg^{-1}.h^{-1}
"Pathological hyperdiuresis" rule (PHR) = OUT_RANGE	>1000ml.h^{-1} *vs* >15.5ml.kg^{-1}.h^{-1}

Table 1. Diuretics treatments & methodological rules

Physiologics	**IN_RANGE (n=669)**	**OUT_RANGE (n=64)**	**p value**
MAP (mmHg)	75.99 (9.80)	80.63 (9.15)	<0.001
EtCO2 (mmHg)	31.58 (5.05)	31.73 (2.60)	0.81
HR (bpm)	71.70 (16.60)	70.16 (14.81)	0.48
Temp (°C)	35.47 (1.42)	35.64 (0.72)	0.34

Table 2. Physiologics presented as means & std deviations

Conclusion(s): This retrospective study confirms the validity of our pre-established rules, confirming implicitely the quality of current practice in terms of osmotic diuresis. Otherwise, we have been able to quantify the threshold that allows us to discriminate between a normal (below) and a pathological (above) induced hyperdiuresis. This could represent a reliable tool for the clinician to be alerted or not about the induced hyperdiuresis, in his current practice. Finally, physiological values validate our current neuranesthesiological practice showing, once again, all the importance of the MAP parameter in the control of the intraoperative brain circulation in relation with osmotic diuresis.

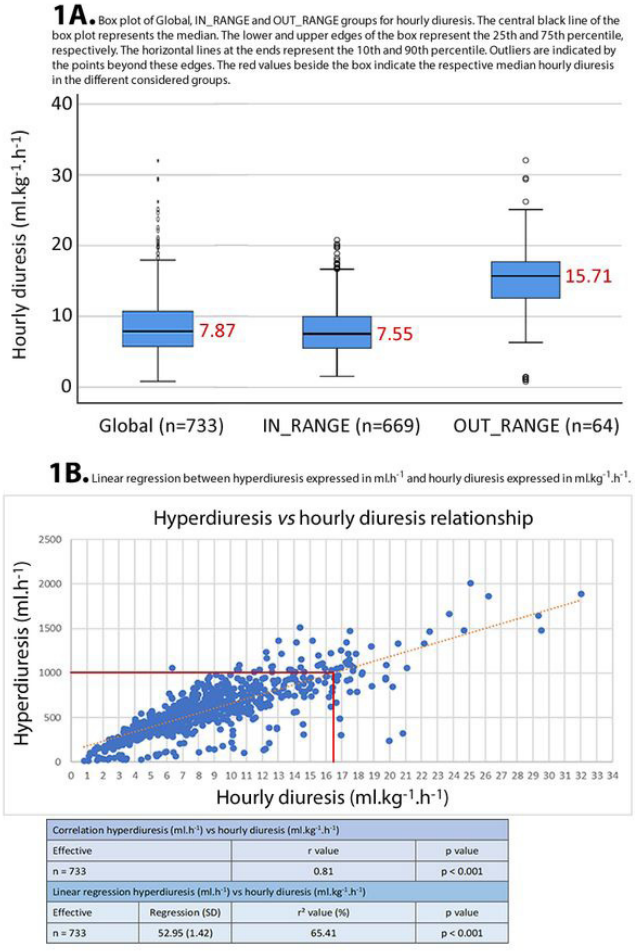

Figure 1.

06AP01-11
Contrast-induced encephalopathy following cerebral angiography: a case report

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This case report evidences the rare potential for development of contrast-induced encephalopathy (CIE) following administration of iodinated contrastand bolsters awareness of its management.
83-year-old female, 65kg, ASA III, with hypertension which underwent carotid cavernousfistula and unruptured aneurysm embolization.
ASA standard monitoring was established, GA was induced (fentanyl 0.1mg, propofol 120mg, rocuronium 80mg, dexamethasone 8mg) and the procedure performed using iohexol 120mL, without complications.Upon admission on ICU, patient was somnolent and poorly collaborative. 2 hours later, evidenced restlessness, left hemiparesis, inability to follow simple orders, progressive neurologic deterioration (GSC 8) followed by a tonic-clonic seizure. Leve-

tiracetam, midazolam, propofol, fentanyl perfusions were initiated. CT revealed probable contrast-induced encephalopathy and the patient started corticotherapy and IV hydration.

A repeated angiography was performed, which didn't reveal any acute ischemia and vessel occlusion. The following day, another seizure and GSC 3 were noticed. A higher dose of midazolam, levetiracetam and NaCl 20% were initiated. On ICU D6, the GSC started improving (3>6>9) and MRI showed reduced cerebral edema. The patient was extubated, progressively recovered, was discharged 3 days later, with GSC 14 (temporal disorientation) and no other signs or symptoms.

CIE is a challenging condition to diagnose due to high variability in presentation and progression. Although pathophysiology and potential risk factors remain uncertain, the disruption of the blood-brain barrier (BBB) integrity may be the most probable trigger to the neurotoxic effects. Chronic hypertension appears to be the most relevant risk factor.

As an exclusion diagnosis, CT or MRI studies are needed to dismiss embolic, hemorrhagic and hemodynamic etiologies. Definitive prevention and treatment for this complication is absent, but hydration, IV steroids and mannitol may prove helpful for some patients.

Spina et al. Recurrent contrast-induced encephalopathy. Med J 2017
Leong S et al. Persistent neurological deficit from iodinated contrast encephalopathy. Interv Neuroradiol. 2012

This case highlights the importance of setting apart CIE from acute stroke. Early identification and diagnosis augment a favorable outcome. Further studies are needed to define risk factors and mechanism of the iodinated contrast neurotoxicity, which may help minimize severe complications.

06AP02-01
The effect of 30⁰flexion and 30⁰extension of the neck on internal jugular vein and carotid artery flows in patients who have supratentorial tumour

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Background and goal of study: Variable patient positions may be used during craniotomy according to the location of the lesion. Vascular structures of the neck could be under pressure while flexion, extension or rotation of the head during the positioning. This may lead to not only various problems such as increase of the intracerebral pressure and cerebral ischemia, but also difficulty for surgical approach.

In this study we aimed to compare the effect of 30⁰ flexion and 30⁰ extension of neck on internal carotid artery and internal jugular vein flows using magnetic resonance imaging (MRI) and doppler ultrasonogaphy (DUSG) on patients who have supratentorial tumor.

Materials and methods: Twenty patients aged between 18-60 yrs, ASA status I-II, BMI 20-25, undergoing planned to craniotomy for supratentorial tumor resection were assigned to study. Internal carotid artery and internal jugular vein flows were measured with doppler ultrasonography measurements from 1cm above of common carotid artery bifurcation in neutral position, 30⁰ flexion and 30⁰ extension of head.

Internal carotid artery and internal jugular vein flows were measured in two different velocity encoding sequences (50ml/sc and 100ml/sc) with MRI in neutral head position, 30⁰ flexion and 30⁰ extension of the head position. All measurements were collected and, statistically evaluated.

Results and discussion: There was no statistically difference between internal carotid artery and internal jugular vein flows in neutral, 30⁰flexion or 30⁰extension of the head positions (p> 0.05).

When we compared the DUSG and MRI measurements in present positions, there was a correlation between DUSG and MRI blood flow measurements taken in velocity encoding 50ml/sc sequence (pearson correlation number ≥60). The correlation was statistically significant especially in venous blood flow measurements (pearson correlation number ≥80).

Conclusion(s): The 30⁰flexion and 30⁰extension positions of the head does not effect the internal carotid artery and internal juguler vein flows in patients who have supratentorial tumour. During craniotomy, the measurement and documentation of the limits of flexion and extension of the head will contribute not only success of surgery, but also outcome of the patients.

06AP02-02
Failure of non-invasive blood pressure cuff monitoring due to surgical taping during anterior cervical discectomy and fusion (ACDF) surgery

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Background: Non-invasive (NIBP) and intraarterial (ABP) blood pressure monitoring are used under different circumstances and may yield different values.

Case report: We present an ASA 1, fit 46 yrs male scheduled for elective single level ACDF surgery. In this case an arterial line was placed in addition to a non-invasive blood pressure cuff. Blood pressure monitoring continued with both methods of measurement, IABP in the right radial artery and NIBP on the left arm. Initial measurements of ABP and NIBP were concordant and the NIBP cuff was set on a five minute cycle mode.

After surgical positioning, including standard caudal taping of the ipsilateral shoulder to optimise surgical access to the neck, it was noted that the NIBP measurement was significantly higher than the IAP measurement (systolic arterial pressure (SAP) 164mmHg vs 102mmHg, respectively).

The blood pressure cuff was re-cycled and the arterial line flushed but the divergence in results remained with a difference of SBP of >60mmHg between the two measurement techniques. Once the surgical taping was removed, the discrepancy in SBP readings resolved with a return of the NIBP to its earlier level.

Discussion: Artefactual readings of spinal neuromonitoring have been reported due to surgical taping during major spinal surgery, however, artefactual NIBP readings as a result of surgical taping have not previously been described.[1]

It is not common practice to site both an arterial line and to cycle a non-invasive blood pressure cuff during ACDF surgery and so it is possible, that artefactual readings are, in fact, more common than currently reported.

Artefacts during anterior cervical fusion surgery can reduce the time to respond to hypotension, which can increase the risk of ischemic stroke.[2]

References:
1. Decruz et al. Neuromonitoring in Cervical Spine Surgery: When Is a Signal Drop Clinically Significant? Asian Spine J. 2021 Jun;15(3):317-323
2. Drummond et al. Cerebral Ischemia as an Apparent Complication of Anterior Cervical Discectomy in a Patient with an Incomplete Circle of Willis, Anesthesia & Analgesia: Mar 2006, 896-899
Learning points: While there is not enough evidence to insist that every ACDF be done with IAP monitoring, close monitoring of NIBP during surgical taping for ACDF should be routine and any otherwise unexplained change in blood pressure before and after taping should prompt further investigation.

06AP02-04
A case of acute severe liver failure following posterior correction and fixation for scoliosis

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Background: Although posterior correction and fixation (PCF) is a standard operation for scoliosis, there are few reports about postoperative acute severe liver failure.[1]
Case report: A patient was 15-year-old, female, 32 kg of body weight and 150 cm of height. She received a PCF at the thoracic vertebra 3rd to the lumbar one 1st for idiopathic scoliosis. There was no remarkable finding in her preoperative examination. General anesthesia was performed with sevoflurane, fentanyl, propofol and rocuronium for induction, and propofol (total dose 1431 mg) and remifentanil for maintenance. The operation was done with no complications. The operation time was 516 minutes and the anesthesia time was 641 minutes.
On the postoperative day (POD) 1, acute severe liver failure was shown by the extreme increase of liver enzymes (AST 3113 IU/L, ALT 2235 IU/L, LDH 2595 IU/L). Platelet decreased to 61000/mcl, prothrombin-time (PT) was 18.8 seconds and PT-INR was 1.62. Transit ischemic liver damage was diagnosed by the contrast-enhanced CT on POD1. These laboratory findings recovered to the normal range on POD15 without any further treatment and the patient discharged on POD21.
Discussion: There are various causes of acute severe liver failure following PCF: ischemia, drug-induced liver dysfunction, propofol infusion syndrome and infection.[2]
In this case, the transit ischemic liver damage was most likely. The device of prone position body-fixation compressed the liver or deteriorated the hepatic blood circulation due to increased thoracic pressure.[3]
Spine alignment correction reflected to the vessel tension and aggravated the blood supply to the liver. In the correction of scoliosis, anesthesia management should be performed in consideration of possibility of causing liver damage.
References:
1. T Yokota et al. Postoperative early stage non-come acute hepatic failure noted following a prone-position surgery: a case report. J Jpn Soc Intensive Care Med. 2018
2. Wendon et al. EASL Clinical Practical Guidelines on the management of acute (fulminant) liver failure. Journal of Hepatology, Volume 66, Issue 5
3. Chikhani M et al. The effect of prone positioning with surgical bolsters on liver blood flow in healthy volunteers. Anaesthesia. 2016
Learning points: To avoid postoperative acute severe liver failure following PCF for scoliosis, liver compression due to prone- position and irrelevant blood supply to the liver by spine alignment correction might be checked.

06AP02-05
Brain vascular surgery neuroanesthetic management: a six years retrospective review of the performance of one Western European university hospital

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Background and Goal of Study: The cerebral preservation during brain vascular neurosurgery (BVN) matches for the maintenance of the cerebral blood flow to prevent potential tissual ischemia. This is underpinned by a physiological triple law (TL): cerebral self-regulation, blood carbon dioxide vasoreactivity and metabolic coupling.
In order to analyse our dailly practice performance during BVN, we have retrospectively analyzed the degree of compliance to the TL by reviewing our anesthetic monitoring data between 2015 and 2020.
Materials and Methods: The individual monitoring data have been extracted from anesthesia records (perioperative management IT solution Dräger™ Innovian™). Five parameters in relation with the TL (HR, MAP, EtCO2, Temperature and SevoMAC) have been assembled in the databse for analysis, consisting, first in the calculation of three individual specific & original indicators (Fig.1) and second, the determination of their median values of all patients for distribution description (Fig.2).

Fig.1A. Original methodology: "from the monitoring parameters to specific indicators"

1. Monitoring Parameters
A. Cerebral self-regulation
- Rule 1: MAP < 60mmHg or MAP > 110mmHg
- Rule 2: at least one time HR < 50bpm
- Rule 3: at least one time HR > 100bpm

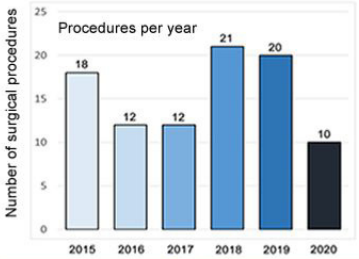
B. Vasoreactivity to blood carbon dioxide
- Rule 4: at least one time EtCO2 < 30mmHg
- Rule 5: at least one time EtCO2 > 40mmHg

C. Metabolic coupling
- Rule 6: Temp < 34°C or > 36°C

D. Pharmacology
- Rule 7: SevoMAC < 1MAC

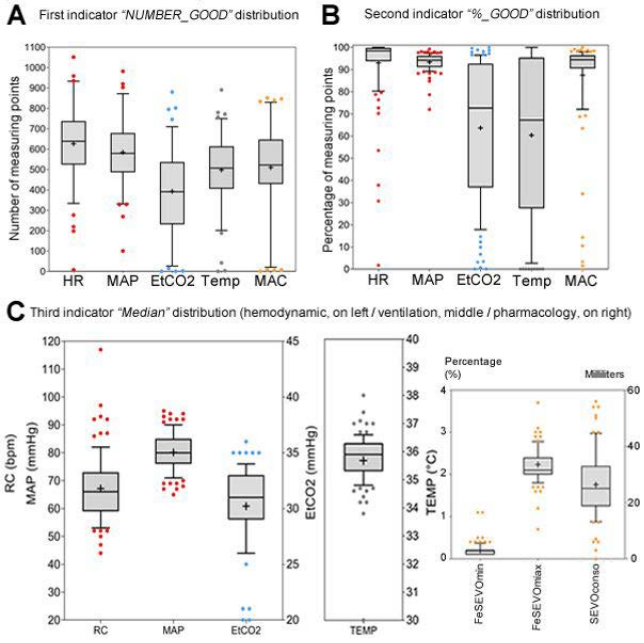
2. Specific Indicators definitions
A. "NUMBER_GOOD"
Number of measuring points of the respective monitoring parameters corresponding to the pre-established rules
B. "%_GOOD"
Proportion (expressed as a percentage) between the number of measurements "NUMBER_GOOD" and all measuring points recorded throughout each intervention
C. "Median"
Median value of all the individual values of the considered parameter with respect to the corresponding rules

Fig.1B. Demographics n = 99 (M= 32/F= 67)



Age groups	Effectives	% effective	Sex ratio M/F	M/F sex %	ASA1/%	ASA2/%	ASA3/%	ASA4/%	No ASA
20-29yo	3	3%	2/1	66,7%/33,3%		66,3%		33,3%	
30-39yo	9	9.1%	2/7	22,2%/77,8%	22,2%	22,2%	11,1%		44,5%
40-49yo	17	17.2%	6/11	35,3%/64,7%	5,9%	35,3%	5,9%	11,8%	41,1%
50-59yo	28	28.3%	9/19	32,1%/67,9%		28,6%	35,7%	7,1%	28,6%
60-69yo	34	34.3%	10/24	70,6%/29,4%		17,6%	44,1%	5,9%	32,4%
70-80yo	8	8.1%	3/5	37,5%/62,5%		25%	62,5%		12,5%
Total	99	100%	32/67	32,3%/67,7%	3%	26,2%	32,4%	7,1%	31,3%

Fig.2. Descriptive statistical analysis regarding the three specific indicators
Results are presented as median bars, the boxplots correspond to 25th and 75th percentiles, the bars to 10th and 90th percentiles, while the crosses depict the mean values
The relatively homogeneous distribution of the respective NUMBER_GOOD (on A, absolute values) is weighted and even contradicted by the distribution of the %_GOOD (on B, relative values) much more realistic of the performance of our practice. These last ones highlight the lower adequacy of the EtCO2 and TEMP of respectively 73% & 67%, revealing the need for optimization of our practice. Finally the "Median" indicator (on C), gives a clear idea of the distribution of the numerical values of the considered monitoring parameters, whose values correspond nonetheless to the recommendations in force.



Results and Discussion: From 157 patients, 99 patients (M=32/F=67) were studied (Fig.1). 93% received Sevo (<1MAC) while TIVA reprented 7%. Demographics advocates for an usual population regarding this kind of pathology impacted by COVID crisis in 2020 (Fig.1). The descriptive statistical analysis of the 3 original indicators (Fig.1) regarding the 5 relevant parameters and the pharmacological data highlights the adequacy of most of our practices (RC, MAP, MAC). Although, EtCO2 & Temp management (73% and 67% of adequacy) need to be optimized (Fig.2).

Conclusion(s): This kind of review (including the original methodology) is able to give valuable informations regarding our real performances regarding the implementation of the TL. Now, we know what must be optimized. More detailed analysis and extension to BFM are possible & even desirable.

06AP02-06
Pre-operative hippocampal volume measured using magnetic resonance imaging: a novel predictor of delayed extubation after sevoflurane anaesthesia in neurosurgeries

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Background and Goal of Study: The process of emergence from general anaesthesia appears to be bottom-up rather than top-down. The brainstem & autonomic functions, as well as the phylogenetically old brain parts (limbic system or hippocampus) are the first to recover. Later the cortical matter gets activated gradually.Therefore, the study objectives were to evaluate correlations of pre-operative hippocampal volume(HV) measured using magnetic resonance imaging(MRI) with duration of emergence from general anaesthesia(GA) in patients undergoing elective neurosurgical procedures and define the cut-off hippocampal volume predicting delayed extubation after general anesthesia.

Materials and Methods: All patients aged between 18 to 60 years with BMI 18-25 kg/m^2 scheduled for elective neurosurgical procedures under GA were included. Patients with Glasgow Coma Scale(GCS)<15 & those with hippocampal & temporal lobe pathologies were excluded. Patients were also excluded from the study if they were transferred to the ICU or remained intubated or re-intubated within 1 hour of emergence. Pre-operatively bilateral hippocampal volumes and total brain volume were measured using MRI T1-MPRAGE brain sequences by the neuroradiologist. Bilateral hippocampal volumes were standardized (normalized) with total brain volume and an average of standardized hippocampal volume was calculated.GA was induced by propofol 2mg/kg, fentanyl 2mcg/kg & vecuronium 0.1mg/kg,& maintained by sevoflurane, air & oxygen mixture titrated to Bispectral Index of 40-60.At the end of surgery, mean alveolar concentration value was noted & neuromuscular blockade was reversed once train of four count≥3. Sevoflurane was turned off & fresh gas flow of 6 litres/min was set allowing patients to wake up using a "no contact technique". Time duration from the point of turning off sevoflurane till the onset of different phases of emergence were measured. Data were described as median and inter quartile range(IQR) for quantitative (ordinal) variables. The correlations between predictors and outcomes were done using Spearman's Rank correlation. ROC was constructed to estimate predictive accuracy of HV for dichotomized extubation times with times >10.1 minutes as delayed extubation & ≤ 10.1 minutes as normal extubation based on previous studies.

Results and Discussion:The complete data of 125 patients out of 1192 screened for recruitment were analysed. The median age was 41(IQR 32-51)years. Table 1 shows pre-operative anatomical volumes. The median time for extubation was 9(IQR 9-16) minutes. The average of bilateral standardized HV had a statistically significant negative correlation with the time taken for extubation (r=-0.185; P=0.039) after switching off sevoflurane. Average of bilateral standardized HV<2097 mm^3 predicts delayed extubation with specificity:70.7%, sensitivity: 51.2% & AUC:0.626. Standardized dominant HV <1925 mm^3 also predicts delayed extubation with specificity: 78%, sensitivity: 46.4% & AUC:0.635.

Variables	(n=125) Median (IQR)
Total Brain Volume (Cm^3)	1264 (1173 - 1370)
Average of Standardized Hippocampal volume(mm^3)	2249.16 (1593.55 – 2652.465)
Dominant side Hippocampal volume (mm^3)	2058.64 (1537.33 – 2718.13)

Table 1. MRI guided anatomical volumes in neurosurgical patients

Conclusion(s): In patients undergoing elective neurosurgical procedures those with average standardized HV < 2097mm^{3}could lead to delayed extubation after sevoflurne anaestheisa. Thus measuring pre-operative HV in such patients would assist to anticipate the duration of extubation after sevoflurane anaesthesia.Hence smaller HV could be considered as one of the causes for delayed extubation in neurosugeries.

This study mandates further analysis to look for correlations between HV and emergence in non neurosurgical procedures.

06AP02-09
Patient with coagulopathy and neurosurgery: Improving safety in the operating room

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Background: We present a patient with coagulopathy who underwent elective brain reintervention with various circumstances converged that could have resulted in severe complications

Case report: A 27-year-old man with seizures due to a left insular lesion and a moderate factor VII deficiency. He currently presented a recurrence of the lesion and was scheduled for resection of it by a language mapping surgery.

Preoperative assessment was carried out of Neuroanesthesia team. The patient was accepted with prothrombin time(PT)1.39. Days prior to the surgery, Neuroanesthesia reviewed the case and detected coagulation alteration, and a consultation with Hemostasiology was requested. They confirmed an elongated PT due to a deficit in the synthesis of factorsV, prothrombin, VII, X, and fibrinogen. They recommended treatment withphytomenadione, tranexamic acid from the day before and administration of prothrombin complex(PC) one hour before.

After the PC and before the surgical incision, an analytical control was requested with correction of the PT of 1.15, a fibrinogen of 2.27g/L and thrombocytopenia (103000/L). A thromboelastogram (ROTEM) was performed to check the quality of the clot, which showed: MCF-EXTEM 46mm, A10 37mm, MCF-FIBTEM 4mm and A10 4mm. 4g of fibrinogen were administered and the control thromboelastogram now showed correct clot formation. Surgery was carried out without perioperative bleeding complications.

Discussion: Correct perioperative hemostasis in Neurosurgery is crucial because bleeding complications have a high risk of brain damage, especially in reoperations.

In this case, several weaknesses of the system weremanifested. In the first place, the patient was scheduledout of Neuroanesthesia agenda. Second, the anesthesiologist did not take notice of the coagulopathy patient's history. Finally, Hemostasiology underestimated the need to correct fibrinogen despite presenting a deficit in its synthesis.

With the analysis of the event, we can also observe some strengths that neutralized these weaknesses.These are a Neuroanesthesia group that reviews cases prior to surgery and the availability of thromboelastogram to guide the optimization of hemostasis in the operating room.

Learning points: Routine and accurate check-list of the perioperative period including a history of coagulopathy and normality of coagulation tests. The usefulness of thromboelastogram as a point of care tool to be used routinely in Neurosurgery.

06AP02-10
Rotational thromboelastometry markers of poor prognosis in the acute period following traumatic brain injury

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Background and goal of study: Traumatic brain injury (TBI) induces hemostatic alterations that vary from hypo- to hyper-coagulation. Any deviation from coagulation equilibrium is associated with poor outcomes. Viscoelastic tests e.g. rotational thromboelastometry (ROTEM), reflect whole blood coagulation from initiation to clot lysis. Our objective was to identify poor prognosis markers using ROTEM in patients with TBI.

Materials and methods: Adult patients with isolated TBI undergoing craniotomy were included. Blood samples were obtained preoperatively and on postoperative days (POD) 1, 2, 3, and evaluated utilizing ROTEM (INTEM, EXTEM, and FIBTEM). Hypocoagulation was identified if at least one ROTEM marker was present as follow: INTEM: clotting time (CT)>240s, clot formation time (CFT)>110s, clot amplitude 10 min after CT (A10)<45mm, maximum clot firmness (MCF)<55mm; EXTEM: CT>80s, CFT>159s, A10<45mm, MCF<55mm; FIBTEM: A10<7mm, MCF<9mm. Hyperfibrinolysis was stated if maximum lysis (ML) was ≥15% and/or abnormal EXTEM parameters improved with antifibrinolytic. Thrombodynamic potential index (TPI=((100xMCF)/(100-MCF))/CFT) value ≥3.5 was used to define hypercoagulation. Fibrinolysis shutdown criterion was ML<3.5%. Binary logistic regression was performed to find markers associated with in-hospital, 1-year mortality, red blood cell (RBC) transfusions, progressive hemorrhagic injury, secondary cerebral ischemia, pulmonary embolism (PE)). Significance level was $p<0.05$.

Results and discussion: 68 patients, who survived at least 72 hours postoperatively, were enrolled (75% male, $p<0.001$). The study revealed independent risk factors for in-hospital mortality: preoperative EXTEM CFT>159 s (odds ratio (OR) 12.94; 95% confidence interval (CI) 1.17-143.34, $p=0.037$) and hyperfibrinolysis on POD 1 (OR, 22.21; 95% CI 1.32-372.85, $p=0.031$). Fibrinolysis shutdown on POD 1 was associated with death at 1-year following injury (OR 6.07; 95% CI: 1.47-25.13, $p=0.013$). The need for ≥3 units of RBC transfusions was associated with preoperative EXTEM CFT>159 s (OR 24.92; 95% CI: 2.22-279.36, $p=0.009$) and FIBTEM MCF<9 mm (OR 28.49; 95% CI: 2.96-274.16, $p=0.004$), as well as INTEM A10<45 mm on POD 1 (OR 13.15; 95% CI: 2.78-62.23, $p=0.001$). Preoperative hyperfibrinolysis (OR 5.58; 95% CI: 1.26-24.63, $p=0.023$) and EXTEM A10<45 mm on POD 1 (OR 7.57; 95% CI: 1.15-49.96, $p=0.035$) were independent risk factors for progressive hemorrhagic injury. TBI patients had increased odds of secondary ischemic injury in presence of FIBTEM A10<7 mm preoperatively (OR 36.93; 95% CI: 2.71-503.07, $p=0.007$), EXTEM A10<45 on POD 1 (OR 15.89; 95% CI: 2.1-120.32, $p=0.007$), or fibrinolysis shutdown on POD 3 (OR 11.48; 95% CI: 1.17-112.45, $p=0.036$). High clotting potential as reflected by TPI was not associated with any of study outcomes. Associations with pulmonary embolism could not be established due to small event count.

Conclusion(s): ROTEM markers of hypocoagulation in the early period following TBI, i.e. preoperatively and on a postoperative day 1, are associated with increased risk of poor outcomes. Fibrinolysis shutdown should not be overlooked as a possible marker of progressive ischemic brain injury and mortality.

06AP03-02
The prevalence of hypercoagulation detected by rotational thromboelastometry in patients with traumatic brain injury undergoing craniotomy

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Background and goal of study: Traumatic brain injury (TBI) induced hemostatic alterations in combination with early procoagulant interventions put patients with TBI at high risk of thrombosis and embolism. Viscoelastic assays, e.g. rotational thromboelastometry (ROTEM), have the potential to identify not only hypo-, but also hyper-coagulable states. We aimed to determine the prevalence of hypercoagulation in isolated TBI patients.
Materials and methods: Adult patients with isolated TBI undergoing craniotomy were included. Blood samples were obtained preoperatively and on postoperative days (POD) 1, 2, 3, and evaluated utilizing ROTEM (INTEM, EXTEM, and FIBTEM). Patients were considered hypercoagulable in presence of INTEM: clotting time (CT)<100 s, clot formation time (CFT)<30 s, clot amplitude 10 min after CT (A10)>66 mm, maximum clot firmness (MCF)>72 mm or EXTEM: CT<38 s, CFT<34 s, A10>65 mm, MCF>72 mm.
Isolated supranormal FIBTEM (A10>23 mm, MCF>25 mm) was not considered hypercoagulability. G value (G=(5,000xMCF)/100-MCF) was also calculated and patients were considered at high thrombotic risk if value ≥11.7 dynes/cm^2 was found. Fibrinolysis shutdown criterion was ML<3.5%. Significance level was $p<0.05$.
Results and discussion: 68 patients, who survived at least 72 hours postoperatively, were enrolled. INTEM and EXTEM showed perioperative increase in the prevalence of hypercoagulation from 1.5% preoperatively to 25.8% on POD 3 ($p<0.001$).
The most frequent pathological parameter indicating hypercoagulable state was EXTEM A10 at all time points. Supranormal FIBTEM values were observed in 14.7% of patients preoperatively, and reached 84.8% on POD 3 ($p<0.001$) reflecting increasing fibrinogen influence on overall clot firmness.
Based on G value, high thrombotic risk was found in 5.9% patients at baseline and in 39.4% on day 3 ($p<0.001$). Pathological G values were more often observed within EXTEM as compared to INTEM. Fibrinolytic activity continuously increased until day 3 and the prevalence of fibrinolysis shutdown decreased from 44.1% preoperatively to 18.2% on POD 3 ($p<0.001$).
Conclusion(s): Hypercoagulability is increasingly prevalent in the postoperative period, and is found at least in 1 out of 4 TBI patients following craniotomy. Further studies specifically investigating the associations between ROTEM parameters and thrombotic events are warranted. Identification of patients with the highest risk of thrombosis could result in timely initiation of thromboprophylaxis, and reduced risk of adverse thrombotic events.

06AP03-03
Heart rate variability to assess nociception balance may be of limited use in patients with compressive cervical myelopathy

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Background: Compressive cervical myelopathy (CCM) is associated with somatic and autonomic nervous system (ANS) dysfunction. Patients present cardiac autonomic changes, namely in the sympathovagal balance of heart rate variability (HRV). Cervical decompression (CD) improves somatic and ANS dysfunction. ANS parameters as HRV and pupil diameter are known to change in response to noxius stimuli and their assessment is being used to evaluate the balance between nociception and anti-nociception in unconscious subjects. The Analgesia Nociception Index (ANI - Mdoloris) is based on HRV and ANI values below 50 suggest inadequate analgesia.
The Pupillary Pain Index (PPI - Idemed) ≤4 suggests adequate analgesia. We discuss the use of ANS derived indexes to guide anti-nociception in the setting of CCM.
Case Report: A 45 years-old man with CCM with somatic deficits, hypertension and dizziness on cervical extension, presented for CD surgery. Monitoring included invasive blood pressure, bilateral BIS, cerebral oximetry and nociception. Fiberoptic awake intubation was performed, followed by Target-Controlled Remifentanil-Propofol anesthesia. After induction, Remifentanil was titrated until achieving a Ce that resulted in a PPI ≤4, which corresponded to a 3,5ng/ml in this case.
Surprisingly, although Remifentanil Ce was maintained at or above 3,5, before and during surgery, ANI was constantly bellow 40. The remaining monitored parameters were compatible with adequate analgesia/anesthesia. Suddenly, with surgical decompression, ANI raised above 60. From that moment on, remifentanil was kept at 3,5 and the ANI remained above 50. The patient awoke without deficits or pain.
Discussion: ANS dysfuntion from CCM can be potentially reversed by CD: parasympathetic function improves, upregulating HRV. The fact that ANI was low despite a likely adequate Remifentanil Ce and the finding that it rose after decompression, suggests that the low HRV observed was due to the CCM. Pupil dilation (PPI) responded to noxious stimuli as expected and may not be affected by CCM, maybe because it is evoked by a specific noxious stimulus.
References:
Spine. 2011;36(8):654-659.*J Clin Monit Comput*. 2020;34(2):319
Learning points: Our findings suggest that HRV may be of limited use to assess nociception balance in patients with cervical myelopathy. Several monitors use HRV to assess nociception balance, but to our knowledge their performance in the setting of CCM has not been studied.

06AP03-04
Comparison of effects of total intravenous anaesthesia and desflurane anaesthesia on brain microcirculation and markers of glycocalyx and astrocyte cell damage

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Background and Goal of Study: Both propofol based total intravenous anaesthesia (TIVA) and desflurane (DES) inhalational anaesthesia have been used during neurosurgical procedures.
The aim of this experimental study was to compare effects of total intravenous anaesthesia and desflurane anaesthesia on brain microcirculation and markers of glycocalyx damage in an animal model.
Materials and Methods: Rabbits (n = 24) were anesthetized, ventilated mechanically, and subjected to a craniotomy. The animals were allocated randomly to TIVA or DES groups, anaesthesia followed a strict protocol. Microcirculation in the cerebral cortex using side-stream dark-field (SDF) imaging was assessed 90 min after induction of anaesthesia.
Brain tissue partial pressure of oxygen ($PbtO_2$), cerebral blood flow using doppler probe, serum markers of glycocalyx damage in serum and urine (syndecan-2) and serum (protein 100B a and interleukin 1 alfa) and cerebrospinal fluid markers of astrocyte damage (interleukin 1 alfa) were measured or sampled immediately after the time of SDF image recording.
Results and Discussion: In the TIVA group, animals exhibited higher values of used microcirculatory parameters – De Backer score was 7.3 (6.6; 7.5) vs 5.9 (5.4; 7.0), P = 0.024) and perfused vessel densities (11.9 (10.9;13.4) vs 9.8 (8.0; 10.6), P 0.0023) in comparison with the DES group.
No significant differences in markers of glycocalyx or astrocyte damage were observed. There was no significant relationship between microcirculatory parameters and macrocirculatory parameters, use of norepinephrine, intake of fluids or fluid balance.
Conclusion(s): Using brain cortex SDF imaging, comparison of TIVA and desflurane anaesthesia revealed better microcirculatory parameters in the TIVA group. No differences in markers of glycocalyx or astrocyte damage were detected.
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06AP03-06
Listen to your brain but follow your heart: seizure evoked autonomic dysregulation leading to out-of-hospital cardiac arrest

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Background: Seizure is characterised by the hypersynchronized activity of cortical neuronal networks. Beside the neurological symptoms, a less well-known manifestation is autonomic dysregulation. This case report describes seizure-elicited autonomic dysregulation leading to out-of-hospital cardiac arrest (OHCA).
Case report: A 70-year-old patient with no cardiac or neurologic history presented with an OHCA due to asystole. After resuscitation, an extensive investigation of the cardiovascular system was conducted. No cardiac causes were found.
It was, however, noticed that a focal seizure preceded periods of bradycardia and asystole. This triggered an extensive neurological investigation. A MRI was performed, and a right-sided temporoparietal cerebral lesion was seen, leading to a working diagnosis of post-ictal asystole.
The lesion, a Low-Grade Glioma, was resected under a TIVA anaesthetic with no complications. No further seizures or autonomic disturbances were observed during the peri-operative period.
Discussion: The pathophysiology of seizure elicited autonomic dysfunction is not well understood. The central autonomic network (CAN) (fig.1) plays a pivotal role in regulating the autonomic nervous system. It is organised into the forebrain, the brain stem, and the spinal system (1). Its involvement in epilepsy impedes its normal functioning, eventually leading to overexpression of sympathetic and parasympathetic output centres in the brainstem.These are rostral ventrolateral medulla (RVLM) and nucleus ambiguous (nAmb)) respectively (fig. 2). In this patient, parasympathetic overactivity, due to seizure evoked CAN dysfunction, resulted in extreme bradycardia leading to OHCA.

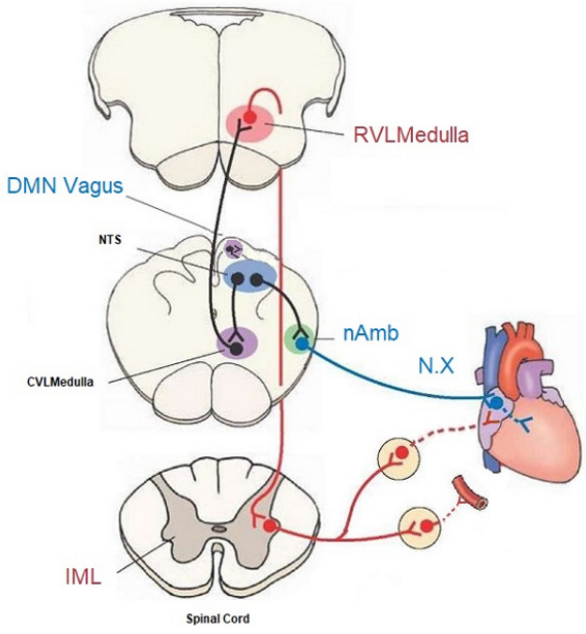

Fig 1.

References:
1. Benarroch, E.E,The Central Autonomic Network: Functional Organization, Dysfunction, and Perspective Mayo Clin Proc 1993; 68:988-1001
Learning points: During the acute care of a patient with a seizure, be aware of potentially severe autonomic dysregulation that can cause bradycardias or even asystole.
Autonomic brainstem and spinal centres:
RVL: Rostral Ventrolateral,
DMN: Dorsal Motor Nucleus, nAmb; nucleus Ambiguous,
N.X: N. Vagus, IML; Intermediolateral nucleus.

06AP03-07
The effect of anesthetic method on hemodynamic stability and postoperative survival in angiografic thrombectomy patients

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Background and Goal of Study: Endovascular thrombectomy is the gold standart therapy for acute ischemic stroke treatment. Endovascular thrombectomy can be used under either general anesthesia or conscious sedation. Despite successful recanalisation, clinical improvement might not always be seen at the end of the procedure. The aim of this study is to evaluate the effect of the anesthetic method on patients' morbidity and mortality retrospectively.
Materials and Methods: After obtaining Institutional Ethical Board approval, we evaluated the medical records of acute iscemic stroke patients who underwent endovascular thrombectomy therapy by interventional radiology department between january 2015-december 2019. We enrolled 102 of 203 patients in our study due to the missing records. Anesthetic induction technique, demographic variables, hemodynamic variables, $EtCO_2$, blood glucose levels and body temperature were recorded.
Results and Discussion: There were no significant difference between patients in terms of demografic variables, ASA scores and concommittant diseases. According to our results, the most decisive factors for 90 day, survival were blood glucose levels and duration of anestesia. According to Bonferroni correction, it was found that blood glucose levels above 140 mg/Dl could increase mortality rates 4,712 times. Every additional 60 minutes of anestesia time, independent from other factors would increase mortality risk 1.996 times.
Conclusion(s): It could be concluded that tight glucose control should be applied perioperatively to reduce the mortality rates in thrombectomy procedures. Also in order to minimize the duration of anesthesia, it is crucial to complete necessary preparations before anesthesia induction and inform the team when procedure is prolonged and follow up those patients closely in intensive care units.
References:
1. Schönenberger S, Möhlenbruch M, Pfaff J, et al. Sedation vs. Intubation for Endovascular Stroke TreAtment (SIESTA) – A Randomized Monocentric Trial.*International Journal of Stroke*. 2015;10(6):969-978. doi:10.1111/ijs.12488
2. Pfaff JAR, Schönenberger S, Nagel S, Ringleb PA, Hacke W, Bendszus M, Bösel J, Möhlenbruch MA. Effect of General Anesthesia versus Conscious Sedation for Stroke Thrombectomy on Angiographic Workflow in a Randomized Trial: A Post Hoc Analysis of the SIESTA Trial. Radiology. 2018 Mar;286(3):1016-1021. doi: 10.1148/radiol.2017171002. Epub 2017 Oct 30. PMID: 29083986.

06AP03-08
Awake craniotomy: a case series of anesthetic management

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Background: Currently, awake craniotomy with brain mapping is the Gold Standard in the treatment of Central Nervous System tumors in eloquent areas, specifically speech and motor regions. Furthermore, compared with general anesthesia, it has better survival and less postoperative neurological dysfunction.
Careful patient selection is essential for them to successfully tolerate the procedure and one of the main objectives is to create a bond of trust between the patient and the surgical team.
The anesthetic technique represents a fundamental pillar so that the procedure can be carried out.[1]
The aim of this study is to describe our experience in a series of 58 patients who underwent awake cranial surgery with conscious sedation anesthesia technique.
Case report: During the period from January 2006 to January 2021 58 patients underwent surgery at our institution through awake craniotomy.The technique of conscious sedation with Propofol+/-Remifentanil associated with SCALP blockade and infiltration of the surgical wound and pin site with Bupivacaine 0.25% and Lidocaine1% with epinephrine was chosen.[2]
Discussion: Regardless of the anesthetic technique used, the goal is to provide analgesia and sedation during the craniotomy with a rapid return to the previous level of consciousness in order to comply with intraoperative tests.
Two principal techniques are described: sleep-awake-sleep technique, widely selected by teams with longer surgical times, in which there is instrumentation of the airway and the conscious sedation technique which is the one we have chosen to implement in our centre. In this one there is not instrumentation of the airway but greater respiratory adverse effects are described.
However, in our experience we did not present problems with the airway or the need for conversion to general anesthesia in any case. Patient safety and comfort were achieved during the intraoperative period with adequate neurological evaluation and wide tumor resections with good functional outcomes.
References:
1. Sewell D,S. M. (Oct 2019).*Awake craniotomy: anesthetic considerations based on outcome evidence.*CurrOpinAnaesthesiol 32(5):546-552.
2. PottersJW, K.(2018).*Local anesthetics for brain tumor resection: current perspectives.*Local Reg Anesth11:1–8.
Learning points: There are several anesthetic techniques with little evidence that one is superior to the other, the choice should be based on the patient,tumor location and duration of surgery, experience and local knowledge.

06AP03-09
Pituitary apoplexy, the role of anesthesia: a case report

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Background: Pituitary apoplexy is a rare clinical syndrome characterized by an acute hemorrhagic infarction of the pituitary gland, often associated with a tumor. Clinical features include severe headache, visual field defects, cranial nerve palsies, mental *status* deterioration, or even coma. Generally, there is an acute failure of anterior lobe function, while the posterior lobe function remains normal.
Case report: A 25 years old man, smoker, with no previous medical history was found unconscious at home with a score of 8 in the Glasgow Coma Score (GCS) (O1V1M6). On admission, neurological examination revealed anisocoria, left hemiparesis, and global aphasia. The patient was transferred to the intensive care unit (ICU) where he was intubated, sedated, and mechanically ventilated.
Emergent computed tomography and magnetic resonance scans were performed and revealed a suprasellar mass, measuring 50 x 72 x 48 mm. The pre-operative blood tests showed hyponatremia, hyperkalemia, hypochloremia, low adrenocorticotropic hormone (ACTH), and high growth hormone (GH). Glucocorticoid replacement therapy was initiated.
The patient was subsequently referred for endoscopic transsphenoidal surgery. In the operatory room, total intravenous anesthesia was performed with propofol, fentanyl, and rocuronium infusions. The patient was hemodynamically stable under norepinephrine.
To prevent cerebral edema, hyperventilation (pCO2 30-35 mmHg) was used and intravenous (I.V.) dexamethasone 8 mg and mannitol (1g/kg) were administrated.
After the surgery, the patient was re-admitted to the ICU. Thirty days after admission, the current neurological deficits are anisocoria, left hemiparesis, and eyelid ptosis, with a score of 13 in the GCS (O3V4M6).
Discussion: A multidisciplinary approach is essential to manage patients with pituitary apoplexy. Preoperative optimization of systemic repercussions of pituitary involvement must be achieved. Management includes adrenocortical replacement therapy with I.V. fluids and hydrocortisone, followed by urgent transsphenoidal decompression.
References: Malhotra S.*et al,*Pituitary Surgery, and Anesthetic Management: An Update, World Journal of Endocrine Surgery, 2013
Learning points: Patient outcomes depend on the duration and severity of symptoms. Surgical treatment of intracranial hemorrhage is recommended immediately after the appearance of neurological symptoms.

06AP03-10
Postoperative seizures after lumbar spine surgery

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Background: Postoperative seizures can have several causes, related to anesthesia and/or surgery. Accidental durotomy in spinal interventions may go undetected by the surgeon and cause postoperative seizures and subarachnoid hemorrhage.
Case report: A 60 year-old male, ASA II, with a past history of diabetes, dyslipidemia, obesity and previous foraminectomy, complicated with hemorrhage and laceration of the dura mater with headaches. He was submitted to lumbar laminectomy and transpedicular fixation under general anesthesia, prone positioning and standard ASA, TOF and BIS monitoring.
Hemodynamic stability was present throughout the surgery. At the end, after repositioning in supine, there was a sudden drainage of 600 mL of clear fluid through the surgical drain. Immediately after extubation, the patient experienced 3 episodes of generalized tonic-clonic seizures. The arterial blood gas test was normal. CT-scan revealed mild subarachnoid hemorrhage. MRI revealed a laceration of the dura mater next to L4. He underwent surgical repair of the laceration without complications.
Discussion: Accidental durotomy is a frequent complication of spinal surgeries, with an incidence of 3.5% in lumbar disc herniation surgeries, 8.5% in lumbar stenosis decompression surgeries and 13.2% in surgical revisions(1). Durotomy leads to loss of CSF, which can cause intracranial hypotension and trigger seizures. Traction of the meningeal vessels resulting from intracranial hypotension can cause subarachnoid hemorrhage. When not detected intraoperatively, occult CSF loss can cause serious complications in the postoperative period.
There are, however, other causes for postoperative seizures that must be excluded, namely pharmacological, cerebrovascular, and hydroelectrolytic alterations.
References: Tafazal, SI, Sell, PJ Incidental durotomy in lumbar spine surgery: incidence and management.Eur Spine J 14,287–290(2005)
Learning points: Postoperative seizures may have anesthetic and/or surgical causes. Accidental durotomy is a frequent complication of spinal surgery that, in rare cases, can trigger seizures. The diagnosis of dura laceration is made with imaging, with MRI being the most sensitive diagnostic test.

Cardiac, Thoracic and Vascular Anaesthesiology

07AP01-01
Role of mitochondrial dysfunction in the occurrence of acute kidney injury (AKI) in postoperative cardiac surgery (MIT-CEC)

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Background and goal of study: Acute kidney injury is a common complication in the immediate aftermath of cardiac surgery, its incidence ranges from 5 to 42%. It involves an excessive inflammatory response responsible for the activation of the inflammasome, accentuated by cellular dysfunctions; a better knowledge of these pathophysiological mechanisms would limit renal complications and postoperative mortality.
Goal of study: To describe the clinical and mitochondrial data of acute renal failure occurring after undergoing Cardiopulmonary bypass.
Materials and methods: Observational, descriptive, prospective and mono-centric exploratory study with measurement of mitochondrial dysfunction in patients undergoing coronary artery bypass surgery with extracorporeal circulation at University Hospital Center of Martinique, over a period extending from October 2019 to July 2021.
Results and discussion: 27 patients were included, 15 cardiac tissue samples were studied, 7 patients (26%) developed AKI mainly KDIGO 1 (57%). In 86%, AKI occurred within the first 3 postoperative days. The risk factors described in this study were the age, diabetes, hypertension and dyslipidemia. Data on mitochondrial respiration appeared to be similar between patients with AKI and those without AKI.
Conclusion(s): This study allowed us to describe the clinical, biological and mitochondrial data in patients undergoing Cardiopulmonary bypass at University Hospital Center of Martinique. The too small number of samples analyzed did not allow us to interpret the mitochondrial respiratory function but allows us to foresee a future perspective for the realization of a larger study focusing on the role of mitochondrial dysfunction in the occurrence of renal failure postoperatively after CPB.

07AP01-02
Flow-controlled versus pressure-controlled ventilation in on-pump cardiac surgery procedures: an explorative study on perioperative lung aeration based on Electrical Impedance Tomography data

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Background: Postoperative pulmonary complications like mild hypoxemia are common after on-pump cardiac surgery and partly due to dys-/atelectasis formation.
In animal studies and clinical cross-over trials, flow-controlled ventilation (FCV) with constant and continuous airway flows during both ins- and expiration, improved regional ventilation distribution compared to conventional ventilation modes (1,2).
As an ongoing, explorative, ancillary study integrated with the randomised-controlled trial FLOWVENTIN HEARTSURG (3), the effect of FCV or best clinical practice pressure-controlled ventilation (PCV) on perioperative lung aeration is assessed by Electrical Impedance Tomography (EIT).
Methods: EIT-data is recorded on six serial perioperative times with an EIT-belt positioned between the 4-6th intercostal space; Baseline: preoperative patient breathing spontaneously; Begin vent: preoperative ventilation; ICU: on postoperative ICU admission; CPAP: on assisted ventilation during weaning; Ext: 1 hour after extubation, POD1: on postoperative day 1.
As preliminary results the percentage of aeration win and loss compared to “Baseline” during the subsequent times was analysed in 60 consecutive patients (FCV:n=30; PCV:n=30) with the PC-version of PulmoVista® (Draeger Medical GmbH, Lübeck, Germany).
Results: Preoperative median aeration win was higher and mean aeration loss lower in FCV compared to PCV after onset of ventilation. However, group differences waned and aeration loss deteriorated in both groups during the postoperative period, respectively (Figure 1).

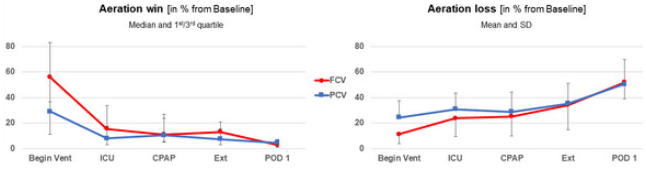

Figure 1.

Discussion and conclusion: Even though the mean postoperative oxygenation indices were higher in FCV versus PCV (3), this finding cannot be explained by an improvement of postoperative lung aeration due to FCV. Thus, other causes of postoperative lung dysfunction might have an impact.
By the time of abstract presentation, the study will be completed and further EIT-parameters as well as confirmatory statistical analyses will be presented.

References:
1. Borgmann, S et al. Crit Care Med 2018;22:245, (2) Weber, J et al. BMC Anesthesiol 2020;20:24, (3) Becker, S et al. Eur J Anaesthesiol 2021; 38(e-S 59):127

07AP01-03
Effects of high positive end-expiratory pressure on distending pressures, distribution of perfusion and ventilation, and oxygenation during one-lung ventilation in pigs

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Background and goal of study: During one-lung ventilation (OLV), positive end-expiratory pressure (PEEP) may improve the function of the ventilated lung by limiting atelectasis formation. However, PEEP may cause overdistension of already opened alveoli, decreasing the pulmonary perfusion, especially in the supine position.
We hypothesized that high PEEP increases distending pressures, shifting perfusion from the ventilated to the nonventilated lung and deteriorating oxygenation.
Materials and methods: After regulatory approval, nine anesthetized pigs were randomly assigned to one of four sequences of OLV with PEEP 0 (OLV0), 5 (OLV5), and 15 cmH_2O (OLV15) and a PEEP (OLVbest) titrated according to the best compliance (45 min each). To mimic thoracic surgery and inflammatory response, a right-sided thoracotomy was performed, and lipopolysaccharide was administered intravenously (0.5μg/kg/h). We measured the distribution of pulmonary perfusion (fluorescence-labeled microspheres) and ventilation (end-expiratory/end-inspiratory computed tomography), gas exchange, respiratory mechanics, and hemodynamics during OLV0, OLV5, OLVbest, and OLV15.
Results and discussion: During OLV, the relative perfusion of the ventilated and non-ventilated lungs did not differ among different PEEP levels. In the ventilated left lung, the centre of relative perfusion and ventilation shifted towards dorsal and caudal with increasing PEEP. With increasing PEEP, the end-expiratory normally and hyperaerated lung compartment increased and the nonaerated compartment decreased. Only OLV15 reduced the end-expiratory poorly aerated compartment. OLVbest and OLV15 reduced tidal recruitment-derecruitment compared to the other PEEP levels, while tidal hyperaeration did not differ between PEEP levels. PaO_2/F_IO_2 was significantly higher during OLV15 (128±69mmHg) and OLVbest (149.3±69.6mmHg) than OLV0 (75±19mmHg, P=0.029). Driving pressure was significantly higher during OLVP15 (22.3±3.5cmH_2O) than all other PEEP values (P<0.001). Cardiac output was significantly lower during OLV15 (5.5±1.5L/min) than OLV0 (7;6±3L/min) and OLV5 (7.4±2.9L/min, P=0.004).
Conclusion: During OLV in pigs in the supine position, high PEEP increased driving pressure and reduced cardiac output, but did not shift the perfusion from the ventilated to the non-ventilated lung. In fact, high PEEP increased ventilation in dorsal areas of the ventilated lung, improving oxygenation.

07AP01-04
Colloid oncotic pressure over time in different priming strategies during cardiac surgery - a multicenter observational study

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Background: Colloid oncotic pressure (COP) plays an important role in transcapillary fluid movement. In cardiac surgery, priming of the cardiopulmonary bypass causes massive hemodilution thereby also affecting COP. However, the extent to which different priming strategies alter COP and fluid movement during cardiac surgery is largely unknown.
Materials and methods: In this multicenter observational trial in two hospitals in the Netherlands. COPs were measured in patients undergoing elective on-pump cardiac surgery comparing three different prime strategies. COP was measured after anesthesia induction, aortic cross clamping, weaning from bypass, 1 hour after bypass, arrival on the Intensive Care Unit, and 6 hours after surgery. Perioperative fluid balance, plasma albumin concentration, total protein, hematocrit, blood loss and blood product use were also measured. Data was analysed using linear mixed models in SPSS (26.0; IBM, New York, USA) and linear regression was used for correlations between two continuous variables.
Results and discussion: Sixty adult patients underwent elective on-pump cardiac surgery between December 2020 to July 2021. Bypass was primed with either gelofusine and lactated ringers (n = 20), albumin and lactated ringers with or without retrograde autologous priming (n = 20) or lactated ringers alone with or without retrograde autologous priming (n = 20).
COPs were lower in the gelofusine group compared to lactated ringers prime fluid alone after weaning bypass (16.4 vs. 18.3, mean difference -1.91, 95% confidence interval [CI]: -3.600, -0.229; P = 0.020) and one hour after bypass (16.8 vs. 19.3, mean difference: -2.443 [95% CI: -4.159, -0.726]; P = 0.002).
Compared to the albumin priming group, the gelofusine group had lower COPs after bypass (16.4 vs. 18.2, mean difference: -1.750 [95% CI: -3.450, -0.050]; P = 0.041) and one hour after bypass (16.8 vs. 19.3, mean difference: -2.448 [95% CI: -4.148, -0.748]; P = 0.002).
The decrease in COP in all groups 1 hour after bypass compared to baseline (ΔCOP) correlated positively with fluid balance at the end of surgery (r^2 = 0.453,P = 0.000).
Conclusion: In this observational study, COP decreased more in the priming group using gelofusine compared to albumin or lactated ringers alone. Moreover, fluid balance was increased with higher differences in COP at the end of surgery indicating fluid therapy must be chosen carefully to preserve COP during cardiac surgery.

07AP01-05
Analgosedationduring stenting of the coronary arteries: is there an optimal depth of sedation

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Background and goal of study: Most invasive diagnostic and therapeutic procedures in interventional radiology are associated with fear or pain. This situation occurs despite the use of sedation and analgesia. To date, there is no consensus regarding the choice of sedation depth in interventional cardiology, which varies widely: from sedation to complete anesthesia.
The goal of study: To establish the optimal depth of analgosedation during coronary artery stenting.
Materials and methods: The study included 90 patients with coronary artery disease who underwent planned stenting of the coronary arteries with a diagnosis of angina pectoris FC II-III with intraoperative analgosedation.
The comparison group 1 consisted of patients who received it with diazepam and fentanyl solution. Groups 2 and 3 consisted of patients for whom, to ensure the level of sedation by the combination of fentanyl and propofol at the level of anxiolysis (group 2) or moderate sedation (group 3).
The depth of sedation was monitored on clinical grounds. For objectification in modern conditions use BIS-monitoring, which is based on electroencephalographic parameters, which are processed by a computer and represented as numerical values from 0 to 100.
During the study, in addition to the level of consciousness, we marked the pre-surgery, during the main stage, namely stent placement, and after surgery, assessed hemodynamics, saturation, gas and electrolyte composition of blood, blood glucose, and cortisol.
Results and discussion: The results of the study testify to the adequate provision of the external respiration function in all studied groups. Most often, during the perioperative period of coronary artery stenting, patients complained of chest pain, back pain, drowsiness, and nausea. When comparing groups with different depths of sedation, the anxiolysis group showed higher levels of stress markers (glucose, cortisol), a tendency to hypertension, and a greater number of complaints than patients in group 3.
Conclusion(s): Based on levels of stress markers (glucose, cortisol), a tendency to hypertension, and a greater number of complaints, we think that providing a state of moderate sedation has advantages in coronary stenting.

07AP01-06
Effects of body position on regional end-expiratory transpulmonary pressure and distribution of ventilation during one-lung anaesthesia in pigs

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Background and goal of study: Compared to two-lung ventilation, one-lung ventilation (OLV) leads to pronounced changes in respiratory system mechanics, which might vary with body position. We aimed to determine the effects of different body positions on regional end-expiratory transpulmonary pressure (P_{Lexp}), a surrogate of lung stability at end-expiration, and ventilation during OLV.
Materials and methods: In sixteen anaesthetised pigs, intrapleural pressure sensors were placed in dorsal, caudal, and ventral positions of the left hemithorax. To mimic thoracic surgery and the associated inflammatory response, a right-sided thoracotomy was performed, and lipopolysaccharide was administered intravenously at 0.5μg/kg/h. Regional P_{Lexp} (ventral, dorsal and caudal) as well as ventilation by electrical impedance tomography, were analysed during two-lung ventilation in the supine position (TLVsup), and during OLV in supine (OLVsup), semilateral (OLVsela), lateral (OLVla) and prone (OLVpro) position.
Results and discussion: P_{Lexp} was lower during TLVsup than OLVsup in dorsal (2.4±2.1 vs. 3.9±2.1cmH_2O, P=0.008) and ventral (3.2±2.7 vs. 4.8±2.9cmH_2O, P=0.009) zones. Caudal P_{Lexp} was lower during OLVsela (1.4±2.3cmH_2O) as compared with OLVla (2.7±1.7cmH_2O) and OLVpro (3.3±1.6cmH_2O; P=0.007), and ventral P_{Lexp} was higher during OLVsup (4.8±2.9cmH_2O) as compared with all other positions and higher in OLVsela (3.3±2.9cmH_2O) as compared with OLVla (1.9±3.3cmH_2O) and OLVpro (1.7±2.5cmH_2O; P≤0.001). During TLVsup, ventilation was predominantly distributed to ventral lung regions but shifted to dorsal regions during OLVsup. Ventilation was evenly distributed between ventral and dorsal lung regions only during OLVpro.
Conclusion: During OLV in pigs, lung stability was more compromised in semi-lateral decubitus than other body positions, which may favour lung injury. In turn, the prone position resulted in an even distribution of ventilation between ventral and dorsal lung regions, which may lead to ventilation-perfusion mismatching and, thus, impair oxygenation.

07AP01-08
Changes of regional cerebral oxygen saturation depending on the degree of carotid stenosis during carotid endarterectomy

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Background and Goal of Study: During carotid endarterectomy (CEA) surgery clamp period of one of the carotid arteries can lead to cerebral hypoxia. Cerebral oximetry provides real-time measurements of regional cerebral oxygen saturation (rSO2) in noninvasive, continuous manner.

The aim was to find an association between changes of rSO2 values detected on operation side and degree of carotid artery stenosis on the contralateral side during CEA. We hypothesized that those, with critical stenosis on contralateral side will present more significant changes of rSO2 on operation side.

Materials and Methods: Prospective study included 33 (16 males) patients undergoing CEA, average age 69.5 years (CI 95 66.3-76.7). Selection criteria was radiology confirmed absence of both posterior connective arteries in the circle of Willis. rSO2 was monitored by INVOS 7100. rSO2 was fixed at baseline (t_0), prior to surgical carotid artery clamping (t_1), while cross-clamping (t_2) and after reestablished blood flow (t_3). SPSS v22.0.

Results and Discussion: CEA in 21 cases were done on the left, in 12 cases on the right carotid artery. Patients were divided into 3 groups by degree of contralateral stenosis: n=13 with stenosis <30% (group 1), n=13, 30%-69% (group 2), n=7, ≥70% (group 3).

Table 1. Changes of median rSO2 on operation side in all time periods.

Time period	Median rSO2 in group 1	IQR	Median rSO2 in group 2	IQR	Median rSO2 in group 3	IQR	p
t_0	65	12	61	5.5	65	10	0.64
t_1	74	9	69	5	66	11	0.014
t_2	66	11.5	55	18.5	59	17	0.075
t_3	72	9	71	9.5	77	8	0.71

As shown in Table 1, stenosis on the contralateral side showed negative correlation with t_1 rSO2 on operated side (p=0.014). Surprisingly, at baseline (t_0), all patients presented similar values of rSO2, but those with severe stenosis at t_3 had the highest rSO2 values on operation side after reestablished blood flow. But no significant intergroup differences were observed in those time periods.

No correlation was found between rSO2 decrease (t_2-t_1) on operative side and stenosis degree on the contralateral side. In all time periods, rSO2 differed statistically significantly between both sides (p=0.001), presenting lower values on operation side.

Conclusion(s): Higher stenosis on contralateral side is associated with lower rSO2 values on operation side prior cross-clamping. No significant differences were observed between stenosis groups for other time periods.

07AP01-10
Clinical management of Hereditary angioedema (HAE) in cardiac surgery: a case report

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Background: HAE is a rare disease caused by C1 esterase inhibitor (C1INH) deficiency leading to diffuse edema formation. Cardiac surgery on Cardiopulmonary Bypass (CPB) is a major stressor for HAE attacks. Multidisciplinary approach is mandatory to manage HAE patients.

Case Report. A woman with HAE type I was scheduled for urgent cardiac surgery. Before surgery she was premedicated with tranexamic acid (TXA) maintained until ICU discharge,her usual Danazol dosage and oral benzodiazepines. General anesthesia was induced and maintained targeting BIS level. Airways were managed gently handling structures. Videolaringoscope, emergency cricothyrotomy set and the bradykinin competitive antagonist Icatibant were available for the whole time.

Considering the low C1 INH level and the need for volemic resuscitation prior to the CPB, we administered 10 ml/kg of Fresh Frozen Plasma to avoid diluting C1INH. Heparin was administered for the CPB, then reverted with targeted dosage of protamine in order to reduce heparin-protamine complexes.

After the procedure she was transferred to ICU sedated, ventilated and hemodynamically stable. Pain and temperature were strictly managed and then she was extubated leaving a Seldinger wire in situ for 12 hours, without discomfort. C1 INH dosage was determined with normal values; after 48h she was discharged without complications.

Discussion: HAE is a life-threatening disorder, more frequent in women after puberty.Three subtypes of HAE exist with reduced quantity (HAEI) or function of C1INH (HAEII) or enzyme deficiency (HAEIII). Proteolytic cascade activates vasoactive substances generation leading to edema formation mostly in the skin, GI and respiratory tract, especially larynx [1].

There is a great variability regarding severity, triggers, concomitant autoimmune diseases and response to treatment. In cardiac surgery CPB could be an important trigger since:

1. It stimulates a generalized inflammatory response,
2. C1INH dilution from pump priming, and;
3. Heparin-protamine complexes activate Complement pathway.

There are only recommendations about C1-INH or FFP administration prior to surgery in HAE[1]. Continuing Danazol, administering TXA and rescue therapy with Icatibant is recommended[1-2].

References:

1. Allergy Rhinol. 2015;6:50-55 [2]Ann Thorac Surg. 2008 Mar 85 (3) 1079-81

Learning points: Continuous updating and multidisciplinarity are necessary to manage patients with rare conditions susceptible to major complications after cardiac surgery.

07AP01-11
Gender differences in applied tidal volume with compliance titrated flow-controlled ventilation during cardiac surgery – a subgroup analysis of a randomized clinical trial

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Background and Goal of the Study: Flow-controlled ventilation (FCV) provides a continuous gas flow and coupled with direct tracheal pressure measurement precise determination of dynamic compliance is feasible. Accordingly, not only positive end-expiratory pressure (PEEP), but also peak pressure can be titrated to achieve the highest dynamic compliance.
This personalized ventilation approach leads to an automatic adaption of the applied tidal volume to the functionally available lung tissue within individual lung mechanic limits, which may differ between female and male patients and represents the rationale for this sub-group analysis.
Materials and Methods: A sub-group analysis of 24 patients randomized to receive flow-controlled ventilation in cardiac surgery without ventilation during the cardiopulmonary bypass period was performed. Ventilation was established with compliance titrated PEEP and peak pressure settings and flow adjusted to maintain normocapnia at an I:E ratio of 1:1. Linear mixed-effects model was used in order to investigate sex related differences in respiratory parameters.
Results and Discussion: Whereas in women (n=6) and men (n=18) PEEP and peak pressure settings were similar after compliance guided titration, the resulting tidal volume was significantly lower in female patients (8.6 vs 9.9, 95% CI -2.3 to -0.2 ml/kg PBW; p=0.029) compared to male individuals. Concomitantly, female patients had a significantly lower compliance (49.3 vs 70.3, 95% CI -33.1 to -8.8 ml/cmH_2O; p=0.003) compared to men. Gas exchange parameters were comparable in either gender.
Our results indicate that the functional lung volume in women are lower compared to men, even after adjustment to published formulas of predicted body weight (PBW). This finding is even more notable, as previous trials have shown that in clinical routine female patients receive higher tidal volumes than male individuals [1].
Conclusion: Female patients were found to receive lower tidal volumes after compliance guided pressure settings with FCV compared to men during cardiac surgery. This finding may indicate that the functionally available lung volume in women is lower and thus using PBW does not adequately comply with sex related differences. This supports the use of a personalized ventilation strategy with FCV.
References:
1. Nijbroek SG, Hol L, Swart P, et al. Sex difference and intra-operative tidal volume: Insights from the LAS VEGAS study. Eur J Anaesthesiol. 2021;38:1034-1041.

07AP01-12
Bispectral index monitoring used as an early indicator of perfusion changes during awake carotid endarterectomy

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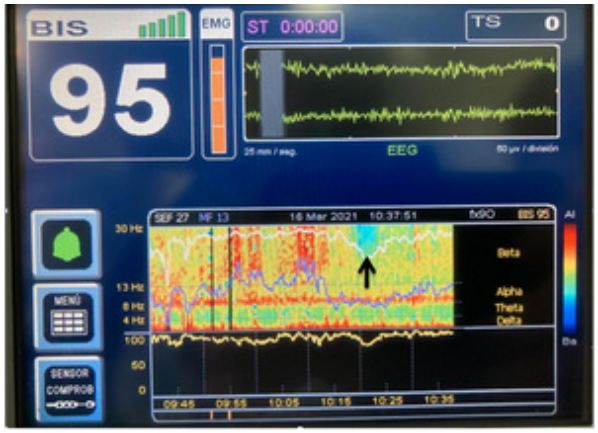
Background: Intraoperative cerebral ischemia during carotid cross-clamping in patients undergoing carotid endarterectomy (CEA) is a major complication. Prompt recognition of insufficient collateral blood supply is crucial. The bispectral index (BIS) may be useful for an early intraoperative diagnosis of changes in cerebral blood flow.
Case report: A 77-year old man with a history of hypertension and diabetes mellitus was diagnosed of a critical right internal carotid artery stenosis. He was scheduled for an awake CEA under regional anesthesia. An intravenous premedication with 1mg of midazolam was administered before performing a cervical plexus block. BIS VISTA complete Monitoring System, version 3.5 (Medtronic plc, Covidien Ilc, Mansfield, USA) was used for continuous cerebral monitoring together with a clinical neurological assessment. Throughout awake carotid surgery, cerebral ischemia during clamping is assumed if a neurological change appears.
During surgery, BIS value remained in the range 90-98. Color density spectral array (CDSA) showed Spectral Edge Frequency (SEF) of 27. At the beginning of carotid clamping, a transient decrease of beta waves (self-limited large amplitude and low frequency waves) was observed on BIS monitor with no clinical repercussion. Two minutes later, CDSA returned to baseline range spontaneously. No shunt was required.
Discussion: When complete temporary unilateral occlusion of the carotid artery is performed during CEA, blood flow through the circle of Willis provides an adequate blood supply to affected cerebral zones and ischemia has electroencephalographic repercussion. This report highlights the relevance of intraoperative BIS monitoring to prompt detection perfusion changes[1]; The beta-band of the CDSA is the frequency most sensitive to ischemia and a rapid indicator of changes in brain perfusion[2].
References: 1. *J Clin Monit Comput. 2021;35 (6): 1531-1533.* 2.J Clin Neurophysiol 2001;18:169-77



Learning points: BIS Spectrogram monitoring provides a rapid indicator of changes in brain perfusion during CEA.

07AP02-02
Oxygen titration with oxygen reserve index in minimal invasive pectus excavatum repair

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Background and Goal of Study: During minimally invasive repair of pectus excavatum (MIRPE), insufflation of carbon dioxide between the visceral and parietal pleura causes desaturation. It may be prevented by increased fractional inspired oxygen level (FiO_2) in the expense of hyperoxemia. Oxygen reserve index (ORI) is a noninvasive multi-wave pulse co-oximetry which shows the oxygenation status in the blood.

Our primary aim was to examine the value of ORI monitoring as an early predictor of hypoxemia during surgery. Our secondary aim was to measure value of ORI monitoring as guide of oxygen titration to prevent hyperoxemia and morbidity.

Materials and Methods: After Ethics Committee approval and parental consent, 128 patients aged 8-18 years who underwent elective MIRPE surgery between 2018-2019 at our hospital were enrolled prospectively.

The patients were randomized into 2 groups using the closed envelope method (n = 64 for each). The 1st group was control group with continuous peripheral oxygen saturation (SpO_2) measurement as standard. In the 2nd group, ORI was measured.

Patients were ventilated with FiO_2 40% as standard practice, and when pneumothorax started FiO_2 increased to 60%, and continuously was increased by 20% more when necessary. Decrease of 0.05 from peak ORI after pneumothorax was considered as ORI decline and 1% decrease from SpO_2 value was accepted as SpO_2 decrease.

Pre-induction, pre-first and second pneumothorax, and postoperative ORI values, mean arterial pressure, temperature, end-tidal carbon dioxide level, demographics, length of hospital stay, anesthesia and surgery durations were recorded.

Results and Discussion: Desaturation time was 59.46 ± 15.57 seconds in the 2nd group according to ORI, while SpO_2 started to decrease in the 1st group after 177.64 ± 20.94 seconds ($P < 0.001$). The use of $FiO_2 \leq 60\%$ and > 60% at the end of surgery was significant between the groups. The length of hospital stay was higher in the 2nd group ($P = 0.002$).

Conclusion(s): ORI may detect hypoxemia earlier than SpO_2 monitoring in MIRPE surgery. Moreover, it also shortens the exposure time to hyperoxemia. We concluded that, ORI monitoring may increase patient safety during MIRPE surgery in pediatric patients.

07AP02-03
The accuracy and precision of estimated continuous cardiac output monitoring after off-pump coronary artery bypass grafting

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Background and goal of study: The trend of modern medicine is 'do less invasively'. A completely non-invasive technology, estimated continuous cardiac output (esCCO), based on pulse wave transit time analysis has become clinically available since 2012. Previous version of esCCO software demonstrated moderate accuracy and precision compared with thermodilution technique.

The aim of our study was to evaluate the accuracy and precision of updated esCCO compared with calibrated pulse-contour analysis (CPCA) in patients after off-pump coronary artery bypass grafting (OPCAB).

Materials and methods: We enrolled 12 patients after elective OPCAB into a prospective study. Cardiac index measured by calibrated pulse-contour analysis (CI_{CPCA}) was calibrated by transpulmonary thermodilution using $PiCCO_2$ monitor (Pulsion/Getinge, Germany). The cardiac index registered by esCCO system (CI_{esCCO}) via KC-910P monitor (Nihon Kohden, Japan) was also calibrated using CI obtained from transpulmonary thermodilution.

Data were collected after ICU admission during 16-20 hrs of postoperative period using Data Acquisition System (Nihon Kohden, Japan) with parallel record of CI_{esCCO} and CI_{CPCA} every minute. Both technologies were recalibrated three times: at 2, 6 and 18 hrs after ICU admission and initial calibration.

Results and discussion: Totally, 7783 pairs of data were collected. We found significant correlation between CI_{CPCA} and CI_{esCCO} (*rho* = 0.55, $p < 0.01$). Bland-Altman analysis with multiple measurements per subjects for all collected data showed the mean bias between CI_{esCCO} and CI_{CPCA} was 0.005 L/min/m^2 with limits of agreement (LoA) of ± 1.02 L/min/m^2 and a percentage error of 36%.

A separate Bland-Altman analysis of data pairs with short and long periods of recalibration demonstrated better agreement between CI_{esCCO} and CI_{CPCA} in short recalibration periods with bias of -0.08 L/min/m^2, LoA of ± 0.71 L/min/m^2 and a percentage error of 29%.

Analysis of data pairs acquired during long recalibration period (between 6 and 18 hrs) revealed the bias of 0.01 L/min/m^2, LoA of ± 1.06 L/min/m^2 and a percentage error of 37%.

Conclusion(s): After off-pump coronary surgery, updated esCCO calibrated by transpulmonary thermodilution demonstrates acceptable accuracy and precision. More frequent recalibration may increase the accuracy and reproducibility of esCCO technology.

07AP02-04
Effect of SARS-CoV-2 lockdown on clinical outcome of patients presenting for coronary artery bypass graft (CABG)

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Background and goal of study: Since the early phases of the SARS-CoV-2 outbreak, there have been reports that the COVID-19 pandemic negatively influences health care. Due to shortage in critical care capacity it might be that patients suffering from coronary artery disease did have a longer waiting period until they got the possibility to undergo CABG. This might have a negative impact of patient's outcome.
Therefore, this retrospective analysis was done to evaluated clinical status, clinical course and outcome of CABG patients in a German university hospital before and while COVID-19 pandemic.
Materials and methods: Patients presented for CAVB surgery before COVID-19 pandemic (time period 01.05.18 – 30.04.19) (group "B") and within pandemic (time period 01.05.20-30.04.21) (group "P") were included in this retrospective analysis.
Analysis of the patient's demographic characteristics, operative data, and postoperative outcome, was performed. The study was registered by the local ethical committee (study number: 2021-681-f-S).
Results: In total data of 596 patients in group "B" and 563 patients in group "P" were analysed. Demographic data (patients age, weight, height, ASA status) did not differ significantly between study groups. More patients underwent emergency surgery while COVID-19 pandemic lockdown period than before (elective CABG group "B" vs "P" n=324 vs n=256, p=0.004, emergency CABG group "B" vs "P" n=64 vs n=86 , p=0,021).
Further, during COVID-19 pandemic lockdown period more patients presented with acute myocardial infarction (group "B" vs group "P" n=122 vsn=260, p=0.000), a decreased systolic ejection fraction (group "B" vs "P" 72% vs67%, p=0.002) and the indication for ECLS support due to cardiogenic shock before CABG (group "B" vs "P" n=0 vs n=4, p=0.039).
However, despite worse clinical status before CABG surgery patient outcome like length of ICU stay (days group "B" vs "P" 2.3±5.4 vs 2.5±4,9, p=0.706), length of hospital stay (days group "B" vs "P" 13.3±10.9 vs 13.3±12.3, p=0.87), complication rate like post-myocardial infarction ventricular septal defect or death (group "B" vs "P" n=27 vs n=33, p=0.307) did not differ between groups.
Conclusion: Following the lockdown in Germany patients presenting with worse clinical status before CABG surgery; however in this retrospective analysis the clinical outcome seems comparable.
Key words: SARS-CoV-2 outbreak, lockdown, CABG, patient's outcome

07AP02-05
Cardiac herniation following a left pneumonectomy

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Background: Cardiac herniation (CH) is a rare but fatal complication that can occur after a pericardiotomy. The presence of a pericardial defect can lead to protrusion of part of the heart through the pericardium.
Case report: A 55-year-old man with history of a left upper lobectomy for an adenocarcinoma. On follow-up, 3 new nodules were detected in the left lower lobe, so it was decided to perform a left pneumonectomy. Intrapericardial access was necessary. Subsequently, a pericardial mesh was placed. Extubation was uneventful. At the intensive care unit (ICU), the patient presented tachycardia (TC), tachypnoea and peripheral oxygen saturation of 92% with oxygen at 6lpm.The chest X-ray showed cardiac displacement. The CT scan reported "large displacement and rotation of the heart in the pneumonectomy cavity". Emergency surgery under balanced anaesthesia was indicated.
Pre-induction, the right radial artery and a central venous line were cannulated. Preoxygenation with FiO2 100% and intravenous induction were performed: 18mg etomidate, 30mg propofol, 100mcg fentanyl, 60mg lidocaine, 100mg rocuronium. Glidescope and a single endotracheal tube were used to intubate.Maintenance was with sevofluorane CAM 1.5.
Afterwards, the patient was turned to right lateral decubitus (LD). Post-induction, continuous noradrenaline infusion was needed (maximum dose 0.8mcg/kg/min). Multiple episodes of self-limited polymorphic ventricular TC were witnessed coinciding with attempts to detorsion the heart. After surgery, the patient was transferred to the ICU.
Discussion: CH usually occurs in the immediate postoperative period. It's difficult to diagnose because of its indistinct presentation, which depends on the side of the CH. After a right pneumonectomy it may present as TC, hypotension and increased central venous pressure. After a left procedure it may present as arrhythmias or myocardial ischemia. Given the nonspecific symptoms, imaging tests are crucial. After diagnosis, it's of utmost importance to place the patient in LD with the unaffected side as the dependent side. This way, due to gravity, the degree of CH is reduced.
Anaesthetically, haemodynamic management is key, as it's a surgery that can involve large variations. Exhaustive monitoring is crucial and inotropic and vasopressor support should be offered if necessary. Good venous accesses are vital.1
Learning points: Imaging tests, positioning of the patient and haemodynamic management are crucial.

07AP02-06
Association of PeriOPerative Aspirin-ResisTance and CardioVascular Outcome (POPART- CVO) – a prospective non-interventional cohort study

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Background and Goal of Study: New onset of aspirin-resistance during surgery, known as perioperative aspirin-resistance, is observed in up to 30% of patients in vascular surgery and has been linked to post-OP troponin elevation.
The objective of this study was to evaluate whether perioperative aspirin-resistance in vascular or endovascular surgery is associated with adverse cardiovascular outcome.
Materials and Methods: In this prospective, single-centered, non-interventional cohort study, 194 adult elective vascular or endovascular surgery patients receiving aspirin were analyzed.
The primary outcome was Myocardial Injury after Non-Cardiac Surgery (MINS). Secondary outcomes included admission to intensive care unit, length of hospital stay, bleeding complications, and Major Adverse Cardiac and Cerebrovascular Events (MACCE) defined as cardiovascular death, myocardial infarction, peripheral vascular occlusion, mesenteric ischemia and embolic stroke.
Subgroup analyses were performed for patients with:
i) coronary heart disease,
ii) diabetes mellitus, and;
iii) for patients with different cardiovascular risk profiles (revised cardiac risk index, (RCRI) 0-2 versus 3-5).
Patients were stratified for suffering perioperative aspirin-resistance vs. adequate aspirin response.Continuous variables were compared using the t-test or Mann-Whitney-U-test and categorical variables using the Boschloo-test, or chi-square-test.
Results and Discussion: Perioperative aspirin-resistance observed in 27.8% of patients was not associated with MINS (27.8% vs. 32.1%, aspirin-resistance vs. no aspirin-resistance, $p=0.555$) or with any of the prespecified secondary endpoints (all $p>0.05$). In five of the six prespecified subgroup analyses, aspirin-resistance was not associated with a difference in MINS rate.
However, in patients with a low cardiovascular risk profile (RCRI 0-2), MINS occurred more frequently in patients without aspirin-resistance.
Conclusion(s): We confirmed that perioperative aspirin-resistance is frequent in patients undergoing vascular or endovascular surgery. However, in vascular or endovascular surgery patients who continue aspirin throughout the perioperative period, aspirin-resistance is a phenomenon, that is not associated with MINS, cardiovascular or cerebrovascular events. Measuring perioperative platelet function with the intention to identify and potentially prevent or treat perioperative aspirin-resistance is dispensable.

07AP02-07
Long-term neurological, cognitive and psycho-emotional complications after surgical reconstructions of the ascending aorta and the aortic arch

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Goal of Study: To identify neurocognitive and psycho-emotional disorders in the immediate and late postoperative periods and to improve neurological and cognitive results of treatment in patients with Ascending Aorta and the Aortic Arch surgery.
Materials and Methods: The prospective study included 100 patients. Group I (n=50) underwent aortic arch surgery with antegrade cerebral perfusion (ACP) and hypothermic circulatory arrest (26°C). Group II (n=50) survived ascending aortic replacement with extracorporeal circulation (EC) and moderate hypothermia (32°C).
Before and after surgery all patients underwent cognitive function, anxiety and depression testing: the Montreal Cognitive Assessment (MOCa), The Hospital Anxiety and Depression Scale (HADS) and Covy anxiety Scale.
For postoperative Delirium testing The Richmond Agitation-Sedation Scale (RASS), the Confusion Assessment Method (CAM) and the Intensive Care Delirium Screening Checklist (ICDSC) were used. 78% of patients were examined 5 years after surgical treatment, 64% - 10 years. Median duration of follow-up was 7,5 years.
Differences between groups were considered significant at the confidence level of 0.05 (p).We used relative risks to study predictors of long-term cognitive impairments.
Results and Discussion: Changes in the neurological and cognitive spheres are presented on the picture. Long-term mental disorders were associated with age, baseline presence of mild cognitive impairment, episodes of intraoperative microembolism, episodes of decreased cerebral perfusion and delirium. Also, for patients of group I increased duration of EC for more than 180 minutes or ACP more than 48 minutes correlated with the risk of neurocognitive impairment.

	Group I	Group II
In the preoperative period:		
Moderate preoperative neurocognitive disorders	8 (8%)	5 (5%)
Severe cognitive impairments	0	0
In the immediate postoperative period:		
Stroke	1 patient (1%)	0
Delirium with subsyndromal form	14 patients (14%)	6 patients (6%)
Moderate cognitive impairment	21 patients (21%)	13 patients (13%)
Severe cognitive impairment	4 patients (4%)	0
At 5-year follow-up:		
Long-term neurocognitive disorders	18 patiets (23.07%)	10 patients (12.82%)
At 10-year follow-up:		
Long-term neurocognitive disorders	24 patients (37.50%)	14 patients (21.87%)

Table. Postoperative neurological and cognitive dysfunction.

Conclusion: The main attention should be paid to the early detection of the patient's neurological impairment and diagnostic of delirium, including subsyndromal form, in the immediate postoperative

period. Dynamic testing can identify disorders and cause therapy correction to improve results of cognitive state after surgical treatment. The intellectual deficit can be aggravated by anxiety-depressive disorders or proceed under their mask.

07AP02-08
Disadvantages of fluid overload after cardiac surgery

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Background and Goal of Study: Fluid accumulation may impact post-operative recovery after major surgery.[1,2] However, only limited data are available on the effects of perioperative fluid accumulation in open-heart surgery patients.
We sought to study the magnitude and body-weight-based rate of fluid overload and their association with adverse events in patients undergoing cardiac surgery.
Materials and Methods: Prospective Finnish CAREBANK study included 740 cardiac surgery patients who were operated in Turku University Hospital between 2016-2020. The study population was divided into two groups based on 5% postoperative weight gain. Receiver operating characteristic analysis was used to determine the threshold for body-weight-based fluid infusion rates within the first 12h.
Results and Discussion: Patients with >5% weight gain were more likely to be older (66.9±10.97 years vs 65.3±9.5 years; p=0.048), women (27.0% vs. 16%; P = 0.001), have lower BMI (27.0±4.3 vs. 29.2±4.6; p<0.001) and more often permanent preoperative atrial fibrillation (25.1% vs. 17.3%; p=0.014).
In a multivariate binary logistic regression analysis, independent-preoperative predictors for>5% weight gain were female gender (OR 2.32; 95%-CI 1.42-3.78; p=0.001) and increasing BMI (OR 0.90; 95%-CI=0.87-0.94; p<.001).
Infusion Rates >50ml/kg/12h were associated with in-hospital deaths (5.1% vs. 1%; p=0.006), the 90 days MACCE (14.4% vs. 4.3%; p=0.001) and the 90 days death (6.8% vs. 1.2%; p=0.001).

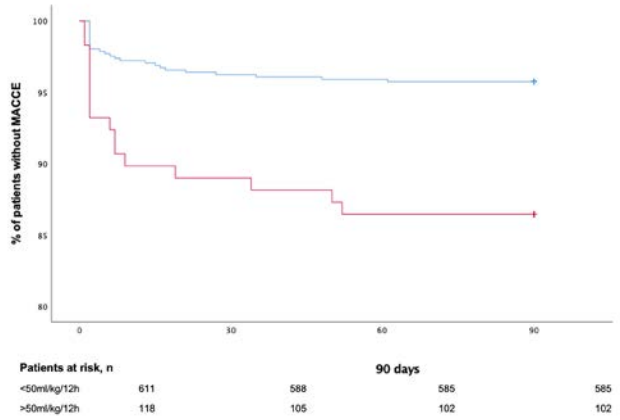

Figure 1. 90 days mortality rates of cardiac surgery patients. Blue line = Fluid accumulation of first 12 hours <50ml/kg. Red line = Fluid accumulation of first 12 hours ≥50ml/kg.

Conclusion(s): Female sex and lower BMI were the most important predictors for postoperative fluid overload and higher infusion rate. High infusion rate within the first 12h was associated with longer hospital stay, MACCE and death. More attention should be paid to avoid unnecessarily high fluid infusion rates in cardiac surgery, especially in low-weight women.
References:
1. Haapio E, et al. Excessive intravenous fluid therapy in head and neck cancer surgery. Head Neck. 2017; 39: 37–41.
2. Brandstrup B, et al. Effects of Intravenous Fluid Restriction on Postoperative Complications: Comparison of Two Perioperative Fluid Regimens - A Randomized Assessor-Blinded Multicenter Trial. Ann Surg. 2003; 238:641–8.

07AP02-09
The effect of carotid endarterectomy on cognitive function regarding cerebral hypoperfusion

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Background: There is no consensus in the literature regarding the effect of the change in cerebral oxygenisation during carotid endarterectomy on cognitive function.
The aim of our study was to assess this effect using near infrared spectroscopy (NIRS) as a monitor of cerebral hypoperfusion and its effect on cognitive function.
Methods: We enrolled 80 patients undergoing carotid endarterectomy (CEA) at Városmajor Heart and Vascular Center, Semmelweis University, Budapest. The surgeries were performed under general anaesthesia. Cerebral tissue saturation was monitored during the entire procedure by NIRS (Somanetics Invos 4000). The maximum desaturation during the clamping period (compared to the mean of the 2 minute long preclamping period) was calculated postoperatively. Patient's cognitive evaluation for general cognitive impairment detection included the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA).
Results: All 80 patients (45 men, mean age of 70,05±6,9 years, Vasc. Possum: 19,06±2,991) were asymptomatic. 47 patients underwent eversion endarterectomy and in 33 patients thrombendarteriectomy with shunt was performed.
Complications occurred in three patients, out of whom two developed cardiological and one developed neurological complications during the postoperative hospitalisation. All the patients completed the MMSE (median 29,IQR:28-30) and the MoCA tests (median 28, IQR:26-29) preoperatively.
Three months after the operation 79 patients completed the tests (MMSE: median 29, IQR:28-30, MoCA: median 28,IQR:26,75-29). 42 patients filled out the 12th month survey (MMSE: median 29, IQR:28-30, MoCA: 29, IQR:27-29,75).
The maximum cerebral desaturation correlated significantly with the occurrence of cognitive decline, confirmed by both of the MoCA tests.:(three months after the surgery: p:0,001, Spearman rho:-0,387, one year after the surgery: p:0,006, Spearman rho:-0,414).

Cognitive tests results significantly differed when the cerebral desaturation exceeded 12% (p: 0,001 -using Mann-Whitney test) during the clamping period.
We found no statistically significant connection between the occurrence of the complications and the degree of desaturation.
Conclusion: A remarkable desaturation (more than 12% compared to the preclamping period) might indicate postoperative cognitive decline. Prevention of intraoperative desaturation during carotid endarterectomy can reduce the risk of cognitive decline in the postoperative period.

07AP02-10
Anesthetic management of an ex-vivo surgical repair of a renal artery aneurysm with renal auto-transplantation

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Background: Ex vivo repair and renal auto-transplantation is a procedure rarely performed given its surgical complexity and the advances in endovascular techniques. Renal artery aneurysms are rare and one of the most important indications for this surgery.[1] Given how unusual this procedure is, there are only a few reports regarding its anesthetic management.
Case Report: We presented a case of a 53y woman, previously healthy, who accidentally found an aneurysm of the left renal artery. No more vascular alterations were found and laboratory analysis showed a preserved glomerular filtration rate. The patient underwent an ex vivo repair and auto-transplantation for renal artery aneurysm treatment under balanced general anesthesia with ASA standard monitoring, invasive arterial pressure, and bispectral index.
After harvesting, the kidney was held wrapped in an iced pad with cold perfusion and the aneurysm was resected. The kidney was then auto-transplanted and we focused on maintaining renal blood flow by optimizing median arterial pressure and intravascular volume. An improvement in crystalloid perfusion, as well as the administration of furosemide (2mg/kg) and mannitol (0,5g/kg), was carried out and urine output was closely monitored. The surgery was uneventful with a warm and cold ischemia times of 22 and 59 min, respectively.
Discussion: The most important period is the auto-transplantation of the kidney and at this stage, the goal was to maintain adequate renal blood flow. Once our patient did not have a hypertensive disease, we intended to keep mean arterial pressure at 70-90 mmHg which was achieved with crystalloids perfusion.
Although scant evidence in the literature, our center has vast experience using an osmotic agent (mannitol) and diuretics (furosemide) to promote diuresis and decrease the incidence of acute tubular necrosis (ATN) after kidney transplantation. Also, the choice of drugs without renal metabolism is of the utmost importance during anesthesia and postoperative analgesia.
References:
1. Sobrinho G et al. Ex-vivo surgical repair of a renal artery aneurysm with kidney autotransplantation. Acta Med Port. 2019.
Learning points: Invasive blood pressure is essential to monitor adequate renal blood flow. Agents as mannitol and furosemide could be used to decrease the incidence of ATN. Ex-vivo repair with renal auto-transplantation is a rare and complex procedure, so the anesthesiologist must be familiar with renal transplant protocol.

07AP02-11
The important role of transesophageal echocardiography in an aortic valve replacement with anoumalous left circumflex coronary artery

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Background: An origin of the left circumflex coronary artery (LCx) from the right coronary artery (RCA) is one of the most frequent coronary anomalies (0.1-0.38%) that is associated with serious complications during a surgical aortic valve replacement (AVR), as regional wall motion abnormalities (RWMAs) and myocardial infarction (1).
During this surgery, the evaluation of coronary artery anatomy with transesophageal echocardiography (TEE)has a significant impact on intraoperative clinical decision making.
Case Report: Two cases, A 77-year-old female and 65 year-old male, both with severe aortic stenosis undenwent a tissue AVR. Both coronary angiographies showed the LCx originated from the RCA following a retro-aortic course.
In the postoperative TEE examinations, the first case showed a decrease of peak velocity and velocity time integral (VTI) of LCx blood flow compared to pre-CPB, so CABG one graft was implanted.
However, in the second case, peak velocity and VTI of LCx blood flow did not decrease significantly compared with the pre-CPB period, so any CABG was needed. Both patients weaned from CPB sussccessfully without new RWMAs.
Discussion: In the case of an anomalous LCx originating from the RCA and coursing behind the aortic annulus, the risk of ligation of this vessel and compression by the prosthetic sewing ring must be considered during AVR. TEE permits an early detection of a compromised LCx when compared with the pre-operative TEE examination. Coronary perfusion can be assessed in color-Doppler Mode and in pulse-Doppler Mode (peak velocity and VTI). Also, a 3D multiple plane reconstruction of the LCx obstruction might be created. If TEE views show compromised LCx, a CABG could be considered before weaning from CPB (like in our case). Then, complications as RWMAs and myocardial infaction would be avoid using intraoperative coronary artery blood flow TEE assessment.
References:
1. Shintaro Yokoyama, M.D., Kazuyoshi Takagi, M.D., Ryusuke Mori, M.D., and Shigeaki Aoyagi, M.D.Aortic Valve Replacement in Patients with an Anomalous Left Circumflex Artery: Technical Considerations. Journal of Cardiac Surgery. 12 December 2011
Learning points: With TEE, it is possible to visualize the LCx in most of the patients undergoing AVR. The comparison between pre- and postoperative assessment of the LCx blood flow helps to identify patients with compromised LCx as early as possible after AVR and should therefore be part of the routine examination.

07AP03-01
Is it safe to reverse the anticoagulant effect of heparin after a percutaneous left atrial appendage occlusion? A series of 2 cases

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Background: Left atrial appendage occlusion (LAAO), a effective alternative option to oral anticoagulation therapy in patients with non-valvular**atrial**fibrillation (NVAF), is performed under sodium heparin iv. However, there are not still clear guidelines for administration of protamine at the end of the procedure.
Case report: A series of two cases with NVAF treated with acenocoumarol were selected for an elective LAAO.
During their procedure under general anesthesia, ACT>250 was maintaining with an initial bolus of sodium heparin iv (100 UI/Kg) until the correct position of Amplatzer Amuletdevice was confirmed and pericardial effusion was ruled out by TEE.
Our patients referred symptoms in recovery unit such us acute chest pain and hypotension. A urgent TTE showed a cardiac tamponade. Protamine was given (0,5mg/Kg) and an urgent pericardiocentesis was performed with a rapid clinical improvement. So, emergency sternotomy was not necessary.
Discussion: Pericardial effusion is one of the most common complication after LAAO (2-5%) and is due to procedural mishaps. Manipulation of the guidewires and transseptal needles can be associated with trauma to the LAA, LA, pulmonary veins or even pulmonary artery. However, 30% of cases, the cause is not identified (1).
A pericardial drainage kit available and thoracic surgical backup are recommended. However, timing of anticoagulation reversal is still a matter of debate. Early reversal can be associated with clotting in the pericardial space and blocking the pericardial drain; however can avoid an imminent sternotomy in unknown cause of pericardial effusion like in our case.
Moreover, there is still no clear consensus with the administration or not of heparin reversal at the end of a straightforward LAAO. Some centers recommend the administration of protamine guided by ACT levels; however, due to the possibility of increase thromboembolic complications, is not a routine practice.
Learning points: In case of bleeding complications after LAAO, hemostatic optimization with protamine seems to be safe and efficient. However, for non complicated LAAO procedure, more studies would be needed in order to obtain futures guidelines.
References:
1. Husain Z, Safavi-Naeini P, Rasekh A, Razavi M, Collard CD, Anton JM, etal. Anesthetic management of patients undergoing percutaneous endocardial and epicardial left atrial appendage occlusion. Semin Cardiothorac Vasc Anesth. 2017;21(4):291–301.

07AP03-02
Thyroid hormones, prolactin and testosterone levels are not associated with 2-years mortality in elective cardiac surgery patients

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Background and Goal of Study: Our aim was to examine the endocrine hormone levels and modified frailty index-11 in patients undergoing elective cardiac surgery.
Materials and Methods: Our research is a single-center, prospective, observational study (ClinicalTrials.gov:NCT03736499).
We examined 252 patients who underwent elective cardiac surgery. Preoperative TSH, T3, T4, prolactin, and testosterone levels were collected and analyzed after the surgery. We examined prolactin and testosterone levels, both for the whole population and grouped by gender. Frailty was calculated based on the modified Frailty Score-11 (mFS-11). It can be divided into three main components medical comorbidities and functional and cognitive impairment. The scoring system was divided into 5 equal parts and clustered into groups. The primary outcome was 2-years mortality.
Results and Discussion: The mean age of the patients was 64.23 years (standard deviation [SD]: 11.07 years). Thirty-three patients (13.01%) died during the median follow-up time of 20.48 months (interquartile range [IQR]: 18.90-22.98 months). The median operation time was 180 (IQR 157-215) min, the median ICU stay was 29 (IQR 22-72) hours, and the median hospital stay was 10(IQR 8-14) days.
The deceased had been on a ventilator (hours) for an extended period (survivors median 10.25 vs. deceased median 22.50). In case of cardiorespiratory bypass (min), the deceased group had a longer bypass time (median 110 vs. 80).
The T3-level was associated with the operation time (R:-0.151 p= 0.031), while the T4-level was associated with the time spent in the ICU (R:0.173 p=0.006). Thyroid hormones were examined in three groups based on low, normal, and high hormone levels, and continuous TSH, T3, T4 were not significantly associated with total mortality.
Looking at the correlation between inotropes and endocrine hormones dobutamine-FT4 (R: 0.135, p=0.033) the others showed no connection. The amount of transfusion in the first postoperative day had a negative correlation with the FT3 level (R: -0.144, p=0.023). The mFS-11 was not associated overall mortality(p=0.882). Frailty score correlated with insulin levels on the first day after surgery mFS-11 R: 0.208, p=0.001.
Conclusion(s): Endocrine hormones and the mFI-11 were not indicators of 2-years mortality.

07AP03-03
Preoperative endothelial dysfunction in cutaneous microcirculation is associated with postoperative acute kidney injury after cardiac surgery using extracorporeal circulation: a prospective cohort study. MONS-AKI study

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Background and Goal of Study: Acute kidney injury (AKI) is a well-recognized complication after cardiac surgery. Although the mechanisms of AKI are not fully understood, probably involves hypoperfusion, neurohumoral activation, inflammation, and oxidative stress. Microcirculatory alterations are also likely to contribute to the development of AKI in cardiac surgery. In the MONS cohort study, preoperative endothelial dysfunction, assessed by iontophoresis of acetylcholine (ACh), was independently associated with postoperative organ injury in patients scheduled for cardiac surgery using cardiopulmonary bypass (CPB).
The aim of this study was to describe the relationship between preoperative microcirculatory function and postoperative AKI after cardiac surgery.
Materials and Methods: This study is a secondary analysis of the prospective observational cohort MONS. The cohort enrolled 60 patients scheduled for valvular (30 (50%)) or coronary (30 (50%) surgery using CPB from January 2019 to April 2019. Preoperative microcirculation was assessed with endothelium dependant and independant reactivity tests on the forearm (iontophoresis of ACh and nitroprusside (SNP), respectively). Skin blood flow was measured by laser speckle contrast imaging. The primary endpoint was the occurrence of AKI according to the KDIGO classification during the hospital stay.
Results and Discussion: 43 (71.7%) patients had a diagnosis of AKI during the in-hospital follow up. Of those AKI patients, 15 (35%) were stage 1 patients, 20 (46%) were stage 2, and 8 (19%) were stage 3. Considering microcirculation data, a higher peak amplitude in iontophoresis of ACh (35.5 [20.2-49.2] vs 23.1 [9.5-44.2] LSPU, p = 0.04) was associated with postoperative occurrence of AKI. Iontophoresis of SNP was not associated with AKI. In multivariable model, peak amplitude in iontophoresis of ACh was independently associated with AKI (OR 1.045 [1.001-1.092], p = 0.045).
Conclusion(s): Preoperative peak amplitude of endothelium-dependent vasodilation was associated with the postoperative occurrence of AKI. These results suggests that microcirculation contributes to the development of AKI in cardiac surgery undergoing CPB and may be surrogate markers for predicting the risk postoperative AKI.
References: Abrard S, et al. Preoperative Endothelial Dysfunction in Cutaneous Microcirculation Is Associated with Postoperative Organ Injury after Cardiac Surgery Using Extracorporeal Circulation. Ann of Int Care 11 (1): 4.

07AP03-04
Xenon alleviates deleterious microglial activation and neuronal injury after SCIRI by modulating the ER stress via ATF6 signaling

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Background and goal of study: Spinal cord ischemia/reperfusion injury（SCIRI） causes deleterious microglial activation. Xenon postconditioning alleviates neuroinflammation, yet the effect of the inhibition on microglial activation and spinal cord IR injury is unknown.
Materials and methods: A spinal cord IR rat model was induced by abdominal artery occlusion 85 minutes and reperfusion. Xenon postconditioning (50% xenon) was administered 1 hour after one hour of reperfusion. Motor function, lumbar spinal cord edema, and histopathologic changes were examined. Using western blot, immunohistology, and real-time PCR, microglial activation/polarization, endoplasmic reticulum (ER) stress, and inflammatory factors were detected.

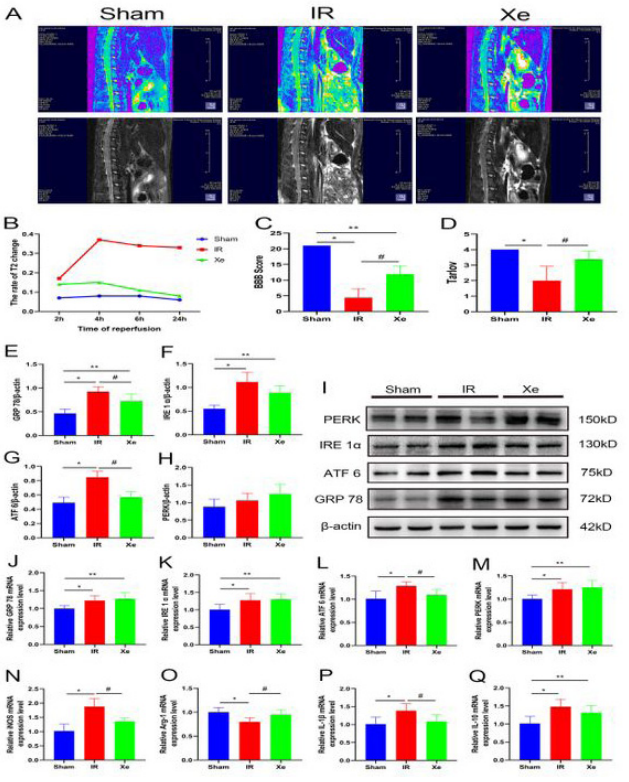

*Figure 1. The spinal cord edema was most severe four hours after IR injury. Xenon postconditioning inhibited ER stress, increased the M2 polarization of microglia and improved motor function. A Magnetic resonance imaging of the lumbar spinal cord at 4h after SCIRI. B The rate of T2 change at 2, 4, 6 and 24h after reperfusion, n=3, C-D BBB and Tarlov score at 4h after SCIRI. E-M Western blots and real-time PCR for the expression of GRP 78, IRE 1a, ATF 6 and PERK in the spinal cord. N-Q Expression of microglia polarization with M1 (iNOS)/M2 (Arg-1) phenotype and inflammatory cytokines (IL-1β, IL-10) mRNA. β-actin was used as an internal reference. The expressions of RNAs were quantified by $2^{-\Delta\Delta CT}$ method. Data are the Mean±SD, n=5, *P<0.05 Sham vs IR, **P<0.05 Sham vs Xe, #P<0.05 IR vs Xe.*

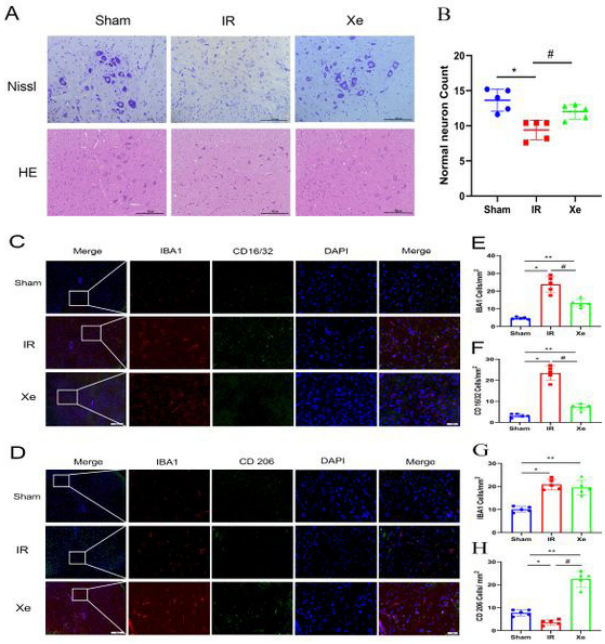

Figure 2. Xenon postconditioning alleviated microglial activation and mitigated neurologic deficits after SCIRI.
A Hematoxylin-eosin (H&E) staining and Nissi staining of the spinal cord tissues. Scale bar = 100 μm.
B The count of normal neurons.
C-D Representative co-staining images with CD 16/32, CD206 and IBA1 were captured at spinal cord.
E-H Graph dispaying the calculated amount of IBA1, CD 16/32 and CD206 cells. Scale bar = 20 μm.
*Data are the Mean±SD, n=5, *P<0.05 Sham vs IR, **P<0.05 Sham vs Xe, #P<0.05 IR vs Xe.*

Results and discussion: The spinal cord edema was most severe four hours after IR injury. Xenon postconditioning attenuated IR-induced motor function, lumbar spinal cord edema, and histopathologic changes. Xenon post-treatment mitigated microglial activation and proinflammatory factors by inhibiting ER stress. Our results provide a possible cause for the decline in nerve injury during ischemia/reperfusion.

Conclusion(s): Finally, xenon postconditioning mitigated neuronal damage and neurologic deficits after IR injury. Xenon post-treatment targeting microglial might be a potential therapeutic strategy for SCIRI.

07AP03-05
Prognostic impact of intraoperative coronary flow velocity evaluation in cardiac surgery. A prospective observational study

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Background and goal of study: The aim of this study was to check the hypothesis that coronary flow velocity difference (CFVD) between baseline and after coronary artery bypass graft (CABG) surgery predicts one year mortality or major adverse cardiovascular events (MACE).

Materials and methods: The prospective observational study of 155 adult cardiac patients operated on under cardiopulmonary bypass. Coronary artery flow was assessed during routine perioperative TEE. The main exposure variable was the CFVD which was defined as a difference between pre- and post CABG coronary flow velocities. The primary outcome was death or MACE occurred during 1 year after surgery.

Pre- and post-cardiopulmonary bypass (CPB) images were obtained upon hemodynamic stabilisation. The anatomical course of the coronary arteries was examined through color Doppler mapping, with all standard and modified views being employed. The entire left main coronary artery was visualized while only the proximal segments of the left anterior descending artery (LAD) and left circumflex artery (LCx) were scanned. The blood flow velocity was measured using pulsed-wave Doppler with a sample volume (2.0 mm) placed on the color signal. The pre- and post-CABG maximal diastolic velocities at the same places were used for analysis.

Results and discussion: The detectability of left coronary arteries were 85.8% before CPB and 79.3%after CPB. The CFVD less or equal to -5 cm/s predicted primary outcome with a sensitivity of 50.0% and a specificity of 80.5% (ROC analysis: AUC, 0.653; 95% CI, 0.555-0.741; p 0.026). Kaplan-Meyer analysis confirmed association with increased risk of one year mortality of MACE (x^2= 9.18; logrank test p = 0.002) (Figure 1).

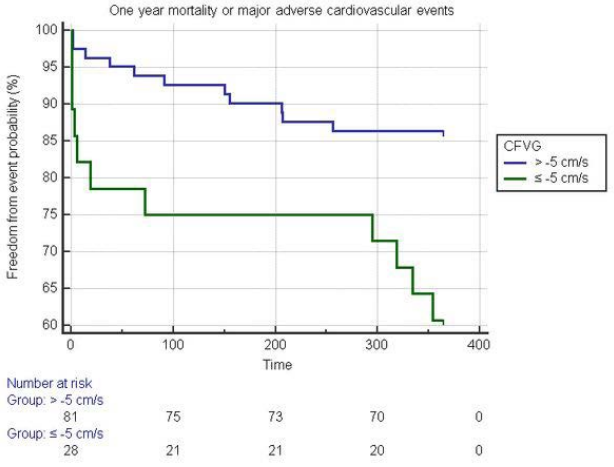

Figure 1.

Conclusion(s): Postoperative increase of coronary flow velocity above 5 cm/s in compare to the baseline measured proximally to graft anastomosis during routine TEE predicts mortality or MACE during 1 year after surgery.

07AP03-06
Anesthesia and airway management for tracheal resection

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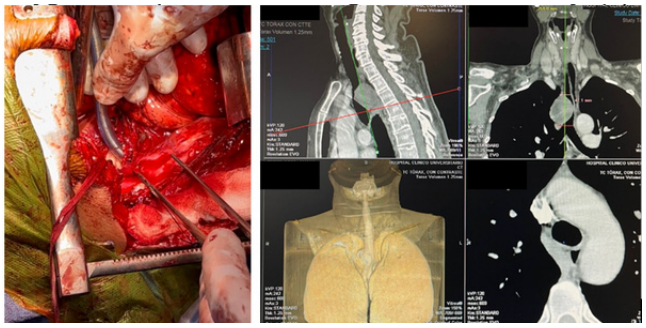
Background: Tracheal resection remains the greatest challenge in airway reconstruction, especially with extensive lesions. Some authors have stated that resection exceeding 3–5cm is nearly impossible. In these cases, airway management is the top issue for the anesthesiologist, and the level of difficulty varies with location, severity of stenosis, and surgical technique. Extracorporeal membrane oxygenation (ECMO) could be the final choice for extensive resections and difficult airways.
Case report: We report a case of anesthetic management in a thoracotomy and tracheal resection of a 4,5 cm tracheal tumor. To the routine monitoring, a brain function and an oxygen reserve index monitor were added. For analgesia, we selected an erector spinae plane block to avoid an epidural hematoma if ECMO was used. Fiberoptic-guided intubation was performed to place an endotracheal tube above the tumor. Femoral vein and artery were catheterized, to use them in case of refractory hipoxemia. For tracheal resection, surgical crossfield intubation was used, as well as single-lung ventilation. The day after the surgery the patient could be extubated.



Discussion: Tracheal resection is the treatment of choice for most tracheal tumors. Patient selection, operative planning, and communication between thoracic and anesthesia teams are required. The principal anesthetic consideration is ventilation and oxygenation in an open airway. Ventilation can be managed in different ways, including manual oxygen and high frequency jet ventilation, spontaneous ventilation, and cardiopulmonary bypass (1).
For very challenging cases, ECMO remains a feasible alternative, since it is a useful for maintaining oxygenation prior to achieving a definitive airway.
References:
1. Schieren M. Anesthesia for tracheal and carinal resection and reconstruction. Curr Opin Anaesthesiol. 2022 Feb 1;35(1):75-81
Learning points: Tracheal resection is a complex airway surgery requiring evaluation of airway obstruction risk, the formulation of strategies for complex airway management and lung ventilation during complete resection of the tracheal segment and a handover plan for safe tracheal extubation.

07AP03-07
Retrospective analysis assessing economic impact of aprotinin reinstatement in 4 French cardiac surgery centres

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Background and goal of study: Until 2008, aprotinin (APR) was used to reduce perioperative bleeding and transfusion needs in cardiac surgery but was suspended following the publication of the BART study, leaving only tranexamic acid (TXA) as available antifibrinolytic. In 2012, the European Medicine Agency revisited all APR data and restored to be given to adult patients at high risk of major blood loss undergoing isolated coronary artery bypass graft (CABG) surgery and requested the marketing authorization holder to gather more information on the profile of APR use through a registry (NAPaR). The economic impact of APR reintroduction on costs was compared to TXA.
Materials and methods: This multicenter before-after study comparing APR with TXA was carried out in 4 French university centers. APR use followed ARCOTHOVA (French association of cardiothoracic and vascular anesthetists) guidance in 2 indication classes: class 1, on-label (iCABG); class 2, off-label, patient with at least 3 risk factors (Trust score) and/or exposed to high risk surgeries.
APR data were retrieved from the NAPaR registry. TXA data were retrieved from each center's database, and were matched to APR data based on indication classes. Business impact was evaluated using both direct costs associated with antifibrinolytics and transfusion products (within first 48h) and indirect costs such as surgery duration and ICU stay.
Results and discussion: Between XII-2018 and XI-2020, 236 patients were treated with APR and were matched to 223 matched patients treated with TXA between V-2016 and X-2019. The 459 patients were distributed as: 17% in class 1, 83% in class 2; 25 APR patients and 23 TXA patients died before ICU discharge and were excluded from the cost analysis.
Mean cost per patient tended to be lower in APR group versus TXA group (21K€ vs 24K€), which resulted in an estimated gross saving > 660 K€ for the whole cohort in favor APR. The mean cost per patient differed with the indication class (22K€ on-label vs 47K€ off-label) and allotments were in the opposite direction (+4.7K€ on-label vs -5.3K€ off-label between APR and TXA).
Higher costs for TXA patients were related to longer ICU stays, mainly due to those patients who stayed more than 16 days (> 90th percentile) (p=0.002).
Conclusion(s): Costs were driven by the ICU stay. The substantial savings observed with APR treatment were because fewer patients in the APR group stayed long at the ICU compared to TXA group.

07AP03-08
Quantifying graft outcome during ex-vivo lung perfusion

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Background and goal of study: Ex-vivo lung perfusion (EVLP) is a recognized method to evaluate marginal lung donors. Graft suitability for transplantation is usually based on gas exchange, lung X-ray and physiological measurements. We evaluated the performance of a prognostic score that combines periprocedural variables and donor's characteristics.
Materials and methods: Data were collected from 60 EVLP procedures performed at Turin University Hospital. Graft outcome was considered unfavorable in case of graft rejection or Primary Graft Dysfunction (PGD) grade 3 in the first 72 hours after transplant. Variables are described as median [IQR] and compared with unpaired two-sample Wilcoxon test. Using logistic multivariable regression, a prognostic model was built to predict the unfavorable EVLP outcome based on literature and statistical differences between the two groups.
Results and discussion: Duration of mechanical ventilation of the donor and smoking history did not differ between groups (3.5 [2;5] vs 3 [2;6.5] days; p=0.729 and 45% vs 39%; p=0.778 for the favorable and unfavorable outcome groups respectively). In Table 1 we report donor's characteristics and physiological variables during EVLP that were included in the model.

	Favorable	Unfavorable	p value
Age of the donor (years)	46 [38;51]	51 [41;54]	0.197
Body Mass Index (kg/m^2)	24 [22;26]	26 [23;29]	0.147
Peak airway pressure after 2 hours of EVLP (cmH_2O)	14 [13;15]	16 [14;19]	0.009
Static compliance after 2 hours of EVLP (mL/cmH_2O)	117 [98;146]	88 [67;121]	0.005
PaO2 after 2 hours of EVLP (mmHg)	499 [457;553]	440 [372;525]	0.028

Table 1 - Variables included in the model

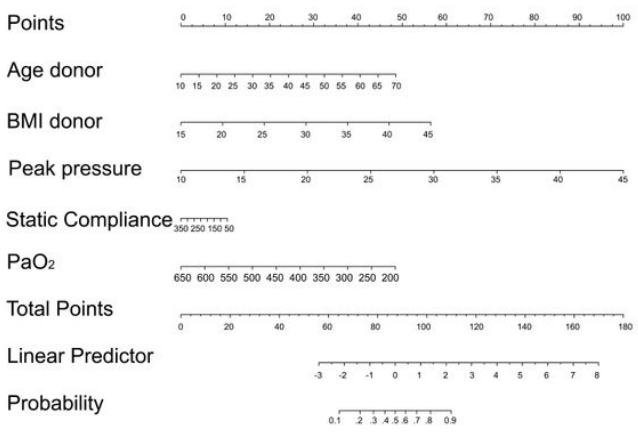

Figure 1 - Nomogram of the model

As shown by the nomogram (Figure 1) peak airway pressure had the greatest effect on outcome while, according to the calibration curve, the prognostic value of the model (C-index 0.78) is higher for intermediate probability of outcome (between 40% and 80%) but underestimates when probability of a negative outcome is low and, conversely, overestimates when the probability is high.
Conclusion: A quantitative approach using a nomogram-based prognostic model during EVLP seems to be accurate in predicting transplant outcome, but further studies are needed.

07AP03-09
Could VerifyNow® be an useful test for guided antiplatelet therapy in vascular surgery? An observational prospective study

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Background and goal of study: The VerifyNow system® evaluates platelet function measured in resistance units (RU) with a blood sample and in only a few minutes(1).
The primary endpoint of this study is to determine aspirin resistance (AR) prevalence in our patients with peripheral arterial disease, and as secondary endpoints, to identify risk factors associated to AR and ratio of major adverse cardiovascular events (MACE) per aspirin resistant units (ARU).
Materials and methods: Our study is based in a prospective cohort of patients with peripheral arterial disease treated with aspirin 100mg/24h more than 30 days starting at February 2021. In the first visit, an hemogram and VerifyNow® test are performed, so patients are classified into group A, acetylsalicylic acid resistant (ARU ≥550) and group B, acetylsalicylic acid sensible (ARU <550). Independently patients are also classified by comorbidities, regular medication and blood tests. Finally, a two-year follow-up is made in order to monitor the onset of MACE.
Results and discussion: Our preliminary results (N=122) show a prevalence of 13.1% of AR. AR and COPD are significantly correlated (*p=0,037*). However, other comorbilities as age, BMI, smoker, hypertension, diabetes, isquemic cardiomiopathy and renal failure are not. Moreover, concomitant treatment with proton pump inhibitors IBPs (*p=0,047*) and level of platelets in the first visit (*p=0,049)* are significantly correlated. So, patients with IBPs as regular medication and with higher levels of platelets (276.000 +/- 91.000 in group A versus 238.000 +/-79.000 in group B) are more resistant to aspirin. Others as ACE inhibitors, ARA II, Calcium Antagonist, Beta-Blockers, Statins and hemoglobin level in the first visit are not statistically significant. The incidence of MACE will be recorded in one year's time.
Conclusion(s): VerifyNow system® is a safe, rapid and simple platelet function test(1). It could be used to recognise patients with AR to intensify or change their antiplatelet therapy in order to reduce MACE(2). However, final results of our study and further researches are still required.
References:
1. Van Werkum JW, Harmsze AM, Elsenberg EH, Bouman HJ, ten Berg JM, Hackeng CM. The use of the VerifyNow system to monitor antiplatelet therapy: a review of the current evidence. Platelets. 2008;19(7):479-88.

2. Guirgis M, Thompson P, Jansen S. Review of aspirin and clopidogrel resistance in peripheral arterial disease. J Vasc Surg. 2017;66(5):1576-1586

07AP03-10
Postoperative delirium rate decreased after implementation of a delirium prevention multicomponent intervention in older cardiac surgical patients: a 6-month prospective observational study

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Background and goal of study: Postoperative delirium is a common and serious problem for older patients undergoing cardiac surgery. To enhance evidence-based consensus guidelines we implemented a four-component intervention followed by a quality improvement project of delirium management at our institution.
The primary outcome was the incidence of postoperative delirium. The secondary outcome measure prescribing practices before and after implementation was the analysis of perioperative anesthesia medications.
Materials and methods: During a 6-month observational period between June 2019 and December 2019 we compared 3 months before and 3 months after a four-component delirium prevention implementation: preoperative delirium risk stratification, multidisciplinary education of consensus guidelines, written memory aids, postanesthesia visits with delirium screening until postoperative day 3. Participants were older age (> 65 years) who underwent elective cardiac surgery. We measured practice change regarding perioperative anesthesia medications after the interventions compared to practice during baseline before implementation.
Results and discussion: In total, 234 patients were observed and analyzed during the 6-month study period. Overall delirium incidence rate was 12.4 %. Multivariate analysis revealed independent risk factors such as age [adjusted OR: 1.046; 95% confidence interval (CI): 1.002-1.092; p<0.042], double valve surgery [adjusted OR: 13.1; 95% CI: 3.240-52.974; p<0.0001] and peripheral arterial disease [adjusted OR: 8.131; 95% CI: 2.336-28.306; p<0.001].
Hospital stay was significantly longer in patients with delirium [median 13 (12-19.5) versus 12 (11-14) days; p <0.009]. Prior implementation 3-month baseline delirium rate was 17.2 % compared to 7.6 % (p<0.026) after implementation of the multicomponent intervention. Dexmedetomidine was more frequently applicated after 3-month implementation (43.2 % versus 17.2 %, p<0.001) compared to baseline.
Conclusion: This 4-component delirium prevention intervention was associated with a significant reduction of delirium incidence. Regarding perioperative medications, dexmedetomidine was administered significantly more after implementation and education of the 4-component intervention.

07AP03-11
Feasibility and safety of the implementation of a multimodal prehabilitation program in cardiac surgery. Results from a pilot study

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Background and goal of study: Frailty and low functional reserve, are common conditions in cardiac surgery patients and potentially modifiable risk factors of postoperative complications[1,2].
Multimodal prehabilitation programs have proven to be effective as a preoperative optimization strategy in patients undergoing abdominal surgery. However, their implementation in cardiac surgery is anecdotal[3].
Our main objective was to assess the feasibility and security of a multimodal prehabilitation program and its effects on functional reserve in patients candidate to cardiac surgery.
Materials/methods: Pilot interventional study. 30 patients candidate for surgical valve replacement and/or myocardial revascularization were included. Exclusion criteria were: physical or cognitive disability, IV NYHA class, unstable angina, severe disease of the left main coronary artery, recent AMI, dynamic obstruction of the outflow tract of the left ventricle and exercise-induced arrhythmias.
The program consisted of:
1. Supervised physical training
2. Respiratory stimulation,
3. Nutritional support, and;
4. Mindfulness.

Functional capacity was assessed prior to the start of the program and at the end of it, using the 6-minute walk test, the 30-second chair test and the Hand Grip test. In addition, functional capacity was estimated with the Duke Activity Status Index Questionnaire, physical activity level assessment using the Yale Physical Activity Questionnaire, as well as anxiety and depression assessment with the HADS questionnaire.
Results/discussion: All patients, with the exception of one who rejected intervention, completed the program, which lasted an average of 45 days. 27 patients were evaluated after the program.
This induced a significant increase in functional capacity measured by the 6-minute walk test (510.7+62m vs 534.3+71m, p=0.007) and the chair test (13.2+4.7 vs 16.4+7 repetitions, p= 0.02), as well as an increase in the level of physical activity measured by the Yale physical activity questionnaire (37.6+20 vs 54.2+27; p=00029). There were no significant differences in the Hand Grip test, nor significant impact on the level of anxiety and depression.
Conclusions: Multimodal prehabilitation in cardiac surgery patients is feasible and increases functional capacity preoperatively without being associated with complications.The presumed beneficial impact of this improvement on the incidence of postoperative complications and hospital stay requires further investigation.

07AP04-01
New advancements in peripheral perfusion during the use of mechanical circulatory support devices

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Background and goal of study: Our research group has demonstrated that Sevoflurane improves the blood flow of organs in left ventricular assist devices (LVAD) when compared with Propofol. Nonetheless, the effect of Desflurane in this scenario is yet to be explored.
The main objective of this research was to compare both anaesthetic protocols: Sevoflurane vs Desflurane in a porcine experimental model during partial support of left ventricle with a continuous-flow mechanical circulatory assist device.
Materials and methods: 12 healthy minipigs were randomized and split into two equal-sized groups according to the anaesthetic agent used for maintenance of general anaesthesia in a LVAD (Biomedicus 540): Sevoflurane or Desflurane. The study of the regional organic flow was achieved using the coloured microsphere technique.
Two study moments were defined: before LV assistance was initiated and after 30 minutes of partial support (50% of basal cardiac output). At the end of the procedure, the animal was sacrificed and a biopsy of the organs (brain, heart, liver, kidney, lungs and small intestine) was performed to determine the regional flow.
Statistical analysis was carried out using the independent samples t-test. Statistical significance: $p<0.05$. This study was approved by the Ethics Committee on Animal Experimentation of the Gregorio Marañon General University Hospital.
Results and discussion: No statistically significant differences were found between both groups before the assistance was initiated. However, after 30 minutes of partial support Desflurane showed a significant increase in blood flow to the brain ($p < 0.001$), lung ($p = 0.035$), kidney ($p = 0.002$), liver ($p = 0.003$) and heart ($p = 0.003$).
Conclusions: Desflurane showed a significant increase in the regional flow of the analysed organs compared to Sevoflurane. Future studies will be needed to reproduce our findings in routine clinical practice.

07AP04-02
Esmolol impact on oxidative stress in rats with structural cardiomiopathy once treatment is stopped

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Background and goal of study: Chronic arterial hypertension (HTA) progressively produces damages on the function and structure of several organs. HTA favors the development of cardiovascular remodeling and thus, endothelial dysfunction. Oxidative stress damage is one of the mechanisms involved. We previously demonstrated that 48h treatment with esmolol improved antioxidants and decreased oxidant biomarkers in spontaneously hypertensive rats (SHR, 1). However, we do not know yet if this is maintained over time once drug infusion is stopped.
Materials and methods: Once approved by the Ethic Committee on Animal Investigation (CEEA), we selected spontaneously hypertensive (SHR) male adult rats (14 months old) and randomly divided them into two groups: those who received 300mcg/kg/min iv esmolol for 48h (SHR-E) and those who received iv saline as placebo (SHR). After treatment, each group was randomly divided into three subgroups: those studied just after 48h of treatment (SHR-48h y SHR-E-48h), after 7 days of stopping the treatment (SHR-7d y SHR-E-7d) and after a full month (SHR-1m y SHR-E-1m). We studied reduced glutation and plasmatic nitrates as plasma antioxidants and lipidic peroxidation and carbonils as plasma oxidant biomarkers. T-Student of repeated measures was applied, considering $p<0,05$ as statistically significant.
Results and discussion: Reduced glutation and plasmatic nitrates were higher in SHR-E than SHR and these effects persisted in SHR-E-7d and SHR-E-1m ($p<0,05$). Lipidic peroxidation and carbonil levels decreased in SHR-E compared to SHR and, again, these effects were maintained over time ($p<0,05$).
Conclusions: 48h esmolol treatment improves oxidative stress in an experimental model of compensated left ventricular hypertrophy caused by chronic HTA (which also shows coronary damage). Significantly, this improvement is maintained over time once drug infusion finishes.
References: 1. Arnalich-Montiel A et al. Short-term esmolol improves coronary artery remodeling in spontaneously hypertensive rats through increased nitric oxide bioavailability and superoxide dismutase activity. Biomed Res Int. 2014;2014:531087.

07AP04-03
Anesthetic approach of a patient with severe tracheal stenosis undergoing urgent tracheal stenting: a case report

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Background: Critical lower tracheal stenosis is a rare life-threatening medical condition that needs urgent intervention. Conventional anesthetic technique may be catastrophic.
Case report: A 52-years old female patient was admitted to our hospital a week ago due to progressive dyspnea and non-productive cough. A computed tomographic scan revealed extrinsic compression of the lower third of trachea, the right main bronchus and the right cardiac chambers by a huge malignant mediastinal mass. According to the CT scan, the tracheal stenosis was about1.5cm above the carina and the diameter of narrowest part was 2-3mm. During the hospitalization, the patient suffered dyspnea at rest with severe stridor and urgent tracheal stenting was mandatory. A metallic self-expanding stent had to be placed through a rigid-bronchoscope with complete neuromuscular blockade and there was no previous experience of this intervention in our hospital.

Airway and ventilation management was our main consideration. The initial plan included intermittent positive pressure ventilation by the side port of the bronchoscope, as jet ventilator was not available. Plan B included femoral veno-arterial ECMO for anticipated respiratory or hemodynamic collapse after induction of anesthesia.
In the operative room, full hemodynamic monitoring was established and a femoral vein catheter was introduced due to superior vena cava compression. The cannulation of femoral vein and artery for ECMO was done under local anesthesia in semi-supine position. Tracheal stent was successfully placed and effective oxygenation was achieved through rigid bronchoscope.
Patient was intubated, the cannulae of ECMO were removed and she was admitted to the ICU, as the next morning a second operation for resection of the mediastinal mass was scheduled.
Discussion: Anesthesia for tracheal stenting remains a challenge, especially in near total obstruction of the airway. Establishment of effective oxygenation/ventilation perioperative is based on the cause, location and severity of tracheal narrowing. ECMO is an option for patients with severe tracheal stenosis. The key components for a successful management are the good communication between the teams involved, advanced planning and anticipitation of possible complications.
Reference:
1. J-H Zhu et al, Ventilation strategy and anesthesia management in patients with severe tracheal stenosis undergoing urgent tracheal stenting, Acta Anaesthesiol Scand 2018 May;62(5):600-607

07AP04-04
Volatile anesthetics and oxidative stress in endovascular aortic repair. Clinical trial

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Background and goal of study: Oxidative stress is implicated in the pathogenesis of vascular disease like abdominal aortic aneurysm (AAA). In the past few years, indentifying biomarkers of oxidative stress and antioxidant defense has been the focus of many studies. Volatile anesthetics seem to have a protective role in oxidative stress during open AAA repair due to their beneficial effect against ischemia-reperfusion injury. However, we have not found studies that show the effect of volatile anesthetics in oxidative stress during endovascular aneurysm repair (EVAR).
The aim of this study was to compare the effect of sevoflurane and desflurane on the oxidant/antioxidant systems of patients undergoing EVAR.
Materials and methods: We conducted a phase IV randomized clinical trial comparative of two groups (sevoflurane n=40, desflurane n= 40) in patients with AAA and indication for EVAR. Inclusion criteria were: adults, ASA I-III who signed the informed consent. Invasive blood pressure was measured before induction of general anesthesia which was maintained with the corresponding volatile anesthetic. Blood samples were collected in two moments: Preanesthetic (before induction) and postanesthetic (when the surgery ends). We measured biomarkers of oxidative stress: carbonyls, malondialdehyde (MDA) and biomarkers for antioxidant defense: nitrates, thiol, glutathione (GSH), superoxide dismutase (SOD) and catalase. Statistical analysis was performed with repeated-measures t-test. Statistically significant results were considered when $p \leq 0.05$. All procedures were approved by the Ethics Committee of Hospital Gregorio Marañón. The trial is registered in ClinicalTrials.gov:NCT 03917186
Results and discussion: We compare oxidative stress biomarkers with sevoflurane and desflurane at preanesthetic time: *Biomarkers of oxidative stress*: carbonyls (p=0.560); MDA (p=0.848) and *biomarkers for antioxidant defense:* nitrates (p=0.174), thiols (0.548); GSH (p=0.095); SOD (p=0.864) and catalase (p=0.21).
In postanesthetic time the following results were obtained: *Biomarkers of oxidative stress*: carbonyls (p=0.965), MDA (p=0.715) and *biomarkers for antioxidant defense:* nitrates (p=0.572); thiols (p=0.930); GSH (p=0.882), SOD (p=0.277) and catalase (p=0.847).
Conclusion: There were no statistically significant differences between the individual biomarkers of the two groups at either time point. Sevoflurane and desflurane do not differ with respect inducing or reducing oxidative stress during EVAR.

07AP04-05
Comparison of the methods used for pain management after thoracotomy

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Background and goal of study: It was aimed to compare postoperative pain scores, opioid and additional analgesic consumption, postoperative complications, and duration of hospital stay between the USG guided erector spina plan (ESPB) block, serratus anterior plane block (SAPB) and the intercostal block (ICNB) performed by the surgical team in posterolateral thoracotomy operations in this study.
Materials and methods: Our study was carried out in Hacettepe University Anesthesiology and Reanimation Clinic who had an elective posterolateral thoracotomy by the Department of Thoracic Surgery between December 2019 and June 2021. The patients aged 18 years and older, ASA score <IV, and body mass index (BMI) <40kg/m2 were examined and the patients with exclusion criteria were not included in the study.
The patients were divided into 3 groups according to the method applied for pain management as serratus anterior area block (Group 1), erector spina area block (Group 2), intercostal nerve block (Group 3).
Postoperative patient follow-up was carried out by responsible anesthesiologists who doesn't know which block has performed to the patient, at all hours. Postoperative follow-up of the pain severity of the patients was recorded with the VAS scale during routine visits in the Thoracic Surgery Intensive Care Unit. Additional analgesic requirements were examined in the nurse records. The records of intensive care unit and digital data of the hospital were inquired for the other variables in the study. The pain scores of the patients, doses of opioids and additional analgesics used, and side effects of opioid use, arterial blood gas outcomes, length of intensive care unit and hospital stay were compared between the three different blocks applied in the first 24 hours postoperatively. The data were analyzed with the SPSS 20.0 statistical program.

Results and discussion: A total of 75 patients were included in the study. There was no statistically significant difference between the groups in terms of age, gender, body weight, height, body mass index, ASA risk score and median length of stay in the intensive care unit ($p>0.05$). The VAS scores at rest and during coughing showed a statistically significant difference between the three groups at all postoperative hours ($p<0.05$). The pain scores of Group 1 (SAPB group) and group 3 (ICNB group) showed a significant difference in all post-op hours ($p<0.05$). In addition, the difference in pain scores between group 2 (ESPB group) and group 3 (ICNB group) was also statistically significant at all hours ($p<0.05$).

There was a significant difference between the pain scores of Group 1 and group 2 at the postoperative 1st hour ($p=0.014$). On the other hand, the difference in pain scores between group 1 and group 2 was not statistically significant in the other hours ($p>0.05$). There was no statistically significant difference between the three groups in terms of the morphine doses taken during the 24 hours postoperatively ($p>0.05$). Considering the number of PCA trials of the groups, there was a statistically significant difference between group 2 and group 3 at the 4th and 6th hours.

Additional analgesic consumption was higher in group 3 compared to both group 1 and group 2 ($p=0.034$, $p<0.001$). The number of patients using additional analgesics was higher in group 1 compared to group 2.

There was no significant difference between the three groups in terms of postoperative heart rate, mean arterial pressure, and SpO2 values. Group 2 had the lowest atelectasis rate while group 3 had the highest rate among all groups.

Conclusion(s): It was found that the ESPB and SAPB decreased the VAS scores, reduced additional analgesic consumption, and reduced the rate of postoperative atelectasis comparing with the intercostal nerve block in the patients who underwent thoracotomy. When comparing the fascial area blocks within themselves, it was observed that there was no significant difference between the VAS scores of the ESPB and SAPB groups. However, the ESPB showed a superiority over the SAPB in terms of consumption of additional analgesics and development of postoperative atelectasis.

References:

Chen, N., et al.,The effect of ultrasound-guided intercostal nerve block, single-injection erector spinae plane block and multiple-injection paravertebral block on postoperative analgesia in thoracoscopic surgery: a randomized, double-blinded, clinical trial. Journal of clinical anesthesia, 2020.59: p. 106-111.

07AP04-06
A prospective randomized trial of the efficacy of two delivery options for warm blood cardioplegia in patients undergoing cardiac surgery

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Background and goal of study: A solution for blood cardioplegia, named Normacor, can be used in two options. Option A: single-dose and option B: intermittent delivery every 15 minutes.

The study aimed at a comparative evaluation of the efficacy of two delivery options of warm blood cardioplegia based on the solution Normacor.

Materials and methods: This single-center prospective randomized study included 20 patients (all men; 67-81 years old) undergoing coronary artery surgery using Normacor cardioplegic mixture with normothermic (35°C) cardiopulmonary bypass (CPB). The patients were divided into 2 groups.

In group A Normacor was used as a single-dose infusion (antegrade, volume 1200 ml, Normacor to blood mixture within 1: 2, infusion rate 300 ml/min for 4 minutes). Re-infusion of cardioplegia was provided if ventricular activity appears.

In group B cardioplegia was repeated every 15 minutes with a mixture of Normacor and oxygenated blood in a ratio of 1:4, the rate 150 ml/min).

The duration of the CPB and myocardial ischemia, the time to cardiac arrest, and the spontaneous rhythm restoration were evaluated. The inotropic support and arrhythmia episodes after aortic declamping, ejection fraction of left ventricle (EFLV), and troponin T levels were assessed.

Results and discussion: The time of aortic cross-clamping in groups A and B was 59±15 min and 62±11, respectively. The time to cardiac arrest was 23.3±3.7 s in group A, and 29.4±4.0 s in group B ($p<0.05$). The time to spontaneous rhythm recovery was 86±23.7 s in group A, and 91±13.0 s in group B ($p>0.05$).

The frequency of spontaneous rhythm recovery was 87% in group A, and 91% in group B. The frequency of inotropic support use was 23% in group A and 29% in group B. The EFLV in group A was 0.45±0.03% and 0.43±0.04% in group B.

The frequency of atrial fibrillation after surgery was 21% and 25% in groups A and B, respectively. Troponin T levels were 0.34±0.03 ng/ml in group A versus 0.39±0.04 ng/ml in group B, $p>0.05$. Warm blood cardioplegia Normacor is an effective cardioplegic technic.

In contrast to the Backberg and Calafiore, Normacor can provide myocardial protection with a single dose of up to 60 min. This allows shortening the time of the surgery.

Conclusion(s): Both options of the cardioplegia with Normacor offer comparable myocardial protection and similar postoperative results in patients undergoing coronary artery bypass surgery with aortic cross-clamping up to 60 minutes. Further studies are required to obtain more reliable results.

07AP04-07
Role of postoperative serum albumin level in pleural effusion development after cardiopulmonary bypass

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Background and goal of study: It is believed that most of the pleural effusions following cardiopulmonary bypass (CPB) develop because of the surgical procedure, however other factor role such as postoperative serum albumin (SA) level in pleural effusion development remains unclear. Since Berbel-Franco et al showed that only 38,6% of all patients after CPB have normal or low deficit of

serum albumin (SA)[1], we hypothesized whether early postoperative decrease in SA levels can influence development of pleural effusion after CPB.

Materials and methods: In this single-center, retrospective study SA levels were measured before, 6 and 12 hours after the elective open-heart surgery in adult patients with normal ejection fraction (EF≥50%).

Patients with hypoalbuminemia prior to surgery were excluded.

All surgeries (ascending aorta, coronary artery bypass grafting and heart valve replacement) were performed using CPB.

Chest radiograph findings such as one-sided and two-sided pleural effusion were analyzed 6 and 12 hours after the surgery.

Results and discussion: We included 98 patients with mean age 65,92 ± 10,0 years.

6 hours after surgery hypoalbuminemia (SA ≤ 35 g/L) was identified in 31 (31,7%) vs 37 patients (37,7%) after 12 hours.

6 hours after surgery one or two-sided pleural effusion was identified in 13 (13,3%) vs 35 (35,7%) cases after 12 hours.

Patients with pleural effusion 12 hours after surgery had significantly lower SA levels 6 hours (34,25 ± 2,73 vs 36,23 ± 3,00; 95% CI 0,76 – 3,19, P = 0,002) and 12 hours after surgery (33,91 ± 3,16 vs 35,68 ± 2,69; 95% CI 0,56 – 2,97, P=0,004) compared to patients with no pleural effusion.

Our study shows possible connection between SA reduction after CPB and pleural effusion development. Although, SA decrease may take a part in pleural effusion development other factors should be considered and analyzed.

Conclusion(s): Hypoalbuminemia remains frequent after CPB.

Hypoalbuminemia may be associated with increased risk of pleural effusion development after CPB.

References:

1. David Berbel-Franco, Juan Carlos Lopez-Delgado, Alessandro Putzu, Francisco Esteve, Herminia Torrado, Elisabet Farrero, David Rodríguez-Castro, Maria Lluïsa Carrio1 and Giovanni Landoni, The influence of postoperative albumin levels on the outcome of cardiac surgery Berbel-Franco et al. Journal of Cardiothoracic Surgery (2020) 15:78 https://doi.org/10.1186/s13019-020-01133

07AP04-08
Is obstructive sleep apnea associated with atrial fibrillation and delirium after cardiac surgery? Sub-analysis of DECADE Trial

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Background and Goal of Study: Atrial fibrillation and delirium are common complications after cardiac surgery. They increased intensive care unit (ICU) and hospital length of stay, 30-day mortality, and health care costs. Obstructive sleep apnea (OSA) is a common sleep disorder that induces deleterious effects in the cardiovascular and nervous system. We tested the hypothesis that in adult patients with preoperative obstructive sleep apnea the incidence of postoperative atrial fibrillation and delirium after cardiac surgery is higher than in patients without obstructive sleep apnea.

Materials and Methods: Sub-analysis of the Ancillary Effects of Dexmedetomidine Sedation after Cardiac Surgery (DECADE) at Cleveland Clinic hospitals. Our primary outcome was postoperative atrial fibrillation defined by clinician diagnosis or documented arrhythmia. The secondary, postoperative delirium assessed twice during the initial five postoperative days using the Confusion Assessment Method for the ICU. The association between OSA and both outcomes was estimated with a weighted logistic regression model, after adjusting for potential confounders using inverse probability of treatment weighting.

Results and Discussion: Out of 547 patients included in the final analysis, 126 were diagnosed with OSA, and 421 had no OSA. Balance was satisfactory between groups with an absolute estandarized difference <0.10 for all variables. The incidence of atrial fibrillation was 38% (n=49) in the patients who suffered from OSA and 33% (n=141) in the non-OSA patients. OSA was not associated with atrial fibrillation with an estimated odds ratio of 1.02 (95% CI:0.59-1.77; P = 0.930). The incidence of delirium was 16% (n=20) in the patients who had OSA and 14% (n=60) in the non-OSA patients. OSA was neither related to delirium with an estimated odds ratio of 0.78 (95% CI:0.41-1.45; P=0.460).

Conclusion(s): In adult patients having cardiac surgery obstructive sleep apnea is not associated with a higher incidence of postoperative atrial fibrillation or delirium, making it unnecessary to establish specific prophylactic strategies to prevent these complications in this specific population.

07AP04-09
Short-term beta-blocker attenuates remodeling of the thoracic aorta and this effect persists after treatment withdrawal

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Background and Goal of Study: Esmolol produces regression of the remodeling in the thoracic aorta after 48 hours of therapy. However, the extension of this effect over time hasn't been studied yet.

Materials and Methods: A group of 14-month-old SHR (SHR-E) were treated with esmolol (300 μg/kg/min) over 48 hours and one separate subgroup of them were given identical treatment but then monitored for a further 1 month after drug withdrawal. A group of SHR receiving vehicle were used as the control group. We analysed the geometry (LD, lumen diameter; ED, external diameter; WT, wall thickness; CSA, cross-sectional area) of the thoracic aorta by histology. Vascular fibrosis (density of collagen) and elastin (density of elastin) were evaluated on sections stained with sirius red and orcein respectively by histology. All data was analysed using T-Student of repeated samples. A "p" value of $p<0.05$ was considered as statistically significant. The study has the propitious judgement of the Committee on Animal Research and Ethics (CARE) of our institution.

Results and Discussion: 48h therapy with esmolol produced a decrease in the aortic ED, WT and CSA ($p<0.05$), and this effect was maintained over time one month after the treatment was finished

($p<0.05$). In addition, 48h therapy was associated with a decrease of collagen density and elastin density ($p<0.05$), and this effect was maintained over one month after drug withdrawal ($p<0.05$).

Conclusion: Administration of a betablocker with ultra-short action over a short period of time produces regression of remodeling of the thoracic aorta, and this positive effect persists over time. Future studies need to be carried out in order to confirm these results in humans.

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07AP04-10
Double lung transplantation after extracorporeal cardiopulmonary resuscitation (ECPR) in a young patient: a case report

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Background: Cardiorespiratory arrest has been traditionally treated with advanced cardiovascular life support, with satisfactory outcomes. Despite that, many patients are refractory, and prolonged cardiopulmonary resuscitation (CPR) can lead to life-threatening metabolic disorders and organic dysfunction. In this context, extracorporeal membrane oxygenation (ECMO) has been increasingly used as a bridge to the return of spontaneous circulation (ROSC) in many large centers[1].

Case report: A 30-year-old male with end-stage lung disease complicated by pulmonary hypertension and severe right ventricle systolic dysfunction was admitted with worsening dyspnea requiring oxygen support with a high-flow nasal catheter, being listed for double lung transplantation. During anesthesia induction, the patient suffered cardiorespiratory arrest (asystole), and CPR was initiated but without successful ROSC. After 36 minutes of fully assisted cardiac arrest, venoarterial ECMO was successfully deployed with reestablishment of tissue perfusion. After stabilizing the emergency, the transplant team decided to proceed with the operation.

The surgery proceeded uneventfully, but the team decided to keep the patient on ECMO. After surgery, he was transferred to the intensive care unit hemodynamically stable on assistance and with low dose inotropic. He evolved satisfactorily on the postoperative period, with good allograft function and progressive improvement of right ventricle function, leading to weaning off ECMO on the fourth postoperative day. He was discharged from the ICU 15 days after surgery.

Discussion: ECPR is the application of rapid-deployment venoarterial ECMO to provide circulatory support and bypass the cardiopulmonary system, allowing the heart to recover while perfusion is granted. This strategy is being increasingly used and has proven favorable outcomes.[1]

It is worth noting that this is a complex intervention requiring a highly trained multidisciplinary team capable of rapidly deploying the circuit and managing the ECMO machine and the critical patient.

References:

1. Miraglia, D, Almanzar, C, Rivera, E, et al. Extracorporeal cardiopulmonary resuscitation for refractory cardiac arrest: a scoping review. J Am Coll Emerg Physicians Open. 2021; 2:e12380.

Learning points: This case illustrates that it is still possible to perform double lung transplantation with satisfactory results despite the repercussions of an intraoperative cardiorespiratory arrest.

07AP04-11
Double lung transplantation with intraoperative therapeutic plasma exchange (TPE) in allosensitized patient after severe COVID-19 infection: case report

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Background: Lung transplantation has become the definitive surgical treatment for many patients with end-stage lung disease. Despite advances, antibody-mediated rejection is still a significant risk factor for allograft failure, morbidity, and mortality[1].

In this context, the COVID-19 pandemic brought on great challenges, as these patients require specific immunosuppressant strategies, and little is known about the outcome of transplantation in allosensitized patients previously infected with COVID-19.

Case report: A 32-year-old female with irreversible lung function loss due to severe COVID-19 infection presented for double lung transplantation. She tested positive on week 32 of her pregnancy, and the baby was delivered safely. After that, her pulmonary function started to worsen with the need for venovenous extracorporeal membrane oxygenation (ECMO V-V) support, and she was listed for lung transplantation. As she was on puerperium and highly sensitized, her cross-match was 99% positive, indicating that she had significant chances of evolving with early organ rejection.

Due to the severity of the case, the transplant team decided to proceed to surgery with intraoperative TPE coupled with cardiopulmonary bypass. The surgery was uneventful, and it was decided to keep the patient on ECMO V-V. In the end, she was transferred to the intensive care unit (ICU), hemodynamically stable. The clinical course was satisfactory, without major complications. On the 11th postoperative (PO) day, she weaned off mechanical ventilation, and on her 17th PO, she was decannulated from ECMO V-V. She spent 31 days in the ICU and 62 days in the hospital, being discharged to reconcile with her baby.

Discussion: Efforts to expand the donor pool often include intensive therapies that may increase the risk of morbidity and mortality in patients allosensitized preoperatively[1].

In addition to complications related to these therapies and the transplant itself, the COVID-19 pandemic brought on a new range of uncertainties regarding the outcome of these patients, as evolution of the infection in the immunosuppressed is still hard to predict.

References:

1. Young KA, Ali HA, Beermann KJ, Reynolds JM, Snyder LD. Lung Transplantation and the Era of the Sensitized Patient. *Front Immunol*. 2021;12:689420.

Learning points: Despite few reports in publication, this case illustrates that lung transplantation in allosensitized patients after COVID-19 infection may have a favorable outcome.

07AP04-12
The agreement between passive leg rising and fluid challenge test after off-pump coronary surgery

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Background and Goal of Study: Passive leg rising (PLR) and fluid challenge test (FCT) are dynamic tests for assessment of fluid responsiveness, which efficacy was confirmed in a number of studies. However, the influence of high thoracic epidural anesthesia (HTEA) on performance of these tests in coronary surgery is still unsettled. The aim of our study was to assess the agreement between PLR and FCT after off-pump coronary artery bypass grafting (OPCAB) in patients receiving HTEA.
Materials and Methods: Thirty-five patients scheduled for elective OPCAB were enrolled into a single-center prospective observational pilot study. All patients received sevoflurane anesthesia (1 MAC), fentanyl 2-4 $\mu g \cdot kg^{-1} \cdot h^{-2}$ and HTEA. An epidural catheter was inserted at Th_{2-5}level with administration of 0.5 % ropivacaine 1 $mg \cdot kg^{-1}$before surgery and continuous infusion of ropivacaine 0.2 % and fentanyl 2 $\mu g \cdot mL^{-1}$ at a rate of 3-8 $mL \cdot h^{-1}$ postoperatively. We measured cardiac index (CI) using Swan-Ganz catheter. To evaluate the response to fluid therapy after OPCAB, we used PLR test and FCT (7 $ml \cdot kg^{-1}$of crystalloids during 15 min). We performed correlation analysis using Spearman*rho*coefficient. The changes of CI during tests were recorded to perform Bland-Altman analysis.
Results and Discussion: One patient was excluded from analysis due to transfer to cardiopulmonary bypass. Totally, 34 pairs of data were collected. Mean CI at the end of operation was 1.86 ± 0.6 $l \cdot min^{-1} \cdot m^{-2}$. After PLR and FCT, CI increased to 2.25 ± 0.7 $l \cdot min^{-1} \cdot m^{-2}$ and 2.43 ± 0.8 $l \cdot min^{-1} \cdot m^{-2}$, respectively ($p<0.01$). There was a significant correlation between increments of CI after PLR and FCT ($rho = 0.4$, $p < 0.01$). According to a Bland–Altman analysis, the mean bias in CI changes between the PLR and FCT tests was - 0.1 $l \cdot min^{-1} \cdot m^{-2}$ with limits of agreement of ± 1.19 $l \cdot min^{-1} \cdot m^{-2}$.
Conclusion(s): During HTEA after coronary surgery, PLR and FCT demonstrate acceptable agreement and can be used for prediction of fluid responsiveness and guiding fluid therapy.

07AP05-01
Association between preoperative and postoperative retrograde hepatic vein flow and acute kidney injury after cardiac surgery

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Background and goal of study: Hepatic venous flow patterns reflect pressure changes in the right ventricle and are also markers of systemic venous congestion. Perioperativeacute kidney injury (AKI) is common and is associated with considerable morbidity and mortality after cardiac surgery. Our objective was to evaluate the association between preoperative hepatic venous flow patterns and the risk of AKI, the vasoactive and inotrope need and ventilation time in patients after cardiac surgery.
Materials and methods: This prospective study included 41 patients without preexisting liver disease who underwent cardiac surgery between January 1, 2021, and March 31, 2021, at a tertiary heart center.
We recorded the velocity time integral (VTI) of the standard four waves in the common hepatic vein with Doppler ultrasound, and we measured the flow at the first postoperative day and in 6 cases on the second day, too.
Our outcome measures were postoperative AKI, defined as the percentage change of the highest postoperative serum creatinine from the baseline preoperative concentration (%ΔCr), the vasoactive-inotropic score (VIS) and the ventilation time at the ICU.
Results and discussion: Among the 41 patients 17 were (41,5%) female and 24 were (58,5%) male. The median age was 68 years (IQR 62-72). The most common surgery type was AVR. (16, 39%).
With linear regression the ratio of preoperative retrograde/anterograde waves' velocity time integral showed correlation with longer ventilation times (B=0.698, 95% CI=0.039-0.069, p=0.001) and with bigger vasoactive-inotropic scores. (B=0.404, 95% CI=0.003-0.022, p=0.003).
The ratio of retrograde/anterograde waves' VTI showed correlation with %ΔCr at the preoperative measurement and on the postoperative day 1 (B=0.345, 95% CI=0.095-0.522, p=0.003, B=0.414, 95% CI=0.065-0.622, p=0.007).
With multivariate regression (adjusted to preoperative GFR and Euroscore) the ratio of preoperative retrograde/anterograde waves' velocity time integral showed correlation with bigger vasoactive-inotropic scores (B=0.343, 95% CI=0.278-21.022, p=0.045), with higher %ΔCr (B=0.581, CI=0.022-0.234, p=0.001) and with prolonged ventilation time (B=0.532, CI=5.433-11.546, p=0.001).
Conclusion: The severity of hepatic venous regurgitation can be a sign of venous congestion and seems to be related to the development of AKI and it comes with prolonged ventilation times and bigger vasoactive-inotrope need.

07AP05-02
Incidence of postoperative pain and PONV at day 1-3 after cardiac surgery: a 6-month prospective observational study

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Background and Goal of Study: Postoperative pain and postoperative nausea and vomiting (PONV) are common issues after cardiac surgery. In most cases fatal consequences are rare, but it affects the patient's quality of life in both short and long term. The goal of this study is to evaluate the pain level and prevalence of PONV after cardiac surgery. We want to analyze, whether the application of current intra- and postoperative guidelines of EACTA result in low occurrence of pain (NRS ≤ 4). Postoperative pain level is the primary outcome, secondary outcome is the incidence of PONV.
Materials and Methods: From June 2019 to December 2019 patients who underwent elective cardiac surgery or intervention were included. Data were collected by postanesthesia visits at day 1-3 after surgery with pain level monitoring using the Numeric rating scale (NRS 0-10) and a PONV screening.
Data about intraoperative and postoperative medication which could influence postoperative pain and PONV were extracted from internal hospital programs.

Results and Discussion: During 6-month period 234 patients were included in the study. 132 (56,4 %) patients indicated a pain level > 4 (NRS) at least once within postoperative day 1-3. 47,9 % of the patients experienced pain level >4 on NRS at day 1, 26,5 % at day 2 and 13,2 % at day 3 (Figure 1).

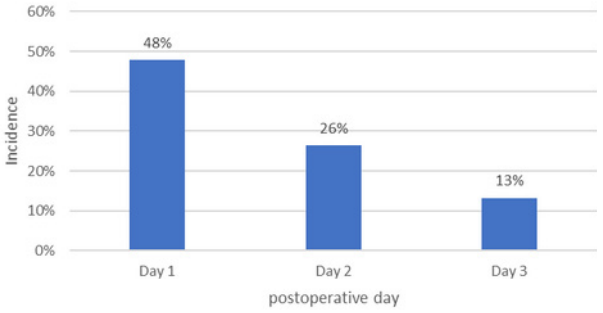

Figure 1. Incidence of pain level NRS>4.

Most pain was experienced at day 1 (mean 4,12), followed by a decreased intensity on day 2 (mean 3,05) and day 3 (mean 2,1).
PONV-data present 96 patients (41%) suffering from PONV at least once during day 1-3. Analogue to pain occurrence, highest PONV incidence was at day 1 after surgery (35,9%), decreasing at day 2 (14,16 %) and 3 (8,12 %).
Postoperative pain and PONV are indicators for the quality of anesthetic management. Application of the EACTA guidelines for postoperative pain management does not lead to a sufficient pain reduction after cardiac surgery especially on day 1. The high incidence of PONV at day 1 does not match our goals.
Conclusion(s): The results of this study indicate insufficient pain therapy after cardiac and high PONV occurrence. Thus, guidelines and standards need to be adapted.

07AP05-03
Flow-controlled ventilation versus pressure-controlled ventilation in thoracic surgery requiring one-lung ventilation – a randomized, controlled, single-center trial

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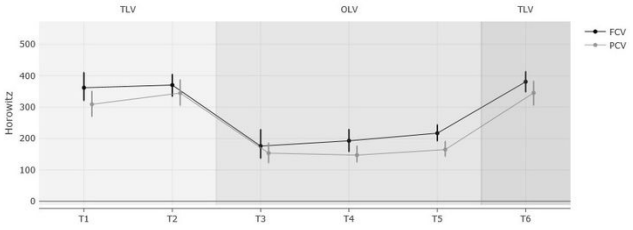
Background and Goal of Study: Flow-controlled ventilation (FCV) establishes a continuous gas flow during the whole ventilation cycle. Coupled with direct intra-tracheal pressure measurement precise determination of dynamic compliance is feasible and ventilator settings can be adjusted accordingly to achieve the highest dynamic compliance as a personalized approach. Aim of this randomized trial was to investigate the effect of compliance-guided FCV in terms of gas exchange compared to current standard pressure-controlled ventilation (PCV) during one-lung ventilation (OLV).
Materials and Methods: Overall 46 patients were randomized to receive FCV or PCV for the duration of general anaesthesia. FCV was established with compliance titrated end-expiratory pressure (PEEP) and peak pressure, flow adjusted to achieve normocapnia during total lung ventilation (TLV) and mild permissive hypercapnia during OLV. In the control group PCV was established with compliance titrated PEEP, peak pressure set to achieve a tidal volume of 6-8 ml/kg predicted body weight (PBW) during TLV and 4-6 ml/kg PBW during OLV, respiratory rate set to maintain normocapnia during TLV and mild permissive hypercapnia during OLV. The primary outcome parameter was defined as oxygenation (paO_2/FiO_2) at 30 minutes after OLV initiation.
Results and Discussion: 43 patients were included into final analysis and the primary outcome parameter paO_2/FiO_2 was significantly higher in the FCV group (n=21) compared to control (n=22) (187 vs 136, MD 39 (95% CI 1 to 75); p=0.047) after 30 minutes of OLV (Timepoint T4). Additionally, the required respiratory minute volume (MV) to obtain similar $paCO_2$ levels was significantly lower in FCV (3.0 vs 4.5, MD -1.3 (95% CI -1.9 to -0.8) l/min; p<0.001), which indicates improved CO_2-removal.



Conclusion: In this randomized trial flow-controlled ventilation was found to be superior to current standard pressure-controlled ventilation after 30 minutes of OLV in terms of oxygenation and CO_2-removal.

07AP05-04
Non-invasive continuous cardiac output monitoring in thoracic cancer surgery: a comparative study between calibrated pulse contour analysis and chest bioreactance

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Background and Goal of Study: Patients scheduled for thoracic cancer surgery are eligible to goal-directed fluid therapy but cardiac output monitoring remains challenging in that specific setting. We aimed to compare chest bioreactance with calibrated pulse contour analysis, the tested hypothesis being that both methods would be interchangeable.
Materials and Methods: A prospective monocentre observational study including conveniently 50 adult patients undergoing thoracic cancer surgery was conducted in a tertiary university hospital over a one-year period. The study was registered with Clinical Trials (NCT04251637). Simultaneous measurements of cardiac index with bioreactance (CI-NICOM) and arterial pulse contour analysis calibrated by transthoracic echocardiography (CI-PCA) were performed at 8 pre-specified intraoperative time points and following fluid challenge and/or vasoactive agents. Relationships between absolute values and changes in CI were assessed by linear regression. Interchangeability was tested with Bland-Altman analysis and percentage error calculation. A four-quadrant plot was used to evaluate trending ability.

Results and Discussion: A complete set of hemodynamic data given by chest bioreactance was available in all patients at all intraoperative time points and no side-effect related to its use was observed in any patient within the study period. There was a significant difference between CI-PCA and CI-NICOM (465 CI paired data points): 2.4 ± 0.8 (extremes: 0.9-5.8) L/min/m² vs. 2.9 ± 0.9 (extremes: 0.9-7.2) L/min/m², respectively (P<0.001). A positive relationship was found between both techniques: y = 0.29x + 2.19; r^2=0.08 (P<0.001). Taking CI-PCA as the reference method, there was a systematic overestimation of CI-NICOM by 21% (0.5 L/min/m²) and limits of agreement were large: -2.49 to 1.47 L/min/m². The percentage error was 77% and concordance rates were 75% and 70% with and without an exclusion zone of 0.5 L/min/m².There was a significant moderate positive relationship between maximum changes in CI over time when measured by both techniques: y = -0.307 + 0.676 x, r^2 = 0.29,P < 0.001.

Conclusion(s): Chest bioreactance is feasible and safe in patients undergoing thoracic surgery for cancer. When compared with calibrated PCA over a wide range of CI values, the technique is moderately correlated, not interchangeable, and provides moderate trending ability.

07AP05-05
The optimal mean arterial blood pressure during cardiopulmonary bypass: does one fit all?

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Background and Goal of Study: Recent investigations have demonstrated that limits of cerebrovascular autoregulation (CA) are patient specific and may exceed the lower and the upper limits of CA in healthy individuals. The goal of the study was to detect impaired CA during cardiac surgery with cardiopulmonary bypass (CPB) and estimate the individual limits of mean arterial blood pressure (mABP) within which the individual CA remains intact.

Materials and Methods: The prospective observational study was conducted at Kaunas Klinikos, the Hospital of Lithuanian University of Health Sciences. The patients undergoing elective coronary artery bypass grafting (CABG) surgery were included. In addition to standard monitoring CA was monitored in real time by "Vittamed" non-invasive monitor. The method is based on monitoring of intracranial blood volume (IBV) changes. Non invasively monitored volumetric reactivity index (VRx(t)) correlates with invasive PRx(t).

Results and Discussion: 65 patients were enrolled in the study. All patients were ASA III class, NYHA III class; their average age was 70 years; average mABP = 63.35 mmHg during CPB. All patients had periods of impaired CA. The mean longest impairment lasted 6.5 min. Average total duration of CA impairments was 25.98 min. (29.57 % of CPB). Though analysis within the study group revealed that mABP was not related with CA disorders individual study of mABP and CA impairments revealed that in 33 patients the limits of CA did not correspond to the currently known limits of the intact CA (Fig.1-2).

Conclusion(s): CA impairment episodes occur during cardiac surgery with CPB. Our results show that limits of mABP for intact CA vary individually.

Further research is needed to analyse the feasibility of non-invasive, continuous CA monitoring in cardiac surgery and possibilities to improve neurological outcomes after cardiac surgery.

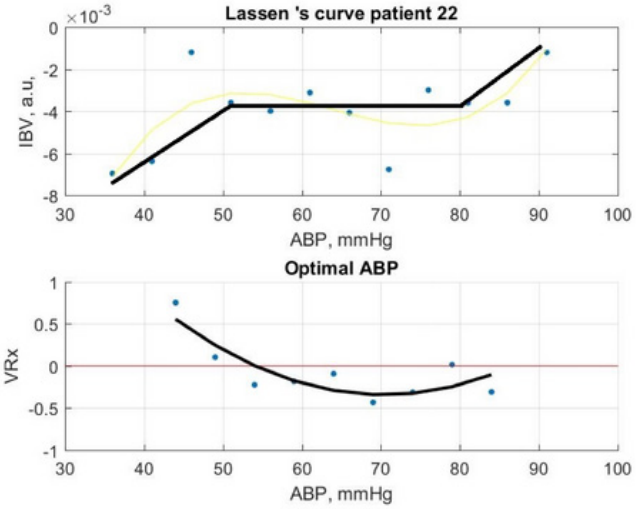

Fig.1

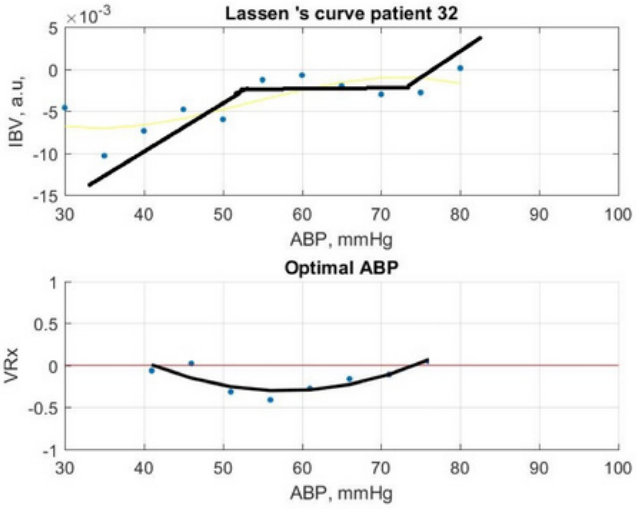

Fig.2

07AP05-06
Mitraclip placement in an adult with single ventricle, systemic-pulmonary fistula and severe single atrioventricular valve insufficiency

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Background: Patients with single ventricle malformation present a parallel supply of the pulmonary and systemic circuits. Values of pulmonary and systemic blood ratio (Qp/Qs) around 1 are needed for maintaining tissue perfusion and oxygenation[1].

Case Report: We present a 40-year-old woman with right single ventricle with transposition of the great vessels, ventricular septal defect and pulmonary atresia. At diagnosis, she underwent an atrioseptostomy and a right systemic-pulmonary fistula interventions. Later, she developed severe postcapillary pulmonary hypertension and despite medical treatment with sildenafil and ambrisentan she suffered a decompensated heart failure secondary to severe single atrioventricular valve insufficiency. Being not a candidate for cardiopulmonary transplantation, it was decided to Mitraclip implantation.
Advanced monitoring with invasive blood pressure, bispectral index, cerebral oximetry and central venous pressure, Edwards FloTrac monitor and 3D transesophageal echocardiography were established.
Lung protective ventilatory parameters were used. Inhaled nitric oxide as pulmonary vasodilator and vasopressin (4 UI/min) as a systemic vasopressor were used. Milrinone and an extracorporeal membrane oxygenation device were available in the operating room. Mitraclip implantation was successful without incidences.
Discussion: Oxygenation of this patient completely depends on the Qp/Qs at the systemic-pulmonary fistula. Therefore, maintaining adequate preload and avoiding myocardial depression are critical, as well as keeping or rising systemic vascular resistance and reducing pulmonary vascular resistance[1].
It is well established which drugs are appropriate for each goal. However, there is controversy in the use of vasopressin instead of α-drugs as systemic vasopressor[2].
References:
1. Magoon R, Makhija N, surendra K. Balancing a single-ventricle circulation: “physiology to therapy”. Indian J Thorac Cardiovasc Surg [Internet]. 2020 [consulted Feb 5 2022]; 36(2):159-162.
2. Raghavan VR, da Cruz EM, Kaufman J, Osorio Lujan S. International Survey on the Use of Arginine Vasopressin in the Postoperative Management of Single Ventricle Patients. Front Pediatr [Internet]. 2021 [consulted Feb 1 2022]; 9(669055).
Learning points: Values of Qp/Qs around 1 are needed to maintain tissue perfusion and oxygenation in single ventricle patients. Vasopressin as systemic vasopressor might be a right choice for this goal instead of α-drugs.

07AP05-07
Chronic disseminated intravascular coagulation associated with persistent aortic endoleak.

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Background: Disseminated intravascular coagulation (DIC) is a rare but life-threating complication of aortic endoleak following endovascular aneurysm repair. Most of the patients with aortic related DIC present mild or occult clinical manifestations. The main symptom is chronic thrombocytopenia but also secondary fibrinolysis. Some patients with aortic related DIC develop hemorrhagic diastasis, first detected when invasive procedures trigger a sudden difficulty in achieving hemostasis. The treatment must consider two strategies; surgical aortic repair and previous pharmacological treatment to halt the cycle of thrombus formation and destruction.
Case report: 85-year-old man who had undergone a TEVAR 8 years previously. He was refered to us with a new type Ia endoleak and a 7 cm aneurysm sac. He had progressive thrombocytopenia, platelet count 65 x 109(ref; 130–400 x 109/ L), fibrinogen of 0,68 (ref; 2–4 g/dl),D-Dimer 27784 (ref; 0-500 g/l),thromboelastometry graphic: CT extem 189 s, A10 extem 22 mm. A10 fibtem <3 mm.
Preoperative bemiparine (2500 U sc daily) and tranexamic ac. for 10 days resulted in an increase in platelets to 102 x109/L and fibrinogen to 1.8 g/dL.The patient was regarded eligible for surgery, endovascular reparation was performed after which DIC was resolved.
Discussion: Few cases of endoleak related DIC with normal liver function are published. One mechanism of DIC is that turbulent flow liberates coagulated material from the aortic sac leading to an activation of coagulation factors, excess generation of thrombin with simultaneous excess plasmin generation and fibrinolysis of the clots.
No specific recommendations for endoleak induced DIC are available, so we followed the recommended treatment for general DIC; low-molecular-weight- heparin (LMWH) and antifibrinolytic therapy (tranexamic. Ac). Prolonged follow up of platelet count, fibrinogen and D-dimer levels are necessary to ensure its resolution.
References:
Jeffrey J. Nienaberet al.”Operativeand nonoperative management of chronic disseminated intravascular coagulation due to persistent aortic endoleak” J Vasc Surg 2014; 59:1426-9
Learning points: Thrombocytopenia may be considered a risk factor for endoleak related DIC in patients with previous endovascular aortic repair.
LMWH and antifibrinolytic therapy before surgical repair may be useful to prevent intraoperative or spontaneous hemorrhagic diastasis.

07AP05-08
Flow-controlled ventilation improved gas exchange during one-lung ventilation: a randomised experimental cross over study

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Background and Goal of Study: Flow-controlled ventilation (FCV) is a new ventilation modality characterized by constant inspiratory and expiratory flow. While the beneficial effects of FCV on respiratory mechanics and gas exchange have been demonstrated, the feasibility of this modality in special conditions, such as one-lung ventilation is yet to be explored. We aimed at comparing the effects of FCV to pressure-regulated volume control ventilation (PRVC) on lung aeration, gas exchange and haemodynamics during one-lung ventilation (OLV).
Materials and Methods: Ten pigs (body weight: 45±0.5 kg) were anaesthetized and randomly assigned to be ventilated with FCV (Fraction of inspired oxygen (FiO_2): 0.5, Flow: 15 l/min, Fr: 30-35/min, peak inspiratory pressure (PIP) set to target a tidal volume of 7 ml/kg for whole lung and 5 ml/kg for one-lung ventilation, posi-

tive end-expiratory pressure (PEEP): 5 cmH_2O) or PRVC (FiO_2: 0.5, Fr: 30-35/min, Tidal volume: 7 ml/kg for whole lung and 5 ml/kg for one-lung ventilation, PEEP: 5 cmH_2O). Electrical impedance tomography (EIT), arterial partial pressure of oxygen (PaO_2), carbon dioxide ($PaCO_2$), central venous oxygen saturation (SvO_2), mean arterial pressure and cardiac output were determined at baseline and one hour after either FCV or PRVC applied during OLV obtained with an endotracheal blocker. The sequence was repeated in a cross-over design and a new set of data was collected.

Results and Discussion: OLV has led to a decrease in PaO_2 under both FCV and PRVC ($p<0.05$) while an increase of $PaCO_2$ was only noted under PRVC ($p<0.001$) compared to whole lung ventilation. EIT demonstrated significant ventilation redistribution by the increased aeration of dependent and non-dependent regions during OLV with both modalities ($p<0.05$ for all) in a similar manner, while PIP was significantly lower under FCV ($p<0.001$).

Ventilating one lung with FCV led to better gas exchange with higher PaO_2 and SvO_2 and lower $PaCO_2$ than with PRVC (170.6±15.8 vs 154.1±13.4 mmHg, 78.7± 5.0% vs 73.1±4.2% and 43.5±6.3 vs 52.6±11.7 mmHg, respectively $p<0.05$). Haemodynamic parameters remained constant with both ventilation modalities and under OLV.

Conclusions: Improved lung aeration and gas exchange was evidenced in FCV during one-lung ventilation at lower airway pressure than with PRVC. Our findings suggest that this new modality can be considered as a protective ventilation modality during one-lung ventilation.

07AP05-09
In Nordic countries 30-day mortality rate is half that estimated with EuroSCORE II in high-risk adult patients given aprotinin and undergoing mainly complex cardiac procedures

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Background and goal of study: European Medicines Agency (EMA)'s approval of aprotinin is restricted to patients at high-risk of major blood loss undergoing isolated coronary artery bypass graft surgery (iCABG). The study's goal was to report aprotinin's present use and safety endpoints, primarily mortality, in adult patients.

Materials and methods: Data came from 10 cardiac surgery centers in Sweden, Finland and Norway partaking in the European Nordic aprotinin patient registry (NAPaR), a non-interventional, post-authorization safety study (PASS) executed at EMA's demand. All patients agreed to participate. Treating physicians decided if aprotinin should be given.

Results and discussion: From 2016 to 2020, 489 patients (male: 72.8%; >75 years: 9.8%) were treated with aprotinin: 59 (12.1%, on-label) underwent iCABG and 430 (87.9%) another procedure, including a surgery for aortic dissection (n=81, 18.8%) and endocarditis (n=175, 35.8%). 437 patients (89.4%) received the full Hammersmith regimen and 37.2% had a previous heart operation. Dual antiplatelet treatment was present in 14.9% of all patients, in 72.9% of iCABG and in 7.4% of non-iCABG patients.

Preoperative renal impairment was present in 50.7% of patients and51.7% of surgeries were urgent, 17.0% emergent and 4.9% salvage. Mean/median bypass time was 159/148 min (range 25-637 min).Within 24h and 48h after surgery 2.5% [CI95%:1.1%-3.8%] and 4.9% [3.0%-6.8%] of patients were re-explorated for bleeding, respectively, and 0.6% patients had anaphylactic reactions due to aprotinin.

Rate of postoperative thromboembolic events, day 1 rise in creatinine >44μmol/L and new dialysis for any reason was 4.7% [2.8%-6.6%], 17.0% [13.6%-20.3%] and 14.3% [11.2%-17.4%], respectively. In-hospital mortality and 30-day mortality was 4.9% [2.8%-6.9%] and 6.3% [3.7%-7.8%] in all patients vs. mean EuroSCORE II (estimates 30-day mortality) 11.4% [8.4%-14.0%, $p<0.01$].

30-day mortality in patients undergoing surgery for aortic dissection and endocarditis was 6.2% [0.9%-11.4%] and 6.3% [2.7%-9.9%] vs. mean EuroSCORE II 13.4% [6.1%-21.0%, $p=0.11$] and 14.5% [12.1%-16.8%, $p=0.01$], respectively.

Conclusions: In patients given aprotinin at high risk of death and bleeding undergoing cardiac surgery, mainly complex procedures, 30-day mortality was significantly lower, with halved mortality rates vs. estimations by EuroSCORE II. NAPaR data from Nordic countries suggest a favorable safety profile of aprotinin in adult cardiac surgery.

07AP05-10
Reversal of immediate paraplegia after aortic surgery using cerebrospinal fluid drainage - a case report

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Background: Spinal cord damage (SCD) remains a persistent problem during aortic surgery. Effective prevention of this atrocious complication is of capital importance. Among the strategies proposed to prevent SCD, the placement of a cerebrospinal fluid drainage (CFD) is described. We report the case of a successful recovery from immediate paraplegia after Stanford Type A chronic aortic dissection repair using CFD.

Case report: 60-year-old man with history of Type A aortic dissection repaired using a supracoronary tube graft. He was diagnosed with chronic proximal and distal residual dissection with aneurysmal dilatation of the descending thoracic aorta and moderate aortic valve insufficiency. Aortic replacement surgery was performed according to the Frozen-Elephant-Trunk technique (ischemia time: 265').

During the immediate postoperative period, the patient developed paraplegia. A CT angiography showed permeability of the entire explored territory. Given the suspicion of post-surgical spinal cord ischemia, lumbar CFD was indicated, with complete resolution of the symptoms after 48 hours.

Discussion: Paraplegia is a feared complication during thoracoabdominal aortic surgery. The vulnerability of the spinal cord to ischemic injury because of aortic cross-clamping or sustained hypotension is related to its variable blood supply. The physiological basis

of strategies that protect the spinal cord, such as CFD, is to improve spinal cord perfusion pressure. Risk reduction with preemptive CFD has been shown[1]however there are scarce reports of reversal of paraplegia in the postoperative period[2,3].

In conclusion, although the evidence for CFD in treating spinal cord injury after aortic surgery remains controversial, the reversal of paraplegia in this patient shows that impaired spinal cord perfusion pressure can be favorably modified, provided treatment is begun expeditiously.

References:

1. Coselli JS et al. J Vasc Surg 35:631-639, 2002
2. Neema PK et al. J Cardiothorac Vasc Anesth. 2006
3. Shimura S et al. Interact Cardiovasc Thorac Surg. 2013

Learning points: Concerning the prevention and treatment of spinal cord damage, the role of CFD in the perioperative management of aortic surgery is yet to be defined with precision, as the debate about the adequate timing and exact indication is still open.

This case suggests that its use as a postoperative measure can be advantageous in treating aortic surgery related paraplegia.

07AP05-12
Nociception level index-guided antinociception versus standard care during remifentanil-propofol anesthesia for moderate-to-high risk cardiovascular surgery: a randomised controlled trial

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Background and goal of study: Patients at risk of hypotension may benefit from maintaining autonomic tonus by personalizing nociception-antinociception balance with the Nociception level (NOL) index (Medasense, Israel). Moderate-to-high risk cardiovascular surgery patients need tight blood pressure control during anesthesia.

We aimed to determine if personalizing remifentanil titration with the NOL index would decrease remifentanil requirements and improve hemodynamics during cardiovascular surgery.

Materials and methods: Moderate-to-high risk vascular or coronary artery bypass graft (CABG) surgery patients were randomized into two groups: NOL index-guided vs standard care remifentanil titration. All patients underwent remifentanil-propofol target controlled infusion anesthesia (Minto and Schnider models). In the NOL index group remifentanil was titrated to maintain the NOL between 10 and 25 while in the standard care group remifentanil titration was left to the discretion of the attending anesthetists.

For both, propofol titration was guided using the Bispectral index (Medtronic, Ireland). All patients benefited from goal-directed hemodynamic therapy (fluids for stroke volume variation 13 or under, norepinephrine for mean blood pressure within 20% of baseline).

The primary outcome was the amount of intraoperative remifentanil. Amounts of intraoperative medication as well as hemodynamic parameters were also investigated.

The study intervention took place in CABG patients until aortic cannulation while it was applied until the end of surgery in vascular surgery patients. Data was analyzed using Mann-U Whitney or Chi^2 tests.

Results and discussion: 48 patients were studied. Baseline characteristics were similar between groups. Patients in the NOL index group had significantly lower remifentanil infusions ($\mu g\ kg^{-1}min^{-1}$) mean±SD–median [IQR_{25}-IQR_{75}]: 0.105±0.028–0.1 [0.08-0.12] vs 0.132±0.03–0.13 [0.11-0.15], p=0.0034.

There was no difference in propofol, antihypertensive, or norepinephrine infusions. No difference was found for intraoperative hemodynamic parameters (heart rate, blood pressure, or cardiac output).

Conclusion: Personalizing antinociception with the NOL index during moderate-to-high risk cardiovascular surgery leads to reduced intraoperative remifentanil infusion. When coupled with a goal-directed hemodynamic protocol, no change in intraoperative hemodynamics occurs.

Acute and Chronic Pain Management and Palliative Medicine

08AP01-01
Acute pain management and perceptions among emergency healthcare workers: feedback from Greece

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Background and goal of study: Pain remains the most common reason patients seek assistance in emergency rooms, however the level of acute pain management during emergencies remains disturbing.
Materials and methods: A cross-sectional study was conducted using a structured anonymous questionnaire among a random sample of doctors working in different tertiary hospitals of Athens and of rural regions. The data were analyzed using descriptive statistics and statistical significance tests via R-Studio, version 1.4.1103.
Results and Discussion: 101 questionnaires were collected from the aforementioned sample. Results show suboptimal knowledge and attitudes regarding acute pain management among emergency healthcare providers in Greece.
The majority of responders are unaware of the term multimodal analgesia (52%), of newer pain treatment methods (59%), they have not attended pain management seminars (84%) nor are they aware of pain treatment protocols in their workplace (74%). Participants appeared to disregard successful pain relief due to time constraints (58%), while leaving certain parts of the population (children under 3 years of age-75%, pregnant women -48%) significantly undertreated in terms of analgesia.
Perceptions about placebo use for deciding whether pain allegations by patients are true and implying that distraction from pain is linearly associated with decreased pain intensity, are disturbingly popular. Demographic correlations showed that clinical experience and pain management education were associated with older and more experienced emergency healthcare workers. Specialties with a previous core training containing pain education showed better results in the majority of the questions.

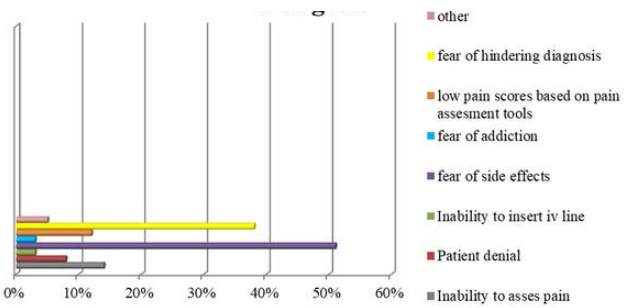

Figure. Reasons for not administering opiods as an analgesic

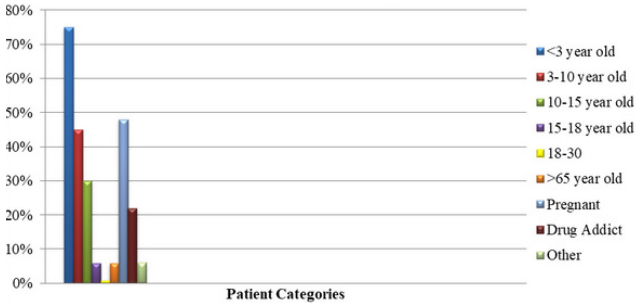

Figure. Patient subgroups that cause reluctance to administer analgesia

Conclusion(s): Educational programs/seminars along with standardized algorithms should be developed in order to cover existing needs and misconceptions.

08AP01-02
Impact of pain on the circadian rhythms of patients with chronic musculoskeletal pain

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Background and goal of study: Chronic musculoskeletal pain (CMP) has a direct impact on the quality of sleep that produces a decrease in the pain threshold, which makes it difficult to manage.[1,2] However, few researchers have evaluated the impact of CMP on the circadian rhythms.[3]
Goal of study: Study the impact of pain on the circadian rhythms of patients with CMP.
Materials and Methods: 50 patients referred consecutively with CMP.
Individual rest / activity, distal temperature and rhythms of light exposure were measured with a Kronowise device for 7 consecutive days and nights.
The study variables were: intensity and time of activity, position, light, temperature and time.
Results and discussion: Patients with CMP were exposed to a luminous intensity of 1.6 log10lux during the day with middle at 1:46 pm and in complete darkness at night (0,0 log10lux), middle at 3:57 am. During the day the acceleration reached 18.4 at 14:39 hours, and the time in movement reached 30.2 counts / min at 2:35 pm.The peripheral temperature reached a maximum value of 34.1 at 04:21 hour and a minimum of 31.6ºC at 13:29 hour. The integrated variable had a maximum of 0.5 at 14:28 hour and a minimum of 0.1 at 04:16 hour, while the sleep reached a maximum of 80% of probabilities of sleeping at 04:21 hours and a minimum of 0% at 14:33 hour.
Conclusion(s): Patients with CMP have a low light exposure during the day, compatible with a life indoors. In addition, they have low values of acceleration, moving time and variable integrated compat-

ible with a sedentary life. Finally, their temperature at night was low, which, together with the low values of inferred sleep, is compatible with a bad night's sleep.

References:

1. Frohnhofen H. Pain and sleep : A bidirectional relationship. Z Gerontol Geriatr. 2018 Dec;51(8):871-874.

2. Haack M et al. Sleep deficiency and chronic pain: potential underlying mechanisms and clinical implications. Neuropsychopharmacology. 2019 Jun 17.

3. Koffel E et al. The bidirectional relationship between sleep complaints and pain: analysis of data from a randomized trial. Health Psychol. 2016 Jan;35(1):41-9.

08AP01-03
Erector spinae plane block, a viable option for terminal patients with refractory liver metastasis pain

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Background: Erector Spinae Plane (ESP) block is simple and usually safe. It is used to deliver analgesia for surgical procedures in the thoracoabdominal areas as well as for the management of acute and chronic pain. Relative limitations to its use rely mostly on systemic disease, such as infection and coagulopathy[1].

Case report: A 44-year-old male, with a known history of asthma and smoking, was admitted to the emergency room with intense abdominal pain. Radiologic evaluation showed a 66mm mass at the right lung apex and multiple focal liver nodules. Hepatic metastization of lung cancer was assumed.

The patient was admitted to the intensive care unit due to uncontrolled pain and was started on transdermal fentanyl (25mcg/hour), dexamethasone (8mg/day), and morphine, 3mg as needed. Rapid progression to acute hepatorenal failure and coagulopathy were noted.

Nevertheless, the patient experienced severe right hypochondrium pain. With the patient's consent, an echo-guided ESP block was performed at T9 level, with 20mL 0,5% ropivacaine. Significant improvement was noted, with an NPRS (Numeric Pain Rating Scale) 2/10, 15min after block. After administration of prothrombin complex and discontinuation of thromboprophylaxis, a continuous right T8 ESP block was performed, and a patient-controlled analgesia pump with an intermittent bolus of 10mL 0,2% ropivacaine every 3 hours was started.

Significant relief (NPRS 2/10) was obtained, with benefits in sleep, nutrition, anxiety, and patient satisfaction. A few days after, the patient developed progressive multiorgan dysfunction, which culminated in death.

Discussion: Cancer pain is a difficult and complex condition to manage. ESP continuous block proved to be efficient for acute cancer pain management[2].

Hepatic or renal dysfunction limit analgesic options, due to the altered pharmacokinetics. In these cases, regional analgesia plays an important role and should be considered in palliative care patients.

References:

1.Cassai A et al. Erector spinae plane block: a systematic qualitative review.*Minerva anestesiologica*.2019;85(3):308-319.doi:10.23736/S0375-9393.18.13341-4

2.Forero M et al.The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain.*Regional anesthesia and pain medicine*.2016;41(5):621-627.doi:10.1097/AAP.0000000000000045

Learning points: Regional analgesia should be considered in palliative care

Erector spinae block is a good option for the management of metastatic liver pain.

08AP01-04
Intraoperative magnesium sulfate versus vitamin C for optimal acute postoperative pain management after elective major abdominal surgery

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Background and goal of study: Both magnesium sulfate and vitamin C are well known as adjuvant agents that support pain control, generally. Our double-blind prospective randomized controlled clinical trial was designed to compare the effect of intraoperative administration of magnesium sulfate versus vitamin C on the quality of acute pain management during first 24 h after elective major abdominal surgery.

Materials and methods: 73 patients (ASA I-III) candidates for elective major abdominal surgery under general anesthesia, were enrolled. They were randomly allocated to group M (n=38 patients), which received 50 mg/kg magnesium sulfate, and group C (n=35 patients), treated with 50 mg/kg vitamin C. Both magnesium sulfate and vitamin C were mixed with normal saline to obtain a volume of 100 ml. The prepared solutions of magnesium sulfate and vitamin C were intravenously infused to corresponding groups according to the same protocol, during first hour intraoperatively, starting immediately prior to initiation of surgical procedures. PCA was used for acute postoperative pain relief during first 24 h post-procedure.

Along our study period, we evaluated every 4 h pain severity at rest and during cough, using VAS and total morphine consumption, as primary endpoints.

The incidence of sedation as well as nausea/vomiting events were documented too, as secondary endpoints. Student's t test and chi square test were used for statistical analysis of our data and the level of significance was set at $p<0.05$.

Results and discussion: Postoperative pain scores at rest were significantly lower in group C compared to group M throughout the study ($p<0.002$). The analysis of pain scores during cough showed similar results ($p<0.001$), excepting the last two evaluations, at 20, respectively 24 h, for which the intergroup difference lost its statistical relevance, although a slight superiority of group C maintained.

Total morphine consumption was significantly reduced for group C versus group M ($p<0.05$). Patients in group C experienced statistically less sedation ($p<0.05$) and they had significantly lower incidence of nausea/vomiting compared to group M ($p<0.05$).

Conclusion(s): According to our findings, intraoperative intravenous infusion of vitamin C contributed to a better control of early postoperative pain by decreasing pain scores, reducing morphine consumption and mitigating the incidence of adverse events compared to magnesium sulfate after elective major abdominal surgery.

08AP01-05
JAK/STAT3 pathway regulates Th17 cell differentiation that contributes to bone cancer pain-depression comorbidity

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Background and Goal of Study: Bone cancer pain (BCP)-depression comorbidity has become a complex clinical problem during cancer treatment; however, its underlying molecular mechanisms have not been clarified. In this study, we focus on T helper 17 (Th17) cell, a subpopulation of CD4+T cells with high proinflammation, and showed implication of neuroinflammation to provide new insights into the comorbidity of BCP and depression.
Materials and Methods: A rat model of bone cancer pain was induced by intratibial inoculation of MRMT-1 breast carcinosarcoma cells. the changes of mechanical withdrawal threshold (MWT) were measured. Depression-related behavior changes were tested by the forced swimming test (FST) and sucrose preference test (SPT). For the interventional study, a lentivirus-shRNA targeting RORγt or empty lentivirus was administered by stereotaxic injection to rat's amygdala.
In addition, STAT3 agonist and antagonist were administered intraperitoneally to rats. Then RT-qPCR and Western Blot were used to detect the expression level of the main changed genes and activated pathway proteins. immunofluorescence and co-immunoprecipitation (Co-IP) were used to detect colocalization of proteins and protein-protein interaction.
Results and Discussion: To clarify the role of Th17 cells in BCP-depression comorbidity, the shRNA lentivirus targeting RORγt, the specific transcription factor of Th17 cells, were delivered to the amygdala. We found that the MWT, FST, and SPT can be alleviated by RORγt knockdown accompanied by the decrease of microglia activation (Fig.1A).

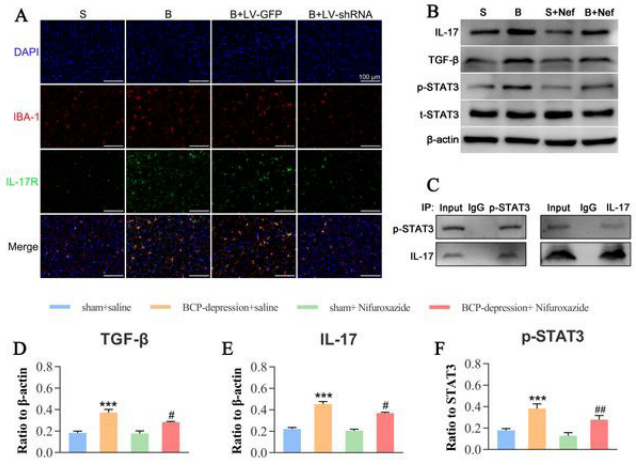

Fig 1.

To further explore the function of the JAK/STAT3 pathway, inhibitors of STAT3 were intrathecally injected. Western Blot showed that inhibitors can significantly reduce the phosphorylation of STAT3, decrease the differentiation of Th17 cells (Fig.1B, D-F), and attenuate pain and depressive behavior. Co-IP assay suggested an interaction of p-STAT3 and IL-17 proteins（Fig.1C）.
Conclusion: JAK/STAT3 pathway mediates Th17 cell differentiation in theamygdala contributes to the development of BCP-depression comorbidity.

08AP01-06
The use of the NSS-2 BRIDGE Device® as an alternative to opioids in cancer patients undergoing abdominal surgery

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Background: NSS-2 BRIDGE Device (NBD®, Innovative Health Solutions, Versailles, IN, USA) is an auricular percutaneous electrical nerve field stimulator, small, battery-operated, disposable, and stimulates nerves present in the ear for 5 days. It is FDA approved for the treatment of withdrawal symptoms which include abdominal pain. This makes NBD® potentially interesting to control postoperative pain following abdominal surgery. The study was designed to assess the role that NBD® may have in minimizing postoperative opioid requirement and the factors affecting its response in patients with cancer undergoing abdominal surgery.
Materials and Methods: This was a single-center, prospective, randomized, double-blind, placebo-controlled trial conducted at the University of Pittsburgh Medical Center. The protocol was approved by the Institutional Review Board for the University of Pittsburgh Human Resources Protection Office and was registered to Clinicaltrials.gov before any eligible patients were approached and consented (STUDY19040260, NCT03555266).
Primary endpoint was the total postoperative opioid consumption (OME) over 5-days (n=53). Data are reported as mean ± SD. Differences between groups were assessed using a one-tail unpaired t-test. Alpha was set up as 0.1.
Results: The use of NBD® resulted in a 26% overall reduction in OME in the absence of a difference in pain . This was the result of a 6% reduction in OME in the laparoscopic procedure group and a 39% reduction in the open surgical procedure group associated with a 25% reduction in pain. NBD® effects on the overall opioid requirement were 56% greater in the elderly (n=12) compared to younger patients (n=14). The effects of NBD® on opioid requirement was similar in males (n=16) vs females (n=10): 92 ± 112 OME mg vs 102 ± 85 OME mg, respectively (p=0.4313).
Discussion: The effectiveness of NBD® is greater in patients undergoing open vs laparoscopic surgery, and in elderly vs young patients. This confirms data reported by Blank et al in patients undergoing colorectal surgery .
Conclusion: Our study suggests that the use of NBD® may represent an effective alternative to control postoperative pain and opioid consumption However, additional randomized placebo controlled studies are required to confirm the role that NBD® may play in patients undergoing surgery.
References:
1. Blank JJ, Liu Y, Yin Z, et al. Dis Colon Rectum; 2020;64:225-33

08AP01-07
40 years of finger pain – misdiagnosed glomus tumor - a case presentation

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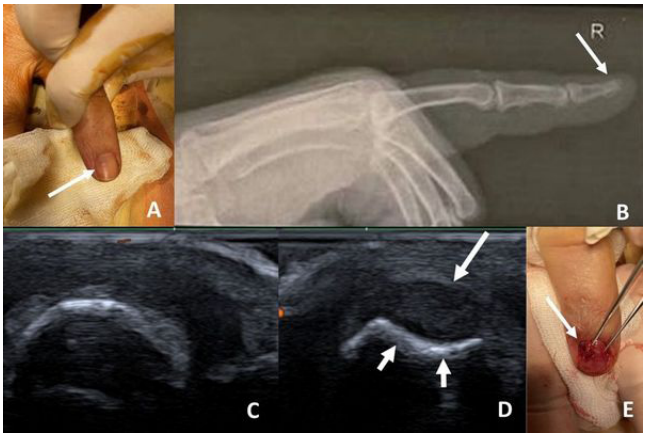
Background: Glomus tumors (GT) are benign and uncommon mesenchymal neoplasms, presenting >2% of all soft tissue tumors, with often hand subungual location (75%). Usually managed by hand and plastic surgeons, these patients may however, present a puzzle for other specialists.
Case report: A 58-yo right-handed woman presented at pain clinic with severe shooting/burning pain in the right index finger, accompanied by ipsilateral forearm and shoulder paresthesia, and provoked by knitting strokes. No history of finger trauma reported. The same symptoms appeared during patient's hand exposure to cold weather. This symptoms pattern persisted >40 years, and was unsuccessfully managed by different specialists (medication for several syndromes including Reynaud and neuroma).Upon examination, the described pain pattern was reproduced by strokes over the pulp, nail pressure, ice application, hand down position. No allodynia, hyperalgesia, or hypoesthesia were detected. The pain relief was quasi-instant while raising and holding the arm up. Locally, a small zone of nail deformation was noted (A).



The x-ray found a mild scalloping of dorsum of distal phalanx (B), the sonography showed a 4x5mm solitary hypoechoic, less vascularized lesion, with adjacent bone defect (C&D). All these findings clearly suggested the diagnosis of GT. The patient was referred to a hand surgeon, who successfully removed this neoplasm (E), confirmed as a GT histologically. After an uneventful postsurgery course all pain symptoms disappeared.
Discussion: Although rare, hand GTs are more frequent in mid-age women. Distal phalanx of dominant hand index, local nail changes, positive Love's pin and Hildteth's signs, inefficient analgesic treatment, imaging confirmation allow the successful managing of GT with complete recovery.
References:
1. Chou T, Ann Plast Surg. 2016
2. Glazebrook K, Skeletal Radiol. 2011

Learning points:
Isolated pain with noninflammatory features in a distal phalanx may suspect a GT.
Phalanx GT is confirmed by specific clinical tests and radiological examinations.
Sonography is sensitive and specific to confirm the diagnosis of GT.
Simple surgical excision is a gold standard of treatment.

08AP01-10
A prospective cohort study to evaluate discharge opioid prescriptions for elective general surgical patients at an NHS tertiary centre in the UK

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Background and goal of study: Opioids are used to treat acute post-surgical pain. There are concerns about the risks associated with opioid use and appreciation of the need for safe prescribing to limit the risk of persistent post-discharge opioid use. Key aspects are to avoid prescribing opioids at discharge where possible and to include a de-escalation strategy if an opioid is needed.
We reviewed the opioid prescriptions of general surgical patients on admission and discharge, and evaluated use of documented de-escalation strategies. This work informs a service improvement programme in development in our hospital and region.
Materials and methods: This is a prospective cohort study of patients undergoing elective general surgery in one UK centre between March 2021 and January 2022, who were also taking part in another study on perioperative outcomes. Electronic GP and hospital records were used to review admission and discharge opioid prescriptions. The presence of de-escalation strategies were recorded. Data were analysed using Microsoft Excel.
Results and discussion: On admission 59/340 (17%) patients had a current opioid prescription. 101/340 (30%) patients were discharged with a new opioid prescription. Overall, 149/340 (44%) patients had an opioid prescription on discharge, of which 40 (27%) had a documented de-escalation strategy. 27 (18%) had the intended duration recorded for all opioids on the discharge prescription. Table 1 shows further admission and discharge prescriptions.

Admission or discharge prescription opioids	Number of patients (%)
No admission or discharge opioid	180 (53)
Admission and discharge opioid	48 (14)
Opioid on admission but not on discharge	11 (3)

Table 1.

Almost 1 in 5 patients were admitted with an opioid. Only 1 in 4 discharged with an opioid had a de-escalation plan. The need for 'universal precautions' and improved safety when prescribing perioperative opioids have been suggested, including use of electronic systems to embed algorithms and prompts for clinicians[1].
Conclusion(s): Patients undergoing elective general surgery are admitted and discharged on opioids. A systematic clinical strategy is needed to ensure appropriate prescribing and de-escalation. Electronic records and prescribing aids may be a solution.

References:
1. Macintrye P, Huxtable C, Flint S et al. Costs and consequences: A review of Discharge Opioid Prescribing for ongoing Management of Acute Pain. *Anaesthesia and intensive Care*2014; **42**: 558-74

08AP01-11
Impact of a sleep intervention program on reducing drug consumption in patients with chronic musculoskeletal pain (CMD)

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Background and Goal of Study: Chronic musculoskeletal pain (CMD) has a direct impact on the quality of sleep. This deterioration produces a decrease in the pain threshold. We present the data of a pilot study registered in the NCT:03646084.
The goal of this study is the assessment of the decrease in the opioid consumption through the management of sleep disorders in patients with CMD.
Materials and Methods: 50 patients with CMD (from January 2018 to December 2019) were recruited. Subjects were randomly assigned to receive the intervention (SCIP, 22 patients) or not (non-SCIP, 28 patients).
The intervention consists of Sleep and Circadian intervention program. The primary endpoint was the difference in the decrease of opioid consumption between both groups. Pain characteristics and medical history were collected. Analgesic drugs were classified by groups according to the WHO scale.
Anthropometric measures, analytical, vital signs, chronobiological (Kronowise) variables and quality of life (SF36; EQ 5D 5L) anxiety and depression (HADS) questionnaires, were measured at the baseline visit and after 6 months.
Subjects in the SCIP group underwent polysomnography and assessment of other sleep disorders using questionnaires (Epworth; Pittsburgh; ISI; FOSQ). Chi square test was used to analyze the data.
Results and Discussion: The demographic characteristics of the participants are described in Table 1. There seems to be a decrease in the use of analgesic medication. A statistically significant reduction in adjuvant medication was observed (Table 2).

	SCIP	No SCIP
Age	49.7	53.4
Gender (women)	6 (37.5%)	16 (64%)
High blood pressure	5 (31.3%)	4 (16%)
Mixed anxiety-depressive disorder	6 (37.5%)	5 (20%)
Prior sleep disorder	2 (12.5%)	3 (12%)
Active smoking	6 (37.5%)	8 (32%)
BMI	28	26.8

Table 1. Demographic characteristics of subjects

	% of drugs use reduction		
Pharmacological group	SCIP	Non SCIP	P
Non-opioid analgesics	37.5%	20%	(>0.05)
Weak opioids	31.3%	20%	(>0.05)
Strong opioids	25%	20%	(>0.05)
Adyuvant medication	43.8%	12%	(0.03)

Table 2. Differences of drugs use reduction in the different groups after the therapeutic intervention.

The proportion of patients who reduced the dose of opioids in the SCIP group was 50% (8/16) and in the Non-SCIP group, it was 32% (8 /25) with a difference of 18% (p>0.05). Extrapolating the data from the study, 112 patients per group would be necessary to achieve statistical significance.
Conclusions: Despite being a pilot study, it may therefore be concluded that the intervention in sleep pathology decreases the consumption of adjuvant medication in the treatment of chronic pain. In addition, there seems to be a reduction in the use of analgesics, which will have to be studied in the future with a larger sample.

08AP01-12
Chronic pain and patient reported outcomes in inguinal hernia surgery

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Background and Goal of Study: Annually, 20 million inguinal hernia repairs are performed worldwide. Surgical treatment is successful in the majority of cases. However, 10-12% of the patients after inguinal hernia repair develop chronic pain [1].
This has a negative impact on quality of life and daily activities. Debate persists on the incidence and evolution of chronic pain after inguinal hernia repair. Patient-Reported-Outcomes Measures (PROMs) are believed to have a growing significant meaning in inguinal hernia management.
The aim of the PRO-ING (Patient-Reported-Outcomes in INGuinal hernia repair) Study was to study the evolution of chronic pain and patient-reported-outcomes after inguinal hernia surgery.
Materials and Methods: A multicenter, prospective cohort study was conducted in five hospitals in The Netherlands. All male patients undergoing elective primary inguinal hernia repair were eligible for inclusion.
Follow-up was conducted at 6 weeks, 3 months, 6 months and 1 year after inguinal hernia repair. Besides Numeric Rating scale (NRS), numerous PROMs were collected, such as Douleur Neuropathique 4, Patient-Reported Outcomes Measurement Information System Physical Function, and Carolinas Comfort Scale.
Results and Discussion: 458 patients were enrolled in the PRO-ING Study. Median pre-operative NRS was 3 (range 0 – 10). Median post-operative NRS-score was 0 (range 0 – 7) at three months follow-up, of which 17 patients had a NRS-score of at least 4. Median post-operative NRS-score was 0 (range 0 – 9) at one year follow-up, of which 15 patients had a NRS-score of at least 4.

The NRS-score at three months follow-up had no effect on the NRS-score at one year follow-up ($p = 0.39$). Chronic pain had significant influence on the patient-reported-outcomes.

Conclusion(s): The PRO-ING Study showed that the incidence of chronic pain is lower than previously reported in literature. However, those patients suffering from chronic pain, showed decreased patient-reported-outcomes and impairments in daily live.

References:

1. HerniaSurge Group. International guidelines for groin hernia management. Hernia. 2018 Feb;22(1):1-165

Acknowledgements: We are greatfull to all participants of the PRO-ING Study.

08AP01-14
Pro-atherogenic cytokine release in a model of chronic neuropathic pain in ApoE$^{-/-}$mice

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Background and goal of study: In Europe, one in five people suffer from chronic pain, a condition linked to an inflammatory response (1). Inflammation in turn is known to drive atherosclerosis.

The aim of this study was to test if pain promotes atherosclerosis. To investigate the effects, we evaluated whether the murine spared nerve injury (SNI) model, a neuropathic pain model, promotes long-term hypersensitivity in apolipoprotein E (ApoE) knock-out mice. In addition, we explored the influence of SNI on an array including pro- and anti-atherogenic plasma cytokines to shed light on mechanisms that are crucial for the interplay of chronic neuropathic pain and atherosclerosis.

Materials and methods: SNI of the sciatic nerve, approved by our local animal welfare committee, was induced in ApoE$^{-/-}$mice fed with a atherogenic diet and compared to a sham surgery group as well as wildtype (WT) and ApoE$^{-/-}$mice without intervention. Hypersensitivity thresholds were quantified over 10 weeks by testing thermal and mechanical withdrawal reflexes and by using a gait analysis (CatWalk XT, Nodlus).

At the end of the behavioural assessments, a semi-quantitative analysis of serum cytokine levels (Proteom Profiler, R&D Systems) was performed. Appropriate statistics were calculated, considering $p < 0.05$ as significant.

Results and discussion: A comparison of WT and ApoE$^{-/-}$mice confirmed that the thermal sensitivity was impaired by a lack of ApoE(2). However, mechanical responses remained intact. SNI, applied to atherosclerosis-prone ApoE$^{-/-}$mice on atherogenic diet, provoked a decrease in thermal ($p<0.0001$) and mechanical ($p<0.0001$) withdrawal thresholds throughout the 10-weeks experiment while sham groups were only for the first weeks ($n = 42$).

In addition, significant limping was overserved in the SNI operated mice by gait analysis. A semi-quantitative serum cytokine array revealed that SNI promoted a proatherogenic cytokine profile. Out of 111 tested cytokines the expression of ten mainly pro-atherogenic cytokines was altered significantly.

Conclusion: ApoE-ko out impacted on noxious thermal signal transduction while mechanosensation remained intact. In a model of chronic neuropathic pain, thermal hypersensitivity was restored. Long-term hypersensitivity induced by SNI promoted the release of proatherogenic cytokines that might promote atherosclerosis.

References:

1. Noh MC, et al. Neuroscience. 2020;428:199-216.
2. Fullerton, SM et al. EXP. NEUROL. 1998;153.

08AP02-01
Efficacy of high-volume low-concentration intraperitoneal bupivacaine irrigation for post-operative analgesia in patients undergoing laparoscopic cholecystectomy

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Background:

- Most studies used low-volume (20ml-100ml), high-concentration (0.125%-0.5%) bupivacaine for irrigation of peritoneal cavity, less effective
- Low concentration (0.02%), high volume (500 ml) bupivacaine is more effective

Goal: Efficacy of high-volume low-concentration bupivacaine for post-operative analgesia

Materials and Methods:

1. Group B (N=15) - 20 ml 0.5% (100 mg) bupivacaine + 480 ml normal saline
2. Group S (N=15) - 500 ml normal saline

- Irrigation fluid as per group allocation
- Surgical bed and peritoneal cavity irrigated with remaining fluid after gall bladder extraction
- Right Trendelenburg position for 5min to facilitate dispersion
- Irrigation fluid aspirated

PRIMARY OUTCOME

- Duration Of Analgesia (DOA)

SECONDARY OUTCOME

- NRS immediately after extubation, at 15min,30min, 1h, 2h, 4h, 8h, 12h and 24h
- Total dose of rescue analgesic in 24h
- PONV and shoulder pain

Pain Management

INTRA-OPERATIVE

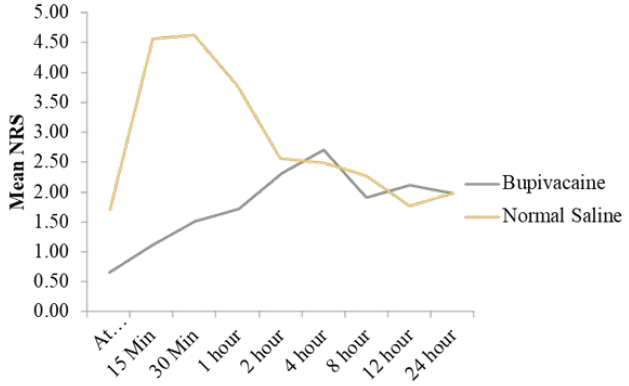
- fentanyl 0.5mg/kg iv (if required) and diclofenac 1.5 mg/kg iv (every patient) 30min before completion

POST-OPERATIVE

- Diclofenac 1.5 mg/kg iv as 1st rescue analgesic whenever NRS >3 or on demand
- 2ndrescue analgesic i.e. tramadol 2 mg/kg iv, if pain not relieved within 30min of 1strescue
- Diclofenac not given within 6h of last dose which every patient received half hour before completion and total dose never exceeded 150 mg in 24h.

Results and Discussion:

	Bupivacaine		Normal Saline		p-value
	mean ± sd	Median (range)	mean ± sd	Median (range)	
Duration of analgesia (h)	6.45 ± 5.57	6 (0.15-24)	3.18±4.21	0.3 (0.15-12)	0.044



Post-operative	Bupivacaine		Normal Saline		p-value
	n	%	n	%	
Nausea Vomiting	1	6.67%	1	7.14%	0.480
Shoulder pain	3	20.00%	2	14.29%	0.342

Cumulative requirement of rescue analgesic (mg)	Bupivacaine		Normal Saline		p-value
	mean	±sd	mean	±sd	
Diclofenac	40.91	±39.17	56.25	±33.92	0.163
Tramadol	30.00	±52.78	83.57	±66.75	0.012

Conclusion(s): Irrigation of peritoneal cavity with high volume low concentration bupivacaine increases DOA, decreases analgesic requirement in postop; lower PONV and shoulder pain incidence.

08AP02-02
The effect of ultrasound-guided fascia iliac compartment block using different dose of nalbuphine and ropivacaine on preoperative analgesia in hip fracture: a multicenter, triple-blided, randomized, controlled trial

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Background and goal of study: Pain management after hip fracture is challenging, and good preoperative analgesia worthy of our attention. Ultrasound-guided fascia iliac compartment block (UGFICB) with ropivacaine relieve pain in clinical, but the analgesia duration can't cover the time from admission to operation. Nalbuphine as an adjuvant can prolong analgesia of localanesthetic.
The aim of this study was to investigate the effect of UGFICB with ropivacaine and different dose of nalbuphine on preoperative analgesia.
Materials and methods: This is a multicenter, Triple-blind, controlled, randomized trial. 280 patients were randomly divided into four groups (n=70): Roppivacaine group (R group): UGFICB with 30ml 0.1% ropivacaine and 2ml 0.9% normal saline; Ropivacaine and low dose nalbuphine group (R+LN group): UGFICB with 30ml 0.1% ropivacaine and 5mg (2ml 0.25%) nalbuphine; Ropivacaine and medium dose nalbuphine group (R+MN group): UGFICB with 30ml 0.1% ropivacaine and 10mg (2ml 0.5%) nalbuphine; Ropivacaine and high dose nalbuphine group (R+HM group): UGFICB with 30ml 0.1% ropivacaine and 20mg (2ml 1%) nalbuphine.
The primary outcomes were Passive Visual Analogue Scale (PVAS), duration of analgesia, sensory block area. Secondary outcomes were vital signs, side effects, sedation scores.
Results and discussion: PVAS in R+LN、R+MN and R+HN groups were statistically lower than R group after block for 6h, 7h, 8h, and 9h*(P<0.05)*.
Additionally, compared with R group, the analgesic duration significantly prolonged, the block area were larger in R+LN、R+MN and R+HN groups*(P<0.05)*, and there was a dose-dependent analgesia duration and sensory block area. There were no differences in vital signs and score of sedation between four groups*(P>0.05)*.
Conclusion(s): The results of this study suggest that5mg, 10mg and 20mgnalbuphine adding to ropivacaine prolong the analgesia duration, amplify sensory block area of UGFICB with ropivacaine alone without obvious side effects, and 20mg nalbuphine with ropivacaine have the longest duration of analgesia and the largest block area.

08AP02-03
Deficits in perioperative analgesic concepts and pain-related patient-reported outcomes after paediatric surgery

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Background and goals: Pain after paediatric surgery is often undertreated. Benchmarking of hospitals using data from routine clinical practice can identify possible deficits in perioperative pain management and ways to address them.
Methods: Analysis of registry data derived from PAIN OUT infant. After ethics approval and parents'/ patients' written informed consent, 898 children (>4 years) undergoing appendectomy or tonsillectomy were enrolled in 11 European hospitals. They filled in a standardized questionnaire on patient-reported outcomes (PROs) 24 hours after surgery (**N**umeric **R**ating**S**cale; yes/no answers).
According to a composite measure of PROs, including pain intensity and pain-related interference, hospitals with favourable results were allocated to group I, with moderate results to group II, and with unfavourable results to group III. Benchmarking of hospital groups looked at variables potentially associated with PROs: 24-hour doses of nonopioid analgesics and opioids, side effects, the intraoperative administration of dexamethasone, as well as children's perception of care. Statistics: χ^2 test, ANOVA, regression analysis with hospital groups depending on PRO measures as dependent variable.
Results and discussion: Based on their PRO scores, 3 hospitals were allocated to group I (PRO score 4.5 (4.2-4.7)), 3 to group II (5.2 (4.9-5.4)) and 5 to group III (5.7 (5.4-5.9)). Preventive loading doses of nonopioid analgesics were given before the end of surgery to 89.9% in group I and 74.7% in group III ($p<0.001$).
During the first 24 hours after surgery, 1.2 (1.1-1.3) full daily doses of nonopioid analgesics (NSAIDs, acetaminophen, dipyrone) were administered in group I and 0.6 (0.6-0.7) in group III ($p<0.001$) in the recovery room and on the ward.
Frequently, doses of nonopioid analgesics were low, particularly for rectal acetaminophen. In group I, side effects and the desire for more analgesics were least frequent and postoperative morphine equivalents were lowest (42.9 (35.4-51.4) μg/kg) compared to group III (87.2 (51.2-83.2) μg/kg; $p<0.001$). Intraoperative dexamethasone was administered to 80% versus 50% of children in groups I and III ($p<0.001$).
Conclusions: The results indicate substantial deficits in analgesic concepts in hospitals with unfavourable PRO measures. Timely administration of adequate analgesic doses could easily be introduced into daily clinical practice.

08AP02-04
Acute postoperative pain after a modification of multimodal analgesia protocol

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Background and goal of study: Perioperative pain management is a challenging process after orthopaedic surgery and it is essential for faster patient recovery and overall medical experience. A multimodal analgetic approach uses a combination of different classes of analgesic and non-analgesic procedures – neuraxial, regional and local techniques - to minimize the use of opioids.
The scientific goal of this study was to analyse postoperative pain in the years between 2018 and 2021 after a modification of multimodal analgesia protocol.
Materials and methods: A retrospective cross-sectional study of patients who underwent different orthopaedic surgical procedures. Pain intensity was evaluated using a Visual Analogue Scale (VAS) which was performed by anesthesiology residents.
All patients received a multimodal perioperative approach and were asked about their pain four times a day. Pain intensity was categorized as 0-3.9 for mild pain, 4-6.9 for moderate pain, 7-10 for severe pain. Patients were categorized according to the type of surgery.
Results and discussion: A total of 376 patients were included. Analysing the average pain on the surgery day, 228 patients (60.6%) felt mild pain, 125 patients (33.2%) felt moderate pain and only 23 patients (6.1%) felt severe pain, and on the second day, 216 patients (57.4%) felt mild pain, 129 patients (34.3%) felt moderate pain and 31 patients (8.2%) felt severe pain.
Mostly mild postoperative pain on the first day was experienced by 73.2% of patients after rotator surgery and 72,1%after hip replacement, although the most severe pain on the first day was after knee replacement surgery by 18.6%. On the second day, 85% of patients had the mildest mean pain after hip replacement and 16,9% had the most severe mean pain after knee replacement.
Conclusion(s): The results show that people still experience a great deal of pain after surgery. On the positive side, mostly mild pain. An interesting point is that moderate and severe pain increased on the second day.

08AP02-05
The role of aromatherapy in the perioperative managment of patients with moderate anxiety undergoing primary hip replacement

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Background: Preoperatiove mood disorders have been established to affect significnatly recovery from surgery. Evidence supports the concept that Lavender in combination with Peppermint is effective in reducing anxiety [2].
indicating that the use of Aromatherapy was associated with a 50% decrease in opioid requirement.
Materials and methods: This study (IRB #20100091, NCT 04800744) was conducted in patients undergoing a primary unilateral total hip replacement. After signing an informed consent, each patient was

asked to complete a PROMIS Emotional Distress – Anxiety – Short Form 8a. If they scores ≥ 57.4 they were randiomized to either an active Aromatherapy treatment (Lavender+ Pepermint aromatab, Elequil®, Beekley Medical, USA) or a placebo Aromatherapy treatment (Almond aromatab, Elequil®, Beekley Medical, USA) for 72 hiours.

The primary end point was postoperative opioid consumption (Oral morphine equivalent, OME in mg). The patients were contacted via Redcap at 24 hours, 48 hours, and 7 days post-operative and asked to complete PROMIS anxiety, pain interference, and report pain scores.

Results: The anxiety score at baseline were similar in both groups (62.22 ± 4.39 (n=12) vs 60.8 ± 2.84 (n=17) in the treatment vs placebo group, respectively). On postoperative day 2, the Anxiety scores were 52.95 ± 7.85 vs 49.44 ± 7.78 in the treatment vs placebo group, respectively.

Concomitantly, the total opioid consumption over the first 2 postoperative days was 24.754 ± 19.3 OME in the Placebo group vs 12.0 ± 9.59 in the treatment group.

Discussion: Our data indicate that the use of Aromatherapy was associated with a 50% decrease in postoperative opioid requirement.

Conclusion: Aromatherapy is an effective technique to reduce requirement.in patients with moderate anxiety.

References:

1. Kim M, Nam ES, Lee Y, Kang HJ. Asian Nurs Res (Korean Soc Nurs Sci). 2021 Nov 11:S1976-1317(21)00077-3. doi: 10.1016/j.anr.2021.11.001.

2. Jones T, Purdy M, Stewart EA, et al. Glob Adv Health Med. 2021 Nov 17;10:21649561211059074. doi: 10.1177/21649561211059074.

3. Larach DB, Sahara MJ, As-Sanie S, et al. Ann Surg. 2021 Mar 1;273(3):507-515

08AP02-06
Cannabinoid cream as an alternative to celecoxib intolerance for the treatmernt of hip pain

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Background: Cannabis has been suggested as an alternativefor to the treatment of pain. Cannabis contains two major active ingredients, delta-9- tetrahydrocannabinol (THC) which is hallucinogenic and cannabinoids (CBD) with only medicinal properties. CBD has been shown to be inetresting to treat inflammation, seizure, and anxiety, but most CBD studies were conducted using oral or intramuscular adminsitration. In 2002, Eskander et al reported 2 cases in which CBD was applied as a cream in patients with chronic back pain and suggested that CBD cream may have antinociceptive and anti-inflammatory properties.

Case report: This case report illustrates the role that pure CBD cream may play in the treatment of pain associated with arthritis and/or trauma in a patient who developed a serious reaction to celecoxib.

Pure CBD 4% cream from a preparation containing 2000 mg was applied (Purform, USA) was applied twice a day on the skin surrounding the right hip of a woman 70 year old, weighing 244 pounds, for right hip pain starting 8 months ago and rated at 6 on a scale 0 (no pain) to 10 (worst possible pain). The patient's medical history included hypertension requiring triple therapy (hydrochlorothiazide 25 mg once a day, metoprolol 50 mg twice a day and ramipril 10 mg once a day). Prior to the use of CBD, the patient was prescribed celecoxib 200 mg twice a day for 3 month, but was required to stop it because of the development of a skin rash with blistering at the level of her right big toe that rapidly extended to the other toes. Following the CBD application for 3 days, the right hip pain decreased from 6 to 2. The patient didn't experience any local or systemic side effects related to the use of the CBD cream.

Discussion: We chose to use pure Citrus CBD cream to eliminate the risk that the effects recorded were in part due to THC contamination. Currently, it is also possible to obtain pure CBD from Canabis.

Conclusion: CBD cream may represent an alternative to oral analgesics for the treatment of local musculoskeletal pain. However, appropriate randomized, placebo-controlled studies need to be conducted to confirm this concept.

References:

1. Eskander JP, Spall J, Spall A, etal. J Opioid Manag. 2020 ;16: 215-18earning points: Using CBD cream as an alternative to analgesic

Learning points: CBD cream may represent an alternative to the use of oral anti-inflammatory.

08AP02-07
Intravenous lidocaine infusion vs thoracic epidural analgesia in cytoreductive surgery with or without heated intraperitoneal chemotherapy. An observational retrospective study

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Background and Goal of Study: Intravenous (IV) lidocaine infusion has been demonstrated an adequate analgesia in different surgeries. However, in extensive abdominal surgery such as cytoreductive surgery has not been evaluated yet.

Our aim was to evaluate the effectiveness of IV lidocaine infusion in this setting

Materials and Methods: After IRB approval (protocol number 21/85), a retrospective observational study in adult patients undergoing cytoreductive surgery in a tertiary referral center from March 2017 until April 2020 was performed.

All patients received general combined anesthesia, which included thoracic epidural analgesia (TEA). Those patients unwilling or unable to receive TEA, perioperative IV lidocaine infusion at 1.5 mg/Kg/h was administered during the first 48 postoperative hours.

Primary outcomes were the assessment of acute pain management through numeric rate scale (NRS) values and IV morphine consumption in the first 48 postoperative hours.

Secondary outcomes were NRS values and IV or epidural opioids consumption in the 5 postoperative days, perioperative complications (medical and surgical), complications related to analgesic technique, postoperative nausea and vomiting (PONV) and length in hospital stay.

Results and Discussion: Forty patients were included, 19 received IV lidocaine infusion (lidocaine group) and 21 patients TEA (TEA group). The median pain score for the whole 2-day and 5-day periods were not statistically significant. IV morphine consumption for breakthrough pain was very low and equal between the two groups despite the lack of epidural fentanyl in the lidocaine group.

The incidence of postoperative complications was similar, except for nausea and vomiting, being higher in the TEA group (76.2% vs 26.3%; p=0.002). No statistically significant difference was found in length of in-hospital stay

Conclusions: Intravenous lidocaine infusion may be an effective analgesic approach when the thoracic epidural analgesia is not possible in cytoreductive surgery.

References: 1. Sun Y, Li T, Wang N, Yun Y, Gan T. Perioperative systemic lidocaine for postoperative analgesia and recovery after abdominal surgery: a meta-analysis of randomized controlled trials. Dis Colon Rectum. 2012; 55(11):1183-94; 2. Weibel, S., Jelting, Y., Pace, N. L., et al (2018b). Continuous intravenous perioperative lidocaine infusion for postoperative pain and recovery in adults. The Cochrane Library, 2018(6).

08AP02-08
Impact of intraoperative phrenic nerve infiltration on postoperative ipsilateral shoulder pain following thoracic surgeries: a systematic review and meta-analysis of randomized controlled studies

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Background: This meta-analysis aimed at investigating the effectiveness and safety of phrenic nerve infiltration (PNI) against post-thoracic ipsilateral shoulder pain (ISP).

Materials and Methods: MEDLINE, Google Scholar, Cochrane Library, and EMBASE databases were searched from inception through December, 2021, for randomized controlled trials (RCTs) comparing the incidence of ISP with or without PNI in adult patients undergoing thoracic surgery.

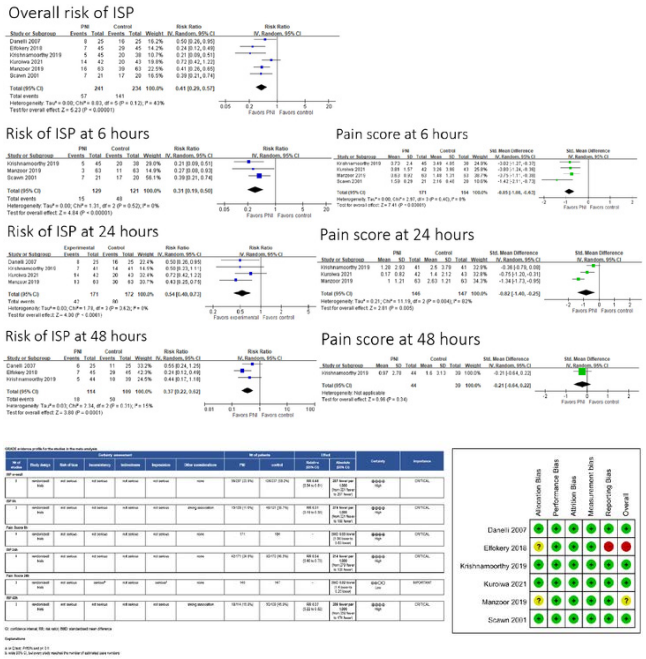
The primary outcome was the overall incidence of ISP, with secondary outcomes including incidence and severity of ISP at postoperative 6 hours, 24 hours, and 48 hours. We also reviewed potential PNI-associated pulmonary complications.

Results: Six RCTs involving 475 patients undergoing thoracic surgery under general anesthesia and epidural analgesia were included. The pooled results found a significantly lower rate of overall ISP in patients receiving PNI (i.e., 23.6%) compared to those without (i.e., 53.2%) [risk ratio: 0.46, 95% confidence interval: 0.34 to 0.61; I^2=19%; six RCTs; n=474].

At postoperative 6-, 24-, and 48 hours, there was also a significantly lower incidence of ISP with PNI use compared to control group.

The severity of ISP was lower in the PNI group than in the control group at 6- and 24 hours, while this information was unavailable at 48 hours. All recruited patients did not require postoperative ventilatory support.

Conclusion: This meta-analysis have shown that phrenic nerve infiltration not only reduced the incidence, but also improved the severity of ISP following thoracic surgery, with a prophylactic effect lasting up to 48 hours. The limited number of studies included warrants further research to support our findings.



08AP02-09
Combined ultrasound-guided femoral nerve block and direct view sciatic nerve block as analgesic approach for above knee amputation

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Background: Above Knee Amputation is a lifesaving procedure in patients with gangrene and imminent septic shock. Analgesic management is a challenge considering the several comorbidities of these patients which render common approaches inappropriate.

Case report: A 58-year-old lady with severe peripheral arteriopathy, end-stage renal disease on dialysis, chronic depression and replaced aortic valve receiving full anticoagulation, was admitted for immediate amputation due to foot gangrene leading to septic shock.

The patient entered the operation theatre hypotensive on a noradrenaline infusion. After establishing basic monitoring, we administered propofol 110mg, fentanyl 150 mcg and atracurium 50mg for induction with simultaneous increase of noradrenaline infusion rate. The patient received further 100mcg of fentanyl, paracetamol and tramadol 100mg for analgesia. Intraoperatively after femoral bone sawing and detachment of the limb, sciatic nerve trunk was visualized behind the bone stump and 75 mg of ropivacaine were injected perineurally.

At the end of the operation, we performed under ultrasound guidance a femoral nerve block injecting 15ml of 0.5% Ropivacaine. Then we discontinued sevoflurane and we administered atropine/neostigmine for neuromuscular blockade reversal. The patient woke up referring almost no pain (VAS 2) apart from a slight traction sensation with no need for further analgesics.

Discussion: We describe the anesthetic management of a challenging patient. The coexistence of end-stage renal disease and anticoagulation restricted our therapeutic options. The metabolism of

potent analgesics is affected by end stage renal disease therefore they cannot be used safely. Central neuraxial or proximal sciatic blockade was contraindicated since the patient was under anticoagulation therapy. In order to sufficiently cover the analgesic needs of the patient we used the combination of blocks with the aforementioned modification, reducing the risk of hemorrhage compared to standard technique.

Learning points: Combined femoral sciatic nerve block is an effective approach for amputation pain management. The direct visualization sciatic nerve blockade is a useful alternative in cases where the patient is fully anticoagulated or there is lack of experience in ultrasound guided sciatic nerve blockade.

Reference:

Chandran R et. al, Peripheral nerve blocks for above knee amputation in high-risk patients. J Anaesthesiol Clin Pharmacol. 2018 Oct 1;34(4):458.

08AP02-10
Management of post-dural puncture headache: is sphenopalatine block always enough?

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Background: Post-dural puncture headache (PDPH)is a common complication after neuraxial anaesthesia and even more prevalent in the obstetric population. PDPH morbidity is high and its symptoms can interfere with patient's daily activities. The gold standard treatment is an epidural blood patch (EBP), which is an invasive procedure. Non-invasive approaches, as sphenopalatine ganglion block (SPGB), are becoming more frequent as an alternative approach for this complication.[1]

Case Report: Woman, aged 32 years, ASA II, 40 weeks of gestation, G3P2, was admitted to elective caesarean section. A subarachnoid block was made with a 27G pencil tip needle at the L3-L4 level, median puncture. The technique was successful, and the surgery occurred without complications.

Two days after the surgery, the patient referred intense headache (numerical rating scale [NRS] 10) and PDPH was suspected. Conventional treatment (including rest, hydration, caffeine intake, and conventional analgesia) was unsuccessful.

After informed consent, a bilateral SPGB was performed with 0.375% ropivacaine and 2% lidocaine under standard ASA monitoring. Immediate relief was reported after the block (NRS 2). However, the symptoms' recurred after 4 hours (NRS 10). EBP was proposed to and accepted by the patient and was performed using 15 mL of sterilely collected blood. It provided immediate relief and the patient was discharged home the following day without recurrence of complaints.

Discussion: PDPH is a common complication and its comorbidities are more problematic in the obstetric population, where the mother's well-being and new-born care can be affected. SPGB is a simple, minimally invasive technique, been described as an effective therapeutic option for PDPH. The block can be repeated as necessary and if successful, an EBP can be avoided, preventing complications, and improving patient satisfaction.

However, EBP remains the gold standard treatment with a higher success rate. Hence, SPGB can be tried as a first approach, followed by EBP if unsuccessful.[2,3]

References:

1. Br J Anaesth. 2003; 91:718-29.
2. Korean J Pain. 2017; 30:93-97.
3. Am J Emerg Med. 2015; 33: 1714.

Learning points: Patients presenting with PDPH can be considered primarily for SPGB. Patients may have a rescue EBP if less invasive treatments fail.

08AP02-11
Percutaneous transforaminal ventral epidural adhesiolysis and dorsal root ganglion radiofrequency treatment in lumbar radicular pain: preliminary results in a large casuistry

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Background and Goal of Study: Chronic or persistent lumbar radicular pain (LRP) is one of the most common cause of disability due to many different causes of compression/inflammation of the lumbar nerve root such as hernieted disc, spinal stenosis or scar tissue from previous surgery. Percutaneous transforaminal ventral epidural adhesiolysis (TA) is a procedure employed to treat LRP, although it has been poorly described in the literature with only few cases reported to determine the true efficacy and the safety of the TA. At the same time, increasing number of publications shows the efficacy and safety of pulsed radiofrequency (PRF) treatment of the dorsal root ganglion (DRG). This retrospective study aim to asses safety of TA procedure associated with DRG PRF, performed by an epidural catheter with an active PRF tip. It is part of a larger study project underway to demonstrate the efficacy in the medium and long term and to stratify risks and benefits depending on the causes that determine the LRP.

Materials and Methods: Retrospective study. All the TA and DRG RFP procedures performed between 2015 and 2021 with fluoroscopic guide, sterile technique, in the operating room, in local anesthesia, mild sedation and standard monitoring(PA, FC, EKG, SaO2)

Results and Discussion: 186 procedures were recorded on 109 patients (pt). Each patient had a diagnosis of lumbar radicular pain based on clinical symptoms and radiographic evidence. Age range: 24-103 yo; 55 women, 54 men. ASA 1-2 (65%), 3 (35%). TA and DRG PRF was performed on one level in 44pt, on two levels in 59pt, on three levels in 4pt, on four levels in 2pt. The target site was monolateral for 81 pt and bilateral for 22. All procedures were carried out without serious complications. All the patient was discharged according PADDS criteria until 2-4 hours, referring consistent pain relief; in 3pt motor anesthetic block lasting more than 6 hours occurred, which involved a longer discharge time. In 2pt with multiple sites of stenosis was impossible to reach one of the target sites in each patient.

Conclusions: Although applications of this study are limited by its retrospective design, the results suggest that TA and DRG RFP is a safe procedure, and short-term results indicate that it is an effective treatment for LRP. This study is aimed to be included into a larger study that evaluates the medium-long term efficacy of this procedure and to stratify the clinical indications depending on the causes of the LRP.

08AP02-12
Detecting alveolar recruitment maneuvers with nociception monitors: a prospective cohort study

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Background and goal of study: Many nociception monitors, such as the Nociception level (NOL) index (Medasense, Israel), use at least in part hemodynamic parameters to assess nociception. Others, (e.g., PainMonitor (Med-Storm, Norway)), assess non-hemodynamic components of nociceptive response (e.g., skin conductance). We aimed to determine if the NOL index and the PainMonitor skin conductance peaks per seconds (SCPPS) would similarly detect intraoperative events.
Materials and methods: All patients underwent remifentanil-propofol target controlled infusion anesthesia (Minto and Schnider models) and were monitored with standard monitors, the NOL index, and the PainMonitor SCPPS. NOL index, SCPPS, heart rate, and mean arterial blood pressure were collected during intubation, alveolar recruitment maneuver (ARM), tetanic stimulation, and incision. Data was analyzed using Friedman and Dunn's multiple comparisons tests.
Results and discussion: 7 patients were included. Both NOL index and SCPPS significantly increased at intubation. During ARM, NOL index values greatly increased mean ±SD–median [IQR25-IQR75]: 6±6–6[0-9] vs 45±9–45[36-53], $p<0.0001$, while no other variable significantly changed. No variable changed following tetanic stimulation but SCPPV increased at incision.
Conclusion: In a small cohort, the NOL index detects hemodynamic changes induced by ARM while the PainMonitor does not. Interpreting changes of nociception monitors derived from hemodynamic variables, such as the NOL index, should be done with caution during ARM.

08AP02-13
Cryoanalgesia of the ankle joint

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Background: Currently much attention is paid to cryoanalgesia in large joints, e.g., hip, knee, shoulder. Strong interest in denervation of these structures can be explained with the fact that part of patients cannot receive adequate orthopedic care. In cases when surgical procedure is unsuitable for any reason, cryoanalgesia remains the only option for returning a normal quality of life. However, at the moment there is no clear data on the success and options for denervation of smaller joints.
Case report: This case reports on a 65 y.o. patient, weight 85 kg, height 161 cm, went to the clinic on June 29, 2021 with complaints of inability to lean on the foot and constant pain in the ankle joint. Diagnosis of 3rd stage arthritis was confirmed. Surgical treatment was refused because of multiple comorbidities. Physical examination revealed swollen joint and irritated skin surrounding it. Passive range of movement in the joint was decreased. Joint compression both in sagittal and frontal plane was painful.
It is reliably known that the ankle is innervated by 3 superficial and 2 deep nerves. It was decided to perform cryoablation in the projection of 2 deep nerves closest to the capsule of the ankle joint. The deep peroneal nerve was denervated in the area of the talus block, the deep branches of the tibial nerve were blocked at the level of the scaphoid. The denervation was performed according to the authors method.
The patient was observed by the staff of the clinic for a week. 3 months after the procedure a phone call was made to assess the quality of pain relief and the patient condition. Pain decreased by 70% (subjectively), the patient could freely move.
Discussion: This clinical case shows that smaller joints are susceptible to cryoanalgesia. With further development of the technique, it could be actively used for perioperative pain control in patients who underwent radical surgery in the joint. In our opinion, cryoanalgesia of the ankle joint may shorten postoperative rehabilitation time in this group of patients.
References:
No literature about full cryoanalgesia of the ankle joint was found; only one research describes cryoanalgesia of separate nerves in this area: L. Hodor, K. Barkal, L. D. Hatch-Fox. Cryogenic denervation of the intermetatarsal space neuroma (1997).
Learning points: Cryoanalgesia of the ankle joint is a new method, which could be useful for patients with chronic pain and in acute pain management before radical orthopedic surgery.

Intensive Care Medicine

09AP01-01
Predictors of weaning failure in mechanically ventilated patients with coronavirus disease 2019: a preliminary retrospective observational study

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Background and goal of study: As their disease progresses, a substantial proportion of patients with coronavirus disease-19 (COVID-19) develop respiratory distress demanding ICU admission and mechanical ventilation (MV). Up to now, little is known about the risk factors associated with prolonged MV in that patient group.
Our primary aim was to explore the predictors of weaning failure in mechanically ventilated COVID-19 patients. Secondly, risk factors for ICU mortality were examined.
Materials and methods: This retrospective observational study included 74 intubated COVID-19 patients, hospitalised in the ICU of "Sismanogleio" General Hospital of Athens.
Collected data were analyzed using SPSS Statistics 26.
Results and discussion: The majority of patients (63.5%) were male, with a median age of 67.5 years old. Arterial Hypertension was the most common coexisting disease observed (71.6%). Median time from symptom onset to hospital admission was 5.5 days, while 4 days was the median time from hospitalisation to ICU admission. Prone positioning was applied to 45 patients (60.8%). While in ICU, 31 patients (41.9%) suffered from at least one extrapulmonary complication, the most common of which being non-pulmonary infections(31.1%), followed by acute kidney injury (AKI) (21.6%).
Among pulmonary complications, late-onset VAP (17.6%) was the most common. 44 patients(59.5%) were successfully weaned within the first 28 days of MV, with a median MV duration of 10 days. Binomial logistic regression revealed that advanced age, high APACHE II scores, presence of coronary artery disease/ chronic heart failure and immunodeficiency at ICU admission, short time interval from the onset of symptoms to hospital admission, late ICU admission, decreased respiratory system compliance (C_{RS}) during the first 5 days of MV, development of AKI, pulmonary embolism(PE), bacteraemia and multiorgan failure, increase the risk of prolonged MV.
The rate of ICU mortality during the study period was 39.2%, with the binomial logistic regression giving out similar results, as well as showing that the presence of active malignancy, neuropsychiatric disease and the occurrence of pneumothorax worsens survival.
Conclusions: Older age and higher APACHE II scores, cardiovascular disease, immunodeficiency, rapid disease progression, delayed ICU admission, low C_{RS}, development of PE, AKI and infectious complications constitute independent risk factors of MV prolongation in COVID-19 patients.

09AP01-02
NOX2 drives M1-like microglial polarization and synaptic impairments following neonatal hypoxic-ischemic brain damage

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Background and goal of study: Hypoxic-ischemic brain damage (HIBD) is an important cause of cognitive dysfunction in neonates. Microglial activation and the neuroinflammation response are the key pathological factors for cognitive dysfunction. Although it has been well-documented that activated microglia polarize towards M1 pro-inflammatory or an alternative M2 anti-inflammatory phenotype upon injury, however, it is still not clear how HIBD affects this differentiation. NADPH oxidase 2 (NOX2) is a major enzyme system that generates reactive oxygen species in microglia. After HIBD, NOX2 is strongly up-regulated in M1-like, but not in M2-like polarized cells. Therefore, we hypothesized that NOX2 drives M1 microglia-mediated neuroinflammation and contributes to synaptic and cognitive impairments after HIBD.
Materials and methods: The HIBD models were constructed in wild-type and NOX2-deficient ($NOX2^{-/-}$) C57/BL6 mice at postnatal day 7. Behavioral tests were performed at 28 d post-HIBD with open field and fear conditioning tests, respectively. Synaptic ultrastructure and morphology were observed at 1 and 28 d post-HIBD. The levels of NOX2 and oxidative stress markers were also analyzed.
Moreover, the expressions of markers of microglial activation and M1/M2 markers of microglia polarization were measured in the hippocampus at 1 d post-HIBD.
Results and discussion: We show that NOX2 deficiency alleviated HIBD-induced cognitive dysfunction, was associated with improving damaged synapses, and restored the expression levels of synaptophysin and postsynaptic density-95 following HIBD.
Importantly, NOX2 deficiency suppressed HIBD-induced microglial NOX2 activation and subsequent oxidative stress, as reflected by reduced levels of malondialdehyde (MDA) and 4-hydroxynonenal (HNE) in the developing hippocampus.
Moreover, NOX2 deficiency reduced markers of M1-like activation, suppressed HIBD-induced neuroinflammation, promoted microglial anti-inflammatory M2 polarization, and inhibited nuclear factor-κB activation in the hippocampus after HIBD.
Conclusion(s): Our data indicate that NOX2-derived oxidative stress after HIBD drives M1-microglial polarization that contributes to neuroinflammation and synaptic impairments, and treatments targeting microglial NOX2 may be a promising therapeutic strategy for cognitive dysfunction in neonates with HIBD.
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09AP01-03
Norepinephrine-to-fluid ratio as a predictor of mortality in septic hypotension

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Background and goal of study: The administration of intravenous fluids and norepinephrine are cornerstones of therapy for septic hypotension. Both interventions are associated with adverse consequences for the patient. It is often unclear which of the two interventions should be intensified in case of persistent hypotension.
The aim of this study was to investigate a possible relationship between the norepinephrine-to-fluid ratio (NFR) and mortality.
Materials and methods: A query against the Amsterdam UMC Database [1] was performed to identify patients admitted to an intensive care unit (ICU) at the *Amsterdam Universitair Medische Centra* with a diagnosis of sepsis. The cumulative amount of norepinephrine in micrograms and the intravenously infused volume (crystalloids, colloids, and blood products) in milliliters within the first 72 hours after admission were used to calculate NFR. The area under the receiver operating characteristics curve (AUROC) was calculated to assess the ability of NFR, cumulative norepinephrine, and cumulative fluids to predict mortality.
Results and discussion: 1936 patients were eligible. Table 1 shows AUROC and 95% confidence intervals (CI) of 72-h values of NFR, cumulative norepinephrine, and cumulative fluid volume as predictors of 7-day and 28-day mortality. Thresholds were determined by calculating the Youden Index.

72-h value	7-day mortality AUROC (CI)	Threshold	28-day mortality AUROC (CI)	Threshold
NFR	0.71 (0.67-0.74)	4.99	0.68 (0.65-0.7)	4.71
Norepinephrine	0.67 (0.63-0.70)	59283 µg	0.66 (0.63-0.69)	39645 µg
Fluids	0.5 (0.47-0.53)	12809 mL	0.53 (0.5-0.55)	8602 mL

Table 1: Results

When NFR was above the threshold, the relative risk (RR) for mortality was 3.32 for 7-day mortality and 2.37 for 28-day mortality.
Conclusion: 72 hours after admission, NFR can be used as a predictor for 7-day and 28-day mortality, outperforming norepinephrine and fluid volume as individual values. Further studies should investigate whether NFR can be used as a tool to find a middle ground between fluid overload on the one hand and the consequences of catecholamine therapy on the other.
References:
1. Thoral PJ, Peppink JM, Driessen RH et al. Sharing icu patient data responsibly under the society of critical care medicine/european society of intensive care medicine joint data science collaboration: The amsterdam university medical centers database (amsterdamumcdb) example. Critical care medicine 2021; 49:e563–e577.

09AP01-04
Lactate concentration and clearance from blood in comparison of surviving and deceased patients with ECLS in a cardiosurgical intensive care unit

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Background and goal of study: The use of extracorporeal life support (ECLS) as part of cardio-circulatory support has increased rapidly in recent years.[1]
Severe hyperlactatemia is not uncommon in this group of patients. Lactate peak concentrations and lactate clearance have already been identified as independent risk factors for mortality.[2]
The aim of the study was to determine a suspected correlation between the parameters lactate concentration and clearance in the blood and mortality in the ECLS context.
Materials and methods: Retrospective, clinical observational study; Inclusion criteria: Patients in the cardiac surgical intensive care unit at an University Medical Center with ECLS therapy in the period from January 1, 2020 to February 28, 2021. Determination of the lactate level before, during and after ECLS therapy (minimum, maximum, time units within defined lactate concentrations). Simultaneous collection of relevant laboratory parameters (bilirubin, creatinine, infection laboratory, platelets), as well as established ICU scores (SOFA, SAPSII, TISS28). Statistical comparison of both groups using the Wilcoxon-Mann-Whitney test; Significance level $p < 0.05$.
Results and discussion: Inclusion of 51 patients (survivors n = 23; non-survivors n = 28; median age of the cohort 63.4 years; gender distribution of the cohort: male 76%, female 24%). The deceased patients had significantly higher SOFA, SAPSII and TISS28 values at the end of the ECLS therapy (7.5 vs. 18.1; 53 vs. 86; 32.8 vs. 48.8; for all $p < 0.001$).
The lactate concentration immediately before ECLS therapy and the first values collected did not differ. Significantly higher concentrations in the non-survivor group were found in the last lactate concentrations measured after the ECLS explantation (lactate - last: 1.5 vs. 13.7 mmol / L; lactate - after explantation: 1.4 vs. 11.4 mmol / L; for both $p < 0.001$).
Statistically relevant lower maximum lactate concentrations could be recorded in the cohort of survivors (lactate maximum: 12.4 vs. 19.7 mmol / L; $p < 0.001$; Figure 1). The deceased patients had significantly higher time units within the defined increased lactate concentrations than the survivors (time units within 5.1-10.0 mmol / L, 10.1-15.0 mmol / L, 15.1-20.0 mmol / L,> 20.1 mmol / L; for all $p < 0.001$; Figure 2).
Conclusion(s): In the examined cohort, a correlation between the maximum lactate concentration and the duration of the hyperlactatemia and mortality in cardiosurgical patients on ECLS therapy could be demonstrated.
References:
1. Karagiannidis C, Brodie D, Strassmann S, Stoelben E, Philipp A, Bein T, et al:. Extracorporeal membrane oxygenation: evolving epidemiology and mortality. Intensive Care Med. 2016;42(5):889-896.
2. Haas SA, Lange T, Saugel B, Petzoldt M, Fuhrmann V, Metschke M, et al: Severe hyperlactatemia, lactate clearance and mortality in unselected critically ill patients. Intensive Care Med. 2016;42(2):202-10.

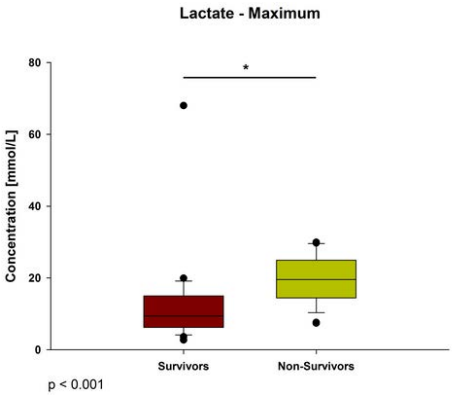

Figure 1.

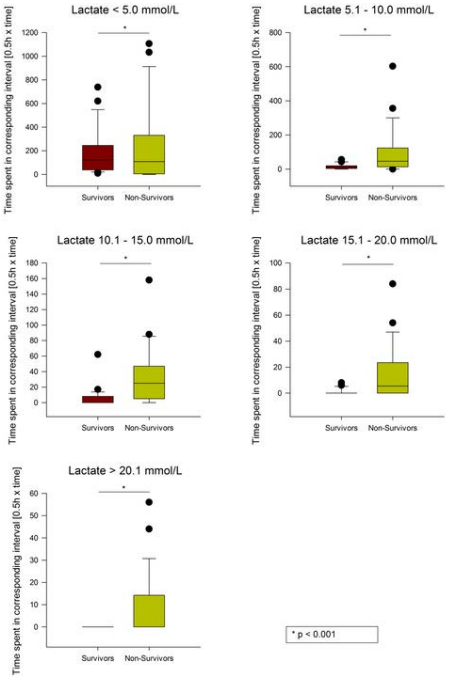

Figure 2.

09AP01-05
Mechanical power and pulmonary neutrophilic inflammation during protective ventilation with different PEEP levels in experimental acute respiratory distress syndrome

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Background: Mechanical ventilation (MV) may cause ventilator-induced lung injury (VILI). Recently, mechanical power (MP), which describes the energy transferred per time to the respiratory system, was shown to be associated with different VILI-surrogats and even mortality(1).

We hypothesised that protective MV strategies using different levels of positive end-expiratory pressure (PEEP) differ regarding MP and pulmonary neutrophilic inflammation assessed by positron-emission tomography (PET/CT).

Methods: In 24 anaesthetised pigs, lung injury was induced by saline lung lavage and followed by a baseline PET/CT. Afterwards, animals were ventilated with low tidal volume either according to the *Open Lung approach* with intermittent lung recruitment maneuvers (OLA), the *ARDSnet* high PEEP table (HighPEEP), or the *ARDSnet* low PEEP table (LowPEEP) (n=8/group) at respiratory rates (RR) titrated to achieve normocapnia.

Physiological measurements were conducted every 6 h. PET/CT was repeated 24 h after initial PET/CT at PEEP settings according to randomization. Pulmonary neutrophilic inflammation was assessed by normalized uptake rate of ^{18}F-fluoro-desoxy-glucose (K_{is}) and its difference between the two PET/CT was calculated (ΔK_{is}). MP was derived by calculating mechanical energy via numerical integration of the acquired pressure-volume curves and multiplication with RR (2). Statistics included non-parametric tests and general lineal model (α=0.05).

Results: Following injury, PaO_2/F_IO_2 was 113±33 mmHg. Median PEEP during intervention time was significantly lower in LowPEEP (5 cmH_2O; IQR 0.1) than in HighPEEP (12 cmH_2O; IQR 0.2) and OLA (12 cmH_2O; ICR 2.0). RR and PaO_2/F_IO_2 were significantly lower in LowPEEP than in OLA, while driving pressure and respiratory system elastance were higher than in other groups.

MP was higher in LowPEEP than in HighPEEP and OLA (P=0.002). ΔK_{is} was higher in LowPEEP (0.0183±0.0109 min^{-1}) than in OLA (0.0049±0.0088 min^{-1}; P=0.024), but did not differ between LowPEEP and HighPEEP (0.0080±0.0073 min^{-1}) or HighPEEP and OLA. Haemodynamic variables did not differ between groups, while total dose of norepinephrine was significantly higher in OLA than in LowPEEP (P=0.033).

Conclusions: In this experimental ARDS model, protective MV with low compared to high PEEP increased mechanical power and worsened lung inflammation.

References:

1. Serpa Neto A et al., 2018, DOI:10.1007/s00134-018-5375-6;
2. Huhle R et al., 2018, DOI:10.21037/atm.2018.09.65

09AP01-06
Efficacy of vitamin C and thiamine for the treatment of refractory septic shock in surgical critically ill patients

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Background and goal of study: Marik, et al showed in 2017 promising results in terms of mortality of septic shock patients with hydrocortisone, vitamin C, and thiamine[1]. Later randomized trials did not find a reduction in mortality. Studies that analyze the efficacy of vitamin C and thiamine in surgical critically ill patients are lacking.

After Marik's study, we implemented a protocol in our surgical critical care unit that included the administration of hydrocortisone, ascorbic acid, and thiamine in refractory septic shock.

The aim of our study was to investigate the association between the use of vitamin C and thiamine and 28-day, ICU and hospital mortal-

ity and occurrence of acute kidney injury, duration of mechanical ventilation and treatment with vasopressors, length of stay (LOS), and reduction in procalcitonin (PCT) and SOFA score.

Materials and methods: Retrospective, before and after single-center study comparing clinical outcomes in refractory septic shock (norepinephrine dose >0.5 mcg/kg/min) patients treated with vitamin C, hydrocortisone, and thiamine during a 2 year period (from 2017 and 2018) with a control group from the preceding two years. Data were collected from electronic health records and paper-based records.

The data were analyzed with the statistical software SAS 9.3 (SAS Institute Inc., Cary, NC, USA).

Results and discussion: A total of 120 patients were included, of which 95% of patients had an abdominal source and 5% urologic infection. Baseline characteristics were similar between the groups, except for congestive heart failure.

There were no differences in 28-day mortality (p 0.053), hospital mortality (p=0.093), and ICU LOS. ICU mortality was higher in the control group (p=0.017). Hospital LOS was longer in the treatment group.

The principal strengths of our study were the homogeneity of the patients between the groups, the severity of illness (SAPS II average 50 and 51.4 in control and treatment groups respectively), and the predominant abdominal source of infection (114 out of 120 patients). The main limitation is the limited number of patients enrolled.

Conclusion(s): Our study did not show differences in 28- day mortality but it showed an increased ICU survival and increased hospital LOS in the treatment group.

Further studies are needed for the surgical population.

09AP01-07
Extracorporeal therapy of end-stage heart failure

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Background and goal of study: Heart failure (HF) is the leading cause of death among all cardiovascular diseases. According to the American Heart Association, from 2015 to 2018, about 6 million Americans in the age of 20 are suffered from HF with 50% of admissions being characterized by a reduced left ventricular ejection fraction (LVEF) <40%. The five-year survival rate for such patients is 50%.

In most cases, heart transplantation is the treatment of choice in the treatment of these patients. However, orthotopic transplantation carrying out is limited by severe and progressive organ donor deficiency.

This work aims to evaluate the effectiveness of hemosorption use in the complex of conservative treatment of patients with end-stage HF.

Materials and methods: A retrospective analysis of the results of treatment in 59 patients was performed (men 89.8%, women 10.2%; average age 41.3 ± 12.5 years; NYHA III-IV, baseline LVEF 21.1 ± 4.66%, end-systolic volume left ventricular (ESV LV) 206.87 ± 84.1 ml, end-diastolic volume left ventricular (EDV LV) 264.4 ± 86.02 ml), who was hospitalized for terminal HF.

Conservative therapy was carried out following international recommendations and was supplemented by a course of 4 hemosorption procedures, for which granulated delegandenesis hemosorbent (HSGD) was used. The average procedure time was 131 ± 10.34 min with an average blood flow rate in the extracorporeal circuit of 44 ± 6.26 ml/min. The procedure was considered successful if at least one circulating blood volume of the patient contacted the hemosorbent.

The Student's-t-test was used to analyze the main clinical, laboratory, and instrumental data (NYHA class, the level of N-terminal pro-brain natriuretic peptide (NT-proBNP), LVEF, EDV LV, ESV LV.

Results and discussion: The clinical condition of all patients improved after the performed hemosorption procedures by at least one NYHA class. The NT-proBNP level decreased 3 times (from 3713.75 ± 466.3 pg/ml to 1175.05 ± 97.16 pg/ml (p <0.05)). LVEF increased to 29.36 ± 6.27% (by 39.1%) (p <0.01), and after 12 months it was 34 ± 2.59% (p <0.05). ESV LV decreased to 137.77 ± 33.21 ml (by 33.4%), EDV LV decreased to 238.04 ± 82.1 ml (by 10%) (p <0.05).

Conclusion: The use of hemosorption with HSGD, against the background of conservative treatment of terminal HF, improves the contractile function of the heart and the general clinical condition of patients.

09AP01-08
The best time to perform tracheostomy in patients with acute traumatic severe brain injury: the retrospective cohort study

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Background and goal of study: Tracheostomy can help weaning in long-term ventilated patients, reducing the duration of mechanical ventilation and intensive care unit length of stay, and decreasing complications from prolonged tracheal intubation, especially due to lost of gag and cough reflexes. In traumatic brain injury, ideal timing for tracheostomy is still debated. The aim of this study was to find out whether early tracheostomy lead to decreasing the incidence of lower airways colonisation with nosocomial pathogens.

The study hypothesis was that time of tracheostomy have no impact on the incidence of lower airways colonisation with nosocomial pathogens and clinical outcome in patients with acute traumatic brain injury.

Materials and methods: We examined data of 245 patients at the age 19-60 years, who had acute traumatic brain injury and needed to be mechanically ventilated. 237 patients were included in the study results analysis.

All patients were retrospectively divided in two groups. In the 1st group (n=105) tracheostomy was performed at day 2 after trauma, in the 2nd group (n=132) - at day 6. The microbiological tests of mucous from lower airways were obtained immediately after tracheostomy and than every 3-4 days up to weaning from mechanical ventilation.

The primary outcome was the length of stay in ICU. Secondary outcomes were complications: incidence of lower airways nosocomial colonisation and ventilator associated pneumonia. Statistical Package for the Social Sciences was used and the results were presented using %, median [IQR], adjusted hazard ratio (HR), duration ratio.

Results and discussion: It was found that among patients of the 1st group the incidence of lower airways nosocomial colonisation was 17% on day 2, than increased to 36% on day 6, while in the 2nd group it was 36% on day 6 and 59% on day 10. There were no patients in the 1st group at day 2 and day 6 with ventilator associated

pneumonia while in the 2nd group this incidence was 0% at day 6 and 41% at day 10. Low incidence of colonisation was associated with higher daily probability of discharging from ICU (adjusted HR 1.44, 95%CI 1.14-1.75, per 10% decrease).

Conclusion(s): Late tracheostomy in patients with acute traumatic brain injury might increase the incidence of nosocomial patogen's colonisation, ventilator associated pneumonia, prolonged length of stay in ICU and impact clinical outcomes.

09AP01-10
Cerebral deterioration detection with near-infrared spectroscopy in patients with aneurysmal subarachnoid hemorrhage

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Background: Early detection of cerebral vasospasm (CV) is essential in patients with aneurysmal subarachnoid haemorrhage (aSAH). Near-infrared spectroscopy (NIRS) is non-invasive, bedside monitoring of regional cerebral oxygen saturation (rSO_2).

We present our experience in detecting cerebral deterioration with NIRS.

Case report: NIRS was applied to 11 Intensive care patients (7 females), mean age 60±9 years, with aSAH, Riga, Latvia. NIRS (INVOS 5100Medtronic (Covidien))was started within the first 48 hours after ictus and continued up to 7 days. All patients at least had one risk factor, but 45.5% had two. Amount of aSAH was Fisher III for 2 and Fisher IV for 9 patients. Median Glasgow Coma scale was 10 points (5-15).

Mean rSO_2at baseline (BL) was 72±6% on the left, 73±6% on the right side. CV occurred in 3 patients within 7 days. All presented a reduction of rSO_2, but more than 20% from BL was detected in two cases. To one patient with CV occurred brain death with continuous rSO_2reduction. One patient experienced cerebral stroke without detected reduction of rSO_2.

For another patient NIRS detected intracerebral hematoma after endovasal embolization, when rSO_2dropped from 77 to 55% on the left, from 71 to 53% on the right side continuing to decrease. Mortality was 3/4 vs. 3/7, median hospitalisation 8 vs. 15 days in patients with changed NIRS vs. without.

Discussion: NIRS has been described as a good toll for real-time detection of cerebral ischemia [1].

Our results show that NIRS helped early detect cerebral deterioration in 3 out of 5 aSAH patients. Therefore, we encourage to use NIRS for aSAH patients as additional tool in detection of early cerebral deterioration [2].

References:

1. Jeong Jin Park, Chulho Kim, Jin Pyeong Jeon. Monitoring of Delayed Cerebral Ischemia in Patients with Subarachnoid Hemorrhage via Near-Infrared Spectroscopy. J Clin Med. 2020 May 24; 9(5): 1595. DOI: 10.3390/jcm9051595.

2. Andrey Khozhenko, Massimo Lamperti, Sergio Terracina, Federico Bilotta. Can Cerebral Near-infrared Spectroscopy Predict Cerebral Ischemic Events in Neurosurgical Patients? A Narrative Review of the Literature. J Neurosurg Anesthesiol. 2019 Oct; 31 (4): 378-384. DOI: 10.1097/ANA.0000000000000522.

Learning points: Our first experience shows that NIRS seems to be promising method for early detection of cerebral deterioration using together with clinical course in aSAH patients.

09AP01-11
Short- and mid-term renal outcomes following transcatheter aortic valve implantation: a single-center retrospective study

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Background and goal of study: Acute kidney injury (AKI) after transcatheter aortic valve implantation (TAVI) has been associated with adverse outcomes, however, data on the changes in renal function that occur after discharge are limited. We hypothesized that AKI after TAVI may confer increased risk of subsequent decline in renal function. This study investigates the association between AKI and renal function at 6 months after TAVI.

Materials and methods: Approval of the Institutional Review Board (approval number 2021-260) for this retrospective study was obtained from Kyushu University Hospital. The study cohort included patients who underwent TAVI at Kyushu University Hospital from 2014 to 2021. Clinical and laboratory data were collected retrospectively. Serum creatinine and estimated glomerular filtration rate (eGFR) were collected at baseline, immediately, 1-day, 2-days, 3-days, 5-days, 7-days, and 6-months after TAVI. Patients who did not have 6-months serum creatinine or eGFR recorded were excluded from the analysis. AKI was defined according to the Kidney Disease Improving Global Outcomes (KDIGO) group, using serum creatinine values. General linear model and student's t-test were used for statistical analysis.

Results and discussion: 167 patients who met inclusion criteria were enrolled in the study (mean age 85 years, female gender n = 123 (73.7 %). 28 patients (16.8 %) developed AKI (AKI+ group), of which eGFR decreased in 22 patients (78.6 %) at 6-months after TAVI. 139 patients (83.2 %) did not develop AKI (AKI- group), of which eGFR decreased in 75 patients (54.0 %) at 6-months after TAVI. eGFR at 7-days after TAVI was not significantly different from baseline in AKI+ group ($p = 0.84$, delta eGFR: -0.4 (95%CI; -4.8 to 3.9)). eGFR at 6-months after TAVI was significantly decreased from baseline in AKI+ group ($p<0.05$). Delta eGFR in AKI+ group at 6-months after TAVI was significantly different from that in AKI– group ($p<0.05$, AKI+ group: -5.9 (95%CI; -9.2 to -2.6), AKI– group: -0.5 (95%CI; -2.0 to 1.0)).

The results were similar even after multivariable adjustment. These results indicate that AKI after TAVI is transient but associated with subsequent decline in renal function.

Conclusion(s): In our study, AKI after TAVI was a risk factor for subsequent decline in renal function. Larger study is needed to elucidate the association.

09AP01-12
Preventive effectiveness of renal optimization measures in patients with highkidney biomarker

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Background and Goal of Study: Creatinine (Cr) and diuresis are currently the elements that describe acute kidney injury (AKI) however they do not allow early detection to establish preventive measures.

New biomarkers can identify kidney distress before the definitive lesion is established. Nephrochek ™ measures TIMP2 and IGFBP7 in urine. Values ≥ 0.3ng / ml indicate a high risk of AKI and allow us to take early measures to prevent its progression.

Materials and Methods: Prospective study to evaluate the reduction of the incidence of AKI after major abdominal surgery in patients with elevated Nephrochek™ applying renal optimization measures (ROM): normovolemia, normotension, avoiding nephrotoxic drugs and normoglycemia, in those admitted to the ICU compared to the usual treatment in hospitalized patients in the ward between March and December 2021 in our hospital.

Patients with a history of chronic kidney disease (CKD) ≥ stage 4, nephrectomy, and kidney and liver transplantation were excluded. A multivariate analysis was performed to evaluate the factors related to postoperative AKI.

Results and Discussion: Patients in the ICU had a higher incidence of elevated Nephrocheck™ (43.6 vs 22.3%) and postoperative (PO) AKI (73.2 vs 13.1%). PO AKI was associated with greater ASAps, hypertension (59.1 vs 38.1%), chronic anaemia (45 vs 13.1%), CKD (12.7 vs 0%), longer-term surgeries (459 ± 225 vs 252± 90 min) and more use of vasoactive drugs (67.6 vs 31.6%), blood products (15.5 vs 2.6%) and nephrotoxics (52.1 vs 84.2%).

To assess whether Nephrocheck™ could predict PO AKI, we compared patients with normal versus high values, obtaining a higher incidence of PO AKI in those with Nephrochek™ ≥ 0.3ng / ml (66.7 vs 10.1%). Elevated Nephrochek™ was more frequent in ICU (64.6 vs 40.4%), longer surgeries, preoperative anaemia, hemodynamic instability (18.7 vs 4%), vasoactives (16 vs 3%), IMV (20 vs 9%), PO transfusion (31 vs 3%) and nephrotoxic drugs (72.7 vs 60.4%).

With the application of ROM in patients with elevated Nephrochek™ in the ICU compared to usual measures in the ward, we obtained a significant reduction in PO AKI (77.4 vs 47%) in the ICU adjusting for multiple variables.

Conclusion: The Nephrochek™ is a good marker of renal stress, allowing to identify those patients at risk, in whom it would be necessary to apply ROM to reduce the incidence of PO AKI.

References:

Bagshaw SM. Acute Kidney Injury Care Bundles. Nephron. 2015; 131(4): 247-51.

09AP02-01
All which wheezes is not asthma

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Background: A 68yrs lady presented to hospital with history of noisy breathing which was worsening over the preceding 2 months. She described the noise as 'wheeze' with no associated dyspnoea. She stated she also experienced significant anxiety due to the recent Covid19 pandemic. The patient was initially managed via the Covid19 pathway until results of her SARS-CoV-2 results returned negative. As her apparent bronchospasm was refractory, the medical team requested a critical care consult. This revealed that the apparent that the wheeze was in fact a biphasic stridor. Examination of her neck found a firm thyroid mass. CT identified an infiltrative thyroid mass. There was significant mass effect on the trachea which is narrowed to 5x4mm. Biopsy of the mass confirmed anaplastic thyroid carcninoma. The patient was commenced on regular steroids, nebulised adrenaline and was listed for urgent surgical tracheostomy following awake tracheal intubation.

Discussion: Triage and admission pathways have changed significantly in many hospitals in the past year in response to the Covid-19 pandemic. Additionally, during the Covid pandemic attendance at ED has decreased dramatically, with a reduction of 45.4% in ED attendances in Irish hospitals in March 2020 as compared to March 2019.[1]

The pre-triage system resulted in a medical admission instead of a referral to the ENT service. It was not until the critical care anaesthesia staff examined the patient that the diagnosis of stridor and not wheeze was made. During this time she had the potential to deteriorate to the point of an airway emergency, particularly due to the fact that she was being nursed in a single room.

References:

1.Turcato et al (2020). The COVID-19 epidemic and reorganisation of triage, an observational study.*Internal and emergency medicine*,*15*(8), 1517–152

Learning Points: The patient stated that anxiety regarding COVID19 transmission in the hospital setting was the primary reason in her delayed presentation.

Secondly, the patient was examined by staff in full PPE. This had the potential to diminish diagnostic accuracy, particularly in regard to auscultation.

Finally, the pre-triage system contributed to the patient having the incorrect primary diagnosis on initial presentation, which delayed her final diagnosis.

All three of these factors are potential pitfalls for clinicians managing patients during the COVID 19 pandemic.

09AP02-02
A pilot study of supraglottic and oropharyngeal decontamination to prevent ventilator-associated pneumonia

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Background and goal of study: Ventilator-associated pneumonia (VAP) is a wide-spread nosocomial infection in modern intensive care units (ICU) resulting to increased length of stay, costs of treatment, and attributive mortality. However, the preventive "bundles" do not lead to the "zero" VAP incidence. Therefore, the search of new barrier measures against VAP is of paramount importance.
The goal of our ongoing pilot study is to assess the effects of combined oropharyngeal and supraglottic decontamination with either bacteriophage or local antiseptic on the incidence of VAP.
Materials and methods: Seventeen ICU patients have been enrolled so far in ongoing multicenter randomized placebo-controlled study. All patients were randomized into three groups depending on the agent administered for supraglottic and oropharyngeal decontamination: a control (normal saline, n = 6), local antiseptic (octenidine, n = 6), and multiple bacteriophage solution (sekstafag, n = 5) every 8 hours.
The standard bundle for prevention of VAP has been provided to all patients during the first five days of invasive mechanical ventilation (MV). The VAP was diagnosed using CPIS score (≥ 6 pts) after 48 hours of invasive MV. The microbiological samples of oropharyngeal and tracheal secretion have been taken to assess colony-forming units. Point-of-care lung ultrasound, gas exchange and ventilatory parameters have been monitored. We used Fisher's exact test for comparisons between the groups.
Results and Discussion: The age, gender, length of ICU and hospital stay, duration of invasive MV and mortality did not differ between the groups. VAP has been diagnosed in three patients in the control group only (p = 0.029 compared with other groups), including two patients with early and one patient with late VAP. In early VAP, the culprit microorganisms were *Acinetobacter baumanii*, *Klebsiella pneumoniae*, and *Raoultella terrigena*. *Klebsiella pneumoniae* was the causative agent in one patient with late VAP. We have found an overlap among the pathogens from trachea and oropharynx in all cases.
Conclusion(s): The antibacterial barrier approach to prevent VAP using combined supraglottic and oropharyngeal decontamination by either octenidine or multiple bacteriophage solution has a potential to decrease the incidence of VAP and warrants further investigation.

09AP02-03
Uric and ascorbic acids in patients with novel coronavirus pneumonia

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Background and goal of study: Uric and ascorbic acids are the main water-soluble antioxidants in the human body. Therefore, our attention was drawn to their importance in patients with a new coronavirus infection.
Materials and methods: More than 1000 patients with new coronavirus pneumonia were examined. In addition to the generally accepted laboratory and instrumental parameters, the level of uric acid in the blood serum and the daily excretion of uric acid in the urine were studied. The therapeutic use of intravenous ascorbic acid in patients was taken into account.
Results and discussion: It was found that in patients with pneumonia caused by the new coronavirus (covid-19), hyperuricemia of both hyperproductive and retention types is detected. It was also found that the level of uricemia changes in inverse proportion to the severity of the systemic inflammatory reaction and the severity of the cytokine storm: the minimum indicators of uricemia are recorded during the period of maximum severity of the inflammatory reaction, then during the recovery period with a favorable course of pneumonia, uricemia returns to normal values. As the patient recovers, uricemia reaches its usual (including abnormal) values.
Initial hyperuricemia and hyperexcretion of uric acid, as a rule, are associated with a favorable outcome of the course of pneumonia. When used in the treatment of high doses of intravenous ascorbic acid, the dynamics of uricemia was much less pronounced.
Conclusion(s):
1. The level of uricemia is an informative tool for monitoring the course of novel coronavirus pneumonia.
2. Initial hyperproductive type of the hyperuricemia, preceding the development of new coronavirus pneumonia, can be considered as a metabolic prognostic sign of the future favorable course and outcome of pneumonia.
3. The use of high doses of ascorbic acid in the treatment of patients with novel coronavirus pneumonia can compensate for the low production of uric acid and is advisable in patients with initial hypouricemia and hypouricorachia.

09AP02-04
Nephrogenic diabetes insipidus induced by amphotenicin-B in a patient with rhinosinusal mucormycosis. About a case

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Background: Amphothenicin-B nephrotoxicity continues to be one of the limiting factors in its use. Although severe ionic alterations secondary to distal tubular acidosis are more frequent, we must not forget nephrogenic diabetes insipidus secondary (NDI) to Amphotenicin-B.
Case Report: 17-year-old woman with diabetes complicated by several episodes of diabetic ketoacidosis. She went to the emergency room for left hemicranial headache with diplopia and ptosis and bloody rhinorrhea. Rhinosinusal mucormycosis was diagnosed, beginning treatment with liposomal Amphotenicin-B (10mg/kg/day) and Isavuconazole, in addition to four surgical interventions.
After the last surgery, she presented pain that was difficult to control with the need for perfusion opioids, associated with vomiting, drowsiness and polyuria (>8ml/kg/h). Severe dyselectrolytemia stands out with K + 1.6mEq/l, Na 159mEq/l, Cl 116mEq/l, Mg 2.41mg/dl and Ca 15.9 mg/dL, blood glucose> 250mg/dl.
She was admitted to the ICU with GSC 11, normal kidney function and internal environment alteration. Fluid therapy is started to correct hypernatremia and potassium replacement, as well as IV insulin infusion.
Osmolarity and ions are requested in blood and urine: osmS 327mmol/kg, osmO 280mmol/kg, NaO 16mEq/l, Ko 24mEq/l, compatible with DIN secondary to Amphotenicin-B. The dose was reduced to 3mg/kg/day and treated with hydrochlorothiazide and amilorine. A stimulation test with desmopressin (4mcg) was performed without obtaining a response.
She was discharged on the 7th day, with GSC 15, ions and glycemia in range with insulin perfusion and reduction in the rate of diuresis.
Discussion: Although the new formulations of Amphotericin B have reduced its adverse effects, at doses of ≥10gr/kg, it can cause a "NDI like", altering the tubular membrane and preventing endogenous ADH from acting in the collecting duct, so that ADH exogenous does not present a response, as happened with our patient.
Maintained hyperglycemia, emetic symptoms, and the use of nephrotoxic drugs could perpetuate polyuria and worsen the internal environment and renal function.
Although treatment is not clear, fluid replacement, electrolyte correction, and certain drugs such as Indomethacin, Hydrochlorothiazide, and Amiloride appear to be effective.
References:
Harbarth S, et al. The epidemiology of nephrotoxicity associated with conventional amphotericin B therapy. Am J Med 2001.
Learning points: Amphotenicin-B. NDI. Diselectrolytemia.

09AP02-05
Myasthenia gravis secondary to pembrolizumab as a directed treatment of colorectal cancer. About a case

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Background: In recent years, the advancement of targeted cancer therapies has increased. Pembrolizumab (PBZ) is a monoclonal antibody, used as an anticancer agent, which, although effective, has serious side effects, since it is capable of enhancing the immune response and generating inflammatory reactions related to the immune system. Among the adverse reactions in the central nervous system, the most frequent are headache, dizziness or peripheral neuropathy. However, encephalitis, Guillén-barré syndrome or Myasthenia gravis (MG) are reactions considered very rare.
Case report: Woman, 72 years-old, diagnosed with stage IV colon cancer under treatment with PBZ. She comes to the ICU for asthenia, ptosis, dysphagia and progressive dyspnea.
After ruling out pulmonary thromboembolism and suspecting MG, anti-acetylcholine receptor antibodies were requested to confirm the diagnosis.
She suffered respiratory deterioration requiring intubation and mechanical ventilation. The used treatments were: plasmapheresis, pyridostigmine and corticosteroids at high doses with discrete transitory improvement. Given the new clinical worsening, Tacrolimus was added with slow but progressive improvement. She required a tracheostomy at 10 days, and could be discharged to the ward after 36 days of stay in the ICU.
Discussion: The development of drugs targeting specific tumours represents a new approach in antineoplastic therapies.
PBZ selectively inhibits PD-1, a programmed death receptor that decreases the activity of T cells through the overexpressed PD-L1 and PD-L2 ligands in certain tumours, thus enhancing the immune and antitumor response of T cells.
In MG, autoantibodies destroy acetylcholine receptors, producing muscle weakness, which may affect the respiratory muscles and require intubation, as was the case in our patient.
Although MG is considered a rare adverse reaction in clinical trials published to date, the increasingly widespread use of this drug in cancer patients is causing an increase in its incidence. It is important to consider it in all patients with symptoms compatible with MG undergoing treatment with PBZ.
References:
Zimmer L, et al. Neurological, respiratory, musculoskeletal, cardiac and ocular side- effects of anti-PD-1 therapy. Eur J Cancer. 2016.60:210-225
Learning points: Myasthenia gravis. Pembrolizumab. Acute respiratory failure.

09AP02-06
Flow controlled ventilation as a novel useful strategy in weaning from extracorporeal membrane oxygenation therapy in critical course of COVID-19 in parturient – case presentation

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Background: Mortality of Covid-19 patients supported with veno-venous extracorporeal membrane oxygenation (ECMO) reaches 38.%.[1] As the duration of ECMO is associated with increased mortality and (hematologic) complications, weaning is crucial. Effective yet protective ventilatory strategies are urgently needed.[1]
Flow Controlled Ventilation (FCV) may facilitate ECMO weaning by decreasing the mechanical energy transferred to and dissipated in the patient's lungs due to the active and fully controlled expiration.[2]
Case Report: A 24-year-old parturient without comorbidities was admitted to hospital for initiation of V-V ECMO due to critical course of COVID-19. Mechanical ventilation was started on the day of caesarean section (32nd gestational week) and ECMO two days later (Resp score 5; ECMO flow 3,5 l/min, sweep gas at 4 l/min).
Initially, we applied ultraprotective ventilation, PEEP titration, neuromuscular blockade, and proning. Norepinephrine was used and SOFA score was 9. Due to heparin and thrombocytopenia, the patient had a bleeding disorder and required multiple transfusions of blood products.
During daily ECMO weaning trials using pressure released volume-controlled ventilation mode (FiO2 0,6) and PEEP titration, normocapnia and sufficient oxygenation were not achieved. On the 9th day of ECMO therapy, FCV was initiated (FiO2 0,6; Inspiration Flow 14 L/min; I:E ratio 1:1,1; Peak 28 mbar; EEP 9 mbar). PaO_2/FiO_2 increased from 96 to 154 and pCO_2 decreased from 63 to 44 mmHg. At 12th day ECMO therapy could be terminated under FCV. Static compliance of the lungs increased from 13 ml/cm H2O to 28 ml/cm H_2O. Two weeks after ECMO termination conventional ventilation is still being applied in the ICU.
Discussion: We present the first case using FCV as an effective method to improve ventilation parameters in patients undergoing ECMO therapy. In this patient FCV significantly improved oxygenation while reducing hypercapnia and shortened ECMO therapy.
References:
1. Ramanathan K, et al. Extracorporeal membrane oxygenation for COVID-19: a systematic review and meta-analysis. Crit Care. 2021 Jun 14;25(1):211
2. Barnes T et al. Minimisation of dissipated energy in the airways during mechanical ventilation by using constant inspiratory and expiratory flows - Flow-controlled ventilation (FCV). Med Hypotheses. 2018 Dec;121:167-176
Learning points: FCV may improve weaning from ECMO and shorten ECMO duration. Presented finding requires confirmation in clinical studies.

09AP02-07
Respiratory muscles contraction sonographic assessment during mechanical ventilation

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Background and Goal of Study: During respiratory cycle, ultrasound assessment of diaphragm and intercostal inspiratory muscles as well as abdominal wall expiratory muscles are well-described non-invasive, bedside, tool applicable to evaluate respiratory muscles activity contractions [1]. The primary aim of the present investigation is to assess the intra- and inter-operators' agreement of diaphragmatic and intercostal muscles ultrasound along with abdominal wall expiratory muscles.
Materials and Methods: After local committee approval and according to Elsinki Declaration principles, in ten critically ill intubated patients, two assessors carried out sonographic evaluations of diaphragmatic and intercostal muscle as well as external oblique, internal oblique, transversus muscle, and rectus muscle during tidal breath. Each operator blindly obtained, through an ultrasound machine equipped with linear probe, two assessments for each respiratory muscle. During each sonographic assessment 3 breaths were measured, and the related muscle thickening fractions were computed and averaged. Intraclass correlation coefficient (ICC) was computed with the bootstrap 95% confidence interval (CI) to evaluate both intra- and inter-rater reliability. ICC >0.75 was considered for good agreement [2].
Results and Discussion: A total of 720 breaths were measured by the two operators in the study cohort. As depicted in table 1, ICCs of the thickening fractions computed were higher than 0.750 for all the respiratory muscles evaluated.
Conclusion(s): Ultrasound assessment of respiratory muscles thickening fraction is a reliable tool to be employed for advanced respiratory monitoring during mechanical ventilation.

	Assessors 1		Assessor 2		Assessor 1-Assessor 2	
Respiratory muscle	ICC	95%CI	ICC	95%CI	ICC	95%CI
Diaphragm	0.870	0.130-0.947	0.913	0.393-0.948	0.796	0.280-0.923
Intercostal muscle	0.975	0.536-0.997	0.943	0.756-0.954	0.919	0.374-0.961
Rectus	0.816	0.144-0.974	0.872	0.080-0.938	0.782	0.228-0.912
External Oblique	0.985	0.950-0.994	0.930	0.697-0.987	0.866	0.759-0.928
Internal Oblique	0.971	0.857-0.994	0.967	0.752-0.992	0.923	0.822-0.966
Transversus	0.945	0.055-0.968	0.938	0.584-0.984	0.898	0.564-0.950

Table 1. Respiratory muscles intraclass correlation coefficient for thickening fractions of respiratory muscles assessed through ultrasound.
ICC, intraclass correlation coefficient; 95% CI, bootstrap agreement 95% confidence interval

References:
1. Dres M, et al. Anesthesiology. 2020.
2. Koo TK. J Chiropr Med. 2016

09AP02-08
Ventilator - associated pneumonia in critically ill COVID-19 patients

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Background and Goal of Study: The implications of nosocomial infections associated with invasive devices among critically ill patients infected with SARS-CoV-2 admitted to Intensive Care Unit have been a matter of concern during the first wave of the pandemic. We conducted a retrospective and observational study to analyze the incidence of ventilator-associated pneumonia and their impact in critically ill COVID 19 patients.
Materials and Methods: We retrospectively review medical records of COVID 19 patients admitted toICU ofCruces University Hospitalbetween march and may 2020. Age, sex, medical history, APACHE II score, specific risk factors, laboratory data, requirement of hemodynamic support, days of mechanical ventilation, ICU stay and mortality were included in analysis. The most frequent microorganisms found were also analyzed. Statistical analysis was performed with SPSS 23.0 software.
Results and Discussion: 57 patients with SARS-CoV-2 infection admitted to ICU were analyzed.23% had ventilator – associated pneumonia. Gram negative bacilli microorganisms were the most frequent germs (85%) and Pseudomona aeruginosa the main microorganism isolated. A greater number of patients presented risk factors (89% treatment with corticosteroids, 100% broad-spectrum antibiotic, and 100% central venous catheters). Apache score mean was 14,75. Sepsis was observed in 95% and septic shock in 5% of patients. Mortality of 32% was observed in patients with ventilator – associated pneumonia.
Conclusion: Ventilator – associated pneumonia of critically ill patients infected with SARS-CoV-2 admitted to ICU was associated with slight increased mortality. Gram negative microorganisms were the most frequent germs (85%). Rational use of broad-spectrum antibiotics and corticosteroids could help reduce this complication, but host susceptibility to these infections probably played an important role. The difficulty of differentiating new chest radiograph infiltrates has been able to overestimate the number. Our study had limitations as its small size and retrospective design required larger and more powerful studies to address this issue.

09AP02-09
Single or combined prokinetic therapy for feed intolerance in mechanically ventilated patients admitted to intensive care unit?

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Background and Goal of Study: Intolerance to enteral nutrition is common in critically ill adults, and may result in significant morbidity including ileus, abdominal distension, vomiting and potential aspiration events.
There are several therapeutic options that help to overcome feeding intolerance.
Combination of prokinetic drugs with different mechanisms of action is frequently used when feeding intolerance is not improved with a single agent. In this study, we evaluated the effect of combined infusion of neostigmine and erythromycin on gastric passage in critically ill patients in ICU compare with neostigmine or erythromycin alone.
Materials and Methods: In this double-blind randomized clinical trial, a total of 120 patients between 20 and 65 years of age who were under mechanical ventilation and had gastric residual volumes (GRV) >120 ml (3 hours after the last gavage) were randomly assigned into three groups with 40 patients in each group: group A (intravenous neostigmine 2.5mg/ 100 ml normal saline), group B (intravenous erythromycin 200mg/100 ml normal saline), group C (combination of both agents at the mentioned doses). Gastric volume aspiration was first performed before starting the study and then at 3, 6, 9, and 12h after the infusion of study drugs was finished. Successful feeding was defined as a gastric residual volume <120mL with the feeding rate ≥40 mL/hr.
Results and Discussion: Severity of illness based on the sequential organ failure assessment score (SOFA), demographic data, blood glucose levels, and use of inotropes, opioids, and benzodiazepines were similar between the three groups. In the combination group, 88.4% of patients showed GRV improvement (GRV<120cc), whereas in the erythromycin and neostigmine groups, 62% and 47.2% of the patients, respectively, showed improvement ($p<0.001$).
The frequency of overall adverse effects in the erythromycin , neostigmine, and combination groups were 8.3%, 11.7%, and 7,2%, respectively ($p=0.28$).Watery diarrhea was more common with combination therapy ($p = 0.01$) but was not associated with enteric infections, including Clostridium difficile.
Conclusion(s): In critically ill patients with feed intolerance, combination therapy with erythromycin and neostigmine is more effective than erythromycin or neostigmine alone in improving the delivery of nasogastric nutrition. Further study is required to examine the role of combination therapy as the first-line therapy.

09AP02-10
Respiratory microbiota and immunonutrition in brain trauma patients

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Background: Recent researches showed extensive crosstalk between the gut microbiome and the brain. Aim of this study is to evaluate the effects of immunonutrition on respiratory microbiota in brain trauma patients admitted in Intensive Care Unit.
Case Report: We enrolled 16 adult patients (age >18 years) with traumatic brain injury who required intubation. All patients received enteral nutrition (25-30 Kcal/ Kg body weight) and were randomly divided in 2 groups: patients with immunonutrition (Impact® Enteral) and patients with standard nutrition. We collected BAL samples at admission (Day 0) and Day 7 and thereafter we analyzed DNA Lung Microbiota through "Ion Torrent, Next-Generation Sequencing (SNG) (Thermo Fisher Scientific)®" kit.
Discussion: There are no differences among 2 groups at ICU admission in sex, age, BMI, Nutric Score, Apache II score and SAPS II score. We analyzed lung microbiota richness and biodiversity through Shannon Index (Fig 1,2).

Figure 1.

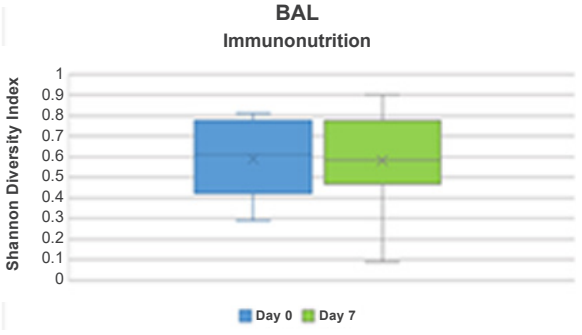

Figure 2.

There are no difference among 2 groups at admission, unlike biodiversity is slightly reduced in patients with standard nutrition during ICU length of stay (Fig 3).

	Nutrition	Day 0	Day 7	p-value
Shannon Index	Immunonutrition	0.61 [0.29-0.81]	0.58 [0.09-0.90]	0.94
	Standard nutrition	0.67 [0.40-0.72]	0.79 [0.52-0.83]	0.04

Conclusion(s):These preliminary data showed that immunonutrition is linked to maintenance of physiological microbiota environment. More data are needed to confirm these preliminary results.

09AP02-11
Food coma: hyperammonemic crisis in urea cycle disorders

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Background: Citrullinemia type 1 is a rare inherited metabolic disease caused by a deficiency of Argininosuccinate Synthetase 1 – an enzyme of urea cycle[1]. This condition disrupts urea cycle, which is the main pathway for ammonia degradation. The classic presentation occurs during the neonatal period, however, milder forms with late onset manifestations have been described. The clinical hallmark of acute decompensation at any age is hyperammonemic crisis.
Case report: An 18-year-old female with citrullinemia type 1 and borderline personality disorder was admitted to the emergency department after trying suicide with ingestion of high protein content yogurts and energy bars.
Initially, the patient was fully awake and with no neurologic alterations. However, her clinical condition evolved with nausea, vomiting, headache and altered mental status that rapidly progressed to coma. Endotracheal intubation was performed and blood sample revealed an hyperammonemia of 780umol/L. Brain CT also showed signs of metabolic/toxic encephalopathy which validates the diagnosis of hyperammonemic encephalopathy caused by protein intoxication.
The patient was then admitted to the ICU and continuous venovenous hemofiltration (CVVH), sodium benzoate and arginine were initiated to decrease ammonia levels. CVVH was interrupted when ammonia levels decreased to 54umol/L. Two days after admission, she was successfully extubated and started an individualized oral diet. She was discharged by day 5 without neurologic deficits or other disfunctions.
Discussion: Ammonia is a well recognized and potent neurotoxin. Hyperammonemic crisis is a neurologic emergency since it can cause cerebral edema, increased intracranial pressure, herniation, and death. Despite their severity, urea cycle disorders such as citrullinemia are rare conditions and most physicians have relatively little experience with crisis management. Prompt recognition is critical as prognosis is strongly influenced by duration of coma and extent of ammonia elevation. Renal replacement therapy should be considered as first-line treatment if ammonia exceeds 200 umol/L, associated with ammonia scavengers and arginine.
References:
Urea Cycle Disorders Overview; Adam MP, et al.. Seattle (WA): University of Washington, Seattle; 1993-2022.
Learning points: Importance of prompt recognition of hyperammonemic crisis - an established neurologic emergency; Renal placement therapy is the first-line treatment if ammonia levels exceed 200 umol/L.

09AP02-12
Severe symptomatic hypercalcaemia in pregnancy: what to do?

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Background: Primary hyperparathyroidism (PHPT) in pregnancy is rare, with a reported incidence of 1%. Maternal and fetal complications increase proportionally to maternal serum calcium levels. Early diagnosis and adequate management are required to avoid complications.
Case report: A 23-year-old female with medical history of radiofrequency ablation of accessory pathway in adolescence, polycystic ovary syndrome and a recent diagnosis of PHPT, probably caused by parathyroid adenoma, presented at the emergency department with vaginal bleeding and fatigue.
Blood tests showed PTH level of 535 pg/ml, phosphate 2.2 mg/dl, calcium 3.82mmol/L, Vitamin D 44 nmol/l, urinary calcium/creatinine ratio =0.009. An abdominal ultrasonography confirmed a 13-week pregnancy.
This patient was admitted in the ICU and initially managed conservatively with oral and intravenous fluid rehydration and took a single dose of 30 mg cinacalcet. A targeted inferior left-sided parathyroidectomy was performed at 14-week gestation due to severe and persistent hypercalcemia (max 4.06 mmol/L) and sudden onset of paroxysmal supraventricular tachycardia.
The procedure was uneventful and histology confirmed a left parathyroid adenoma. Within 24 hours after surgery the patient developed symptomatic hypocalcemia and required intravenous calcium gluconate infusion in the five postoperative days.
Discussion: Therapeutic management of PHPT in pregnancy remains a challenge due to limited safe options. Cinacalcet has been used in a few cases of severe hypercalcemia although there is no official approval. Parathyroidectomy is the only definitive treatment and recent guidelines recommend surgical approach on 2nd trimester if serum calcium >2,85 mmol/L.
There is no other firm recommendation regarding parathyroidectomy related to incomplete organogenesis in the 1st trimester and the risk of preterm birth in the 3rd trimester. Thus, treatment should be individually tailored according to gestational age, severity of hypercalcemia and the risk–benefit balance.
References:
McCarthy *et al*. Management of primary hyperparathyroidism in pregnancy: a case series. Endocrinology, Diabetes & Metabolism Case Reports 2019. https://edm.bioscientifica.com/ Published by BioscientificaLtd.
Learning points: Maintaining calcium homeostasis can be a challenge in pregnancy and lead to both maternal and fetal complications. PHPT still lacks more evidence to ensure safe treatment options in this population.

09AP03-01
Total and ionized magnesium in intensive care patients with COVID-19

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Background: Low magnesium levels are associated to increased COVID-19 mortality [1-2]. Ionized magnesium serum level is a biomarker of impaired magnesium status in critically ill patients [3].
We aimed to evaluate the association between the ratio magnesium/calcium (Mg/Ca) and ionized-magnesium/ionized-calcium (iMg/iCa) with mortality in intensive care patients with severe COVID -19.
Methods: A retrospective cohort study was conducted on 133 SARS-Cov-2 positive patients admitted to COVID ICU for respiratory failure. Outcome was assessed 30 days after ICU admission or until hospital discharge. Blood samples collection took place at admission.
Results: Serum magnesium and calcium values were within the normal range in all the 133 patients admitted to COVID-19 ICU. No correlation between Mg and Ca serum levels and well known COVID-associated risk factors such as obesity, diabetes or hypertension was found, neither significant difference in patients treated with invasive or non-invasive ventilation. Both the Mg/Ca (fig 1A) and iMg/iCa (fig 1B) ratios were higher in surviving patients than in non-survivors ($p < 0.001$). Mg/Ca ratio <0.3 mg/dl and iMg/iCa ratio of less than 0.55 mmol/L were associated with higher mortality in patients with severe COVID-19.

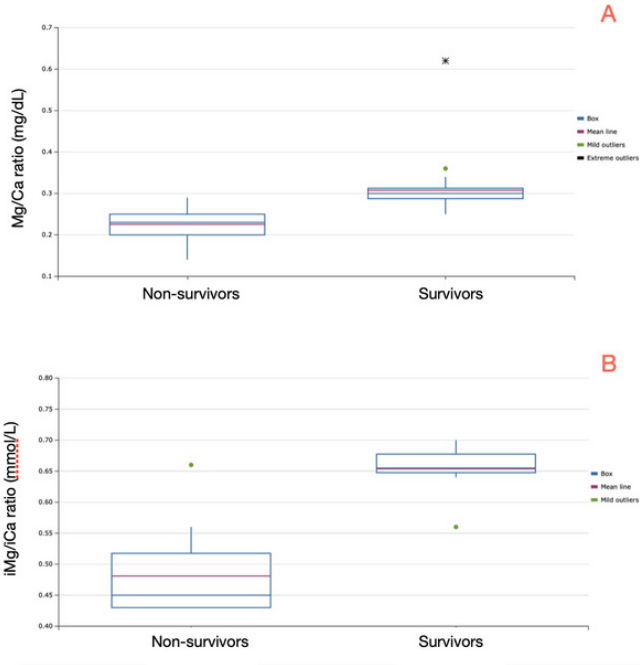

Figure 1: A Box Plot Mg/Ca ratio by outcome.
B Box Plot iMg/iCa ratio by outcome.

Conclusions: Even if a Mg/Ca ratio <0.3 mg/dl and an iMg/iCa ratio <0.55 are associated with higher mortality, unfortunately, at present we do not possess enough knowledge to answer to the question: does supplementation of magnesium offer a therapeutical opportunity?

References:
1. Medeiros de Morais C. Nutritional therapy in COVID-19 management. *Kompass Nutr Diet.*2021;1:10–12.
2. Trapani, V., Rosanoff, A., Baniasadi, S., Barbagallo, M., Castiglioni, S., Guerrero-Romero, F, Iotti, S., Mazur, A., Micke, O., Pourdowlat, G., Scarpati, G., Wolf, F I., Maier, J. A. (2021). The relevance of magnesium homeostasis in COVID-19.*European journal of nutrition*, 1–12.
3. Scarpati G, Baldassarre D, Oliva F, Pascale G, Piazza O. Ionized or Total Magnesium levels, what should we measure in critical ill patients?. *Transl Med UniSa*. 2020;23:68-76.

09AP03-03
Nitrofurantoin-induced ARDS in immunosuppressed patient: a case report

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Background: Nitrofurantoin is a widely prescribed antibiotic to treat lower urinary tract infections (UTIs) as well as prophylactic treatment against recurrent UTIs. Pulmonary nitrofurantoin-induced toxicity is a rare side-effect and is classified as acute, sub-acute or chronic. The acute form of the illness has a higher incidence and occurs in approximately 1 in 5000 patients after first exposure.[1,2]
Case Report: A 54-year-old immunosuppressed woman presented with increasing shortness of breath 3 days after initiation of nitrofurantoin to treat recurrent UTI. In her medical past, she received simultaneous pancreas-kidney transplant (SPK) for type I diabetes and renal chronic failure. Brought to the Emergency Department (ED), she deteriorated in the first 24h with respiratory failure and shock requiring intensive care unit (ICU) admission with mechanical ventilation and vasopressor support. Empiric antibiotic IV therapy was started and nitrofurantoin was stopped. A CT-scan showed bilateral infiltrates. A bronchoalveolar lavage was compatible with acute aspecific reaction. Treatment with steroids was initiated and her immunosuppressive therapy was adapted.
Discussion: Nitrofurantoin pulmonary drug side-effects are rare but can result in life-threating conditions and prolonged hospitalisations. Pulmonary pathologies associated with nitrofurantoin toxicity include cryptogenic organizing pneumonia, diffuse alveolar haemorrhage and acute, sub-acute or chronic interstitial lung disease.The gold-treatment remains withdrawal of the drug.
References:
1. Huttner A et al. Nitrofurantoin revisited: a systematic review and meta-analysis of controlled trials. J antimicrob Chemother. 2015 Sep, 70 (9) : 2456-64
2. Kabbara WK, Kordahi MC. Nitrofurantoin-induced pulmonary toxicity: A case report and review of the literature. J Infect Public Health. 2015 Jul-Aug; 8(4):309-13
Learning points:
- Nitrofurantoin drug-induced pulmonary toxicity is a rare side-effect and is classified as acute, sub-acute or chronic.
- It should be promptly diagnosed by physicians, particularly in patients with a past medical history drug-exposition.
- Stopping nitrofurantoin is the gold standard for recovery.

09AP03-04
Neuroleptic malignant syndrome – critical presentation of a rare pathology with many complications

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Background: Neuroleptic malignant syndrome (NMS) is a life-threatening neurologic emergency associated with the use of antipsychotic agents and characterized by the tetrad of mental status change, rigidity, fever, and dysautonomia.
Case Report: A 54 year-old male with schizophrenia, primary hypertension and dyslipidaemia, on haloperidol, olanzapine, losartan and trihexyphenidyl, presented to the Emergency Department with a history of sudden rigidity and altered mental state, without loss of conscience or tonic-clonic movements.
Objectively: unresponsiveness to stimulus, flexion posture of all limbs, generalized augmented tonus and neck rigidity, hemodynamic stability, diaphoresis and hyperthermia of 42°C. Complementary studies revealed high creatinine kinase and hyperlactacidemia. Computorized tomography scan and lumbar puncture excluded intracranial lesions and infection, toxicology was positive for benzodiazepines. Patient was admitted to intensive care unit (ICU), with the diagnosis of NMS, and dantrolene treatment was initiated.
Despite treatment, patient evolved with sinus tachycardia, blood pressure lability requiring both vasopressors and antihypertensors, progressive deterioration of mental status requiring orotracheal intubation. Patient also had thrombotic events, namely left radial and subclavian, right cephalic, umeral and axillary deep vein thrombosis (DVT) secondary to thrombophlebitis of distal vessels.
After 14 days of dantrolene, with no clinical improvement, bromocriptine was initiated, with neurological improvement, reduced muscular tonus, weaning of ventilation and extubation after 17 days. Patient was transferred to medical ward for reintroduction of antipsycotics.
Discussion: NMS is a diagnostic challenge without proven treatments efficacy. Mental status change is the initial symptom in 82 percent of patients(1), but is often disregarded, given the usual psychiatric comorbidity of the typical patient.
References:
Velamoor VR, Norman RM, Caroff SN, Mann SC, Sullivan KA, Antelo RE. Progression of symptoms in neuroleptic malignant syndrome. J NervMent Dis. 1994 Mar;182(3):168-73.
Learning points: This case reports many of the classic symptoms of NMS, which required support on ICU and had associated complications, such as rhabdomyolysis, thrombophlebitis and DVT. Swift diagnosis of the syndrome, suspension of antipsychotics, supportive care, and management of complications are the cornerstones for favourable outcome in NMS.

09AP03-05
How accurately BOBI score predicts mortality in patients with burn injuries

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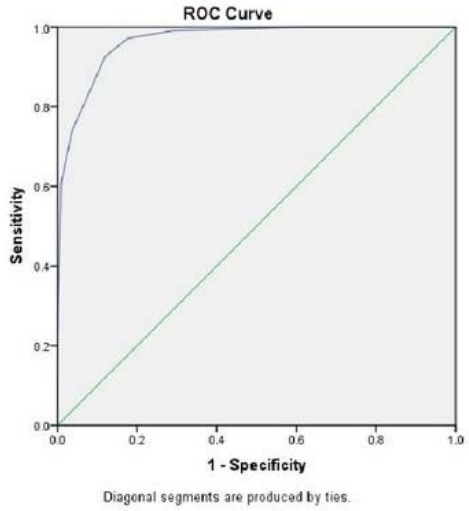
Background and Goal of Study: Burn mortality indicators and prognostic scores are fundamental in arranging to triage burned patients in agreement with the seriousness of the problem. Belgium Outcome Burn Injury (BOBI) score is a score that is validated in numerous studies. The aim of this presentation is to validate the use of the BOBI prognostic score in our patients.
Materials and Methods: The study is designed as a retrospective clinical and analytical cohort of 1515 patients hospitalized in ICU of the service of Burns, University Hospital Center "Mother Teresa 'In Tirana Albania during 2010-2019. The BOBI score uses absolute values of age which is divided into four groups(0-3 points), of BSA(%) which is divided into 5 groups (0-4 points), and the presence of inhalational burn (No=0 point; yes=3 points).
This formula predicts mortality by total score. Based on the total score (0-10 points), predicted mortality ranges between 0.1% and 99%. The Receiver Operator Characteristic (ROC) curve was used to test the score for mortality.
Results and Discussion: During this period 1515 patients were included. The mean age of the patients was 25.7±3.1 years, 40% of the total number have flame as the causative agent. In the children group, mortality was lower 0.9% (7 deaths of 763 patients 0-14 years), in the adults' group mortality was 7.7 % (42 deaths of 539 patients) while the elderly population mortality was 27.2%.In table 1 we have presented the prediction of the BOBI score for mortality and the real outcome.

	SURVIVE	DEAD	TOTAL	MORTALITY	MORTALITY	DEATHS		
				Observed (%)	Predicted (%)	Predicted (%)		
BOBI score						from	to	average
0	550	0	550	0	0-1	0	5.5	2.75
1	448	1	449	0.22	1-5	4.49	22.45	13.47
2	161	2	163	1.23	5		8.15	8.15
3	81	5	86	5.81	10		8.6	8.6
4	64	11	75	14.67	20		15	15
5	53	9	62	14.52	30		18.6	18.6
6	38	14	52	26.92	50		26	26
7	10	32	42	76.19	75		31.5	31.5
8	3	20	23	86.96	85		19.55	19.55
9	0	11	11	100	95		10.45	10.45
10	0	2	2	100	99		1.98	1.98
TOTAL	1408	107	1515				167.78	156.05

Table 1. Predicted deaths during 2010 - 2019 (n=1515)

In figure 1 we have presented the ROC curve for validating this score (0.965, p<0.0001)



Area Under the Curve

Test Result Variable(s): BOBI SCORE

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.965	.007	.000	.952	.978

The test result variable(s): BOBI SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.
a. Under the nonparametric assumption
b. Null hypothesis: true area = 0.5

Figure 1. Area under the curve for BOBI score and mortality

Conclusion(s): BOBI score is a very good predictor of mortality in burn patients.

09AP03-06
Nosocomial infection rates in the Burn Intensive Care Unit

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Background and Goal of Study: The TensorTip™ MTX is a non-invasive device measuring various vital signs, blood content and blood gas analysis. Studies on accuracy and precision have thus far only been conducted by the manufacturer. The aim of our study was to investigate the accuracy and precision of the TensorTip in comparison to measurements obtained with a artery catheter.
Materials and Methods: After informed consent was provided, 53 patients scheduled for elective surgery were included. Placement of the arterial catheter was part of the elective procedure. During hemodynamically stable conditions measurements where obtained and compared using Bland-Altman analysis. A bias of 5 mmHg and maximal LoA of 8mmHg was considered acceptable for Blood pressure. A percentage error greater than 20% was considered clinically undesirable in blood content and blood gas.

Results and Discussion: The device malfunctioned in 9-12 of 53 patients (17-23%), resulting in 41-44 paired observations. Bland-Altman plots for mean arterial pressure, haemoglobin and carbon dioxide partial pressure are displayed in figure 1. Accuracy, precision and percentage error are presented in table 1. All parameters were subject to proportional bias. accuracy, precision and percentage error was insufficient. In addition, the device regularly gave error messages. The screen of the device was not always accessible due to the positioning of the patient.

Conclusion(s): The TensorTip was not able to reliably measure vital parameters and blood analysis compared to values obtained with an arterial catheter. Moreover, practical drawbacks hamper the use of the device in perioperative and critical care.

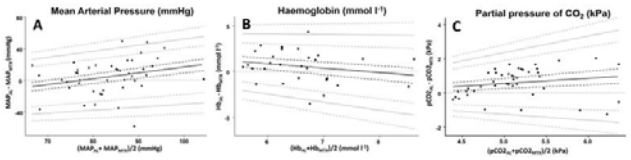

Figure 1. Bland-Altman plot for TensorTip MTX

Parameter	Bias (95%-CI)	± LoA (95%-CI)	PE (95%-CI)
MAP (mmHg)	4.2 (-1.9 to 10.4)	±40.8 (30.2 to 51.4)	48.9% (36.1 to 61.7)
SAP (mmHg)	6.6 (-2.2 to 15.4)	±56.3 (41.1 to 71.5)	45.4% (33.1 to 57.7)
DAP (mmHg)	-6.8 (-11.9 to -1.8)	±32.5 (23.7 to 41.3)	47.7% (34.9 to 60.4)
O_2 Sat (%)	-1.01 (-0.36 to -1.67)	±4.33 (3.20 to 5.46)	4.4% (3.3 to 5.6)
pCO_2 (kPa)	0.61 (0.32 to 0.89)	±1.87 (1.39 to 2.36)	36.6% (27.1 to 46.2)
pO_2 (kPa)	8.09 (5.22 to 10.97)	±19.07 (14.09 to 24.05)	110.2% (81.4 to 139.0)
Hb (mmol l^{-1})	0.57 (0.05 to 1.10)	+3.50 (2.58 to 4.41)	53.1% (39.2 to 67.0)

Precision and accuracy of the most practical values that can be measured by the TensorTip MTX. MAP, mean arterial pressure; SAP, systolic arterial pressure; DAP, diastolic arterial pressure; pCO_2, carbon dioxide partial pressure; pO_2 oxygen partial pressure; Hb, Haemoglobin; LoA, Limit of agreement; PE, percentage error.

Table 1. Numerical values from Bland-Altman analysis of MTX parameters

09AP03-08
Neurocognitive impairment, biomarkers and advanced imaging in COVID-19 critical care survivors

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Background and goal of study: A feature of severe COVID-19 is temporary and extended neurocognitive impairment of which the causes have not yet been fully elucidated. In this study, we aim to relate neurocognitive impairment in COVID-19 critical care survivors with biomarkers of immune activity, coagulopathy, and neuronal injury temporally to assess long-term structural and functional brain changes.

Materials and methods: At 3-, 6-, 12- and 24-months post-discharge, follow up bio-samples will be analyzed. Biomarkers that will be measured include neurofilament light and total-tau as markers for neuronal injury, along with glial fibrillary acidic protein as a marker of astrocytic activation. At 3-,12- and 24-month follow-ups neuropsychological evaluation, MRI of the brain and lungs and neurological assessment are conducted. The cognitive test battery includes eight tests and three self-reported questionnaires.

Results and discussion: We have performed 51 3-month follow-up MRIs and 43 12-month follow up MRIs. Two patients (~4%) have had incidental findings requiring activation of the Incidental Findings Management Plan. Furthermore, the neuropsychological and neurological examinations have revealed varying and mixed patterns. Several patients expressed cognitive and/or mental concerns and fatigue, complaints closely related to brain fog. Temporal biomarkers of immune activity, neurodamage and neurodegeneration will be analyzed shortly.

Variable (N=56)	%	Mean (Range)
Age		57.6 (23-79)
Sex, Female	28%	
BMI		31.1 (20.3-42.3)
Smoker/previous smoker	39%	
Charlson Index (non-Age)		(0-8)
Hypertension	52%	
Ischemic Heart Disease	12%	
Diabetes Mellitus	36%	
Obesitas	46%	
SAPS III Score		50 (37-70)
PFI on ICU arrival		11.5 (6.2-29)
MV / NIV / HFOC prior ICU	38% / 5.4% / 34%	
ICU days		8.3 (1-51)

Table 1.Demographics

Conclusion: The study goal is to gain a better understanding of the pathological mechanisms and neurological consequences of this new disease, with a special emphasis on neurodegenerative and neuroinflammatory processes, to identify targets of intervention and rehabilitation.

09AP03-09
Successful sugammadex reversal of rocuronium-induced bi- or unilateral pupillary dilation in COVID-19 ARDS patients

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Background: Management of Covid-19 related severe acute respiratory distress syndrome (ARDS) often requires deep sedation and neuromuscular blocking agents (NMBA) administration. In this condition, neurologic assessment is often difficult, and evaluation of pupil size and reactivity are crucial elements. Fixed pupil dilation rises a suspicion for central nervous system damage and is not expected as an adverse reaction of NMBA administration. However, it has been observed in a few Covid-19 ARDS patients[1], probably due to blood-brain-barrier impairment[2]. We evaluated whether sugammadex, selectively reversing rocuronium effects, may reverse fixed pupil dilation in patients receiving a continuous infusion of rocuronium.

Case report: We report a mini-series of three cases of uni- or bilateral pupil dilation with rocuronium infusion. In each patient, as rocuronium was suspected to be the causative agent, it was decided to proceed with a diagnostic test with sugammadex. Instantaneous full recovery was observed.

Discussion: Covid-19 provides increased risk of stroke due to endothelial involvement and enhanced anticoagulation. When pupil dilation occurs in ICU patient, the usual workup includes a cerebral CT scan to investigate for potential brain damage. However, transport of unstable patients comprises a few risks. Also, especially in Covid-19 patients, the risk of virus exposure has to be considered. Therefore, the risk/benefit of each transport must be carefully evaluated.

In the few previous cases rocuronium discontinuation led to complete resolution in a variable timeframe. We demonstrated that rocuronium induced fixed pupillary dilation can be reversed instantly by sugammadex. Moreover, sugammadex administration has been reported as relatively safe.

Once the diagnosis of this rocuronium adverse effect is made, the attitude of either shifting towards another NMBA, or continuation of rocuronium administration while accepting to lose the neurologic evaluation window, remains to be discussed.

References:

1. Zakynthinos GE. J Crit Care. 2021 Oct;65:259-260. doi: 10.1016/j.jcrc.2021.07.005.

2. Buzhdygan TP.Neurobiol Dis. 2020 Dec;146:105131. doi: 10.1016/j.nbd.2020.105131.

Learning points: Rocuronium induced fixed pupil dilation can be reversed by sugammadex which has not been previously described. This could represent an easy bedside diagnostic option, reducing the risk of transportation and sparing human resources.

09AP03-10
Incidence of acute kidney injury in laparoscopic liver surgery

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Background and goal of study: Postoperative acute kidney*injury* (AKI) is associated with an increase in hospital morbidity and mortality.

Major abdominal surgery, especially liver surgery, is one of the known risk factors for the development of AKI, however, more studies are needed on its incidence and impact in our population.

Materials and methods: We conducted a retrospective observational study to evaluate the incidence of AKI in laparoscopic hepatectomy from January 2018 to December 2021 in our hospital. A total of 110 patients were collected. Patients with chronic kidney disease stage ≥ 4, nephrectomy, and kidney or liver transplantation were excluded.

Results and discussion: The incidence of postoperative AKI was 14.5%, all of them KDIGO stage 1 with normalization of renal function at 90 days. Only one patient died during his hospital stay.

The factors related to the development of postoperative AKI were gender (male 14/71 = 19.7% vs. female 2/39 = 5.1%), baseline creatinine (0.9 vs. 1.2 mg/dL) and body mass index -BMI- (25.8 vs 28.4 kg/m2).

Although it was not statistically significant, those who suffered AKI underwent longer surgeries (412 + 174 vs 392 + 190 min) and had more comorbidities: hypertension (62.5% vs 51.06%), anemia (12.5 vs 8, 5 g/dL) and chronickidneydisease (31.3 vs 6.4%).

Patients with AKI suffered a mean clamping time of 107 min, had higher lactic acid at the end of surgery (3.39 mmol/L) that normalized after 48h and were more frequently admitted to the ICU. In addition, 12.5% required blood transfusion, 87.5% received nephrotoxic drugs, and 68.8% perioperative vasoactives.

No statistically significant differences were found in terms of primary cancer vs metastasis in postoperative AKI.

The multivariate analysis only revealed overweight as a risk factor for AKI development in hepatectomies.

Conclusions: Liver surgery has a high incidence of postoperative AKI but just KDIGO stage 1 with no permanent damage.

BMI is a possible independent prognostic factor for the development of postoperative AKI in laparoscopic liver surgery, so as it is a modifiable factor, it is possible to influence it by reinforcing healthy lifestyle habits.

References:

Romagnoli S, Ricci Z, Ronco C. Perioperative Acute Kidney Injury: Prevention, Early Recognition, and supportive Measures. Nephron. 2018; 140: 105-110.

09AP03-11
Does antithrombin administration reduce inflammation during veno-venous ECMO?

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Background and goal of study: Veno-venous Extracorporeal Membrane Oxygenation (ECMO) support is used in the most severe cases of respiratory failure and further exacerbates the patients' inflammatory status. Antithrombin is supplemented during ECMO for its anticoagulant effects, but it also deploys anti-inflammatory properties.

We aimed to evaluate the effect of:

a) antithrombin administration and;

b) antithrombin plasma levels (either endogenous or exogenous) on inflammation during ECMO.

Materials and methods: Ancillary study of the GATRA trial[1]. Forty-six patients were included in the study: 23 randomized to receive antithrombin to maintain a level of 80-120% (study group) and 23 randomized not to be supplemented (control group). Anticoagulation was provided in both groups with heparin infusion to maintain aPTT ratio 1.5–2x. Six cytokines were measured: IL-8, IL-6, IL-10, IL-1β, TNF-α and pro-adrenomedullin (ADM) at 5 timepoints: prior to, 24 h and 72 h after ECMO start, before and 7 days after ECMO removal.

To evaluate the effect of antithrombin administration on cytokines between the two study groups we used random-intercept linear models on log-transformed cytokines and inserted as covariates interaction terms between time and study group to evaluate a time-varying effect.

Results: Duration of ECMO was not very different in the two groups (median 8.0 and 9.9 days in the study and control group, respectively, p=0.49). ARDS was the main cause of respiratory failure (87% of

the patients). In general, higher values of cytokines in the treatment compared to the control group prior to ECMO start were found, especially for IL1β and TNF-α. Cytokines decreased during the study but overall were not very different in the two groups.
Testing the interaction between the study group and timepoints revealed that the administration of antithrombin led to a more rapid decrease over time (reported as delta change (%) with 95% CI) of IL-6: -17% (-30%; -1%), IL-1β: -9% (-15%; -3%), TNF-α:-6% (-9%; -2%) and ADM: -9% (-17%; 0%). Plasma levels of antithrombin were consistently associated with a reduction of cytokines.
Conclusion: Inflammation decreases during ECMO course and is negatively associated with plasma levels of antithrombin. Whether the administration of antithrombin has a causal effect on the reduction of inflammation (and its clinical relevance) must be confirmed by appropriately powered studies.
References:
1 Panigada, M.*et al.Crit. Care Med.*1636–1644 (2020)

09AP03-12
Normoglycemic ketoacidosis and COVID-19

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Background: Ketoacidosis is a metabolic disorder with ketone bodies in the blood, usually associated with diabetes. However, normoglycemic diabetic ketoacidosis is a relatively rare condition that mainly affects pregnant patients, and has been rarely described with COVID19 as presented in our case.
Case report: A 36-year-old woman at 34 weeks of gestation was admitted to the ICU due to severe pneumonia caused by COVID-19. Clinical history: mild extrinsic asthma and grade II obesity, no previous history of diabetes. On admission, the patient showed tachypnea without significant hypoxemia with a blood gas analysis showing severe metabolic acidosis with increased GAP anion. Normoglycemic ketoacidosis was suspected and ketone bodies were found (+++) in urinalysis. Resuscitation with fluid therapy, glucose and bicarbonate was started, obtaining progressive improvement. Corticotherapy and heparin were given. Fetal monitoring showed no signs of fetal distress.
After two days in the ICU, and due to respiratory worsening, an emergency cesarean section was successfully performed. Intubation was required due to respiratory distress on the fourth day of admission, needing invasive mechanical ventilation for seven days. She was discharged to the ICU on day 15 with good general condition and no metabolic alteration.
Discussion: Normoglycemic ketoacidosis is a very rare complication of pregnancy with high maternal and fetal morbidity and mortality. Recent studies describe an intrauterine fetal mortality up to 35%, so diagnosis and treatment should be early. However, the finding of normal blood glucose levels and the fact that it can occur in patients with no history of diabetes makes this condition a diagnostic challenge. COVID-19 pneumonia has been shown to be a stressful event that increases the incidence of ketoacidosis in diabetic patients.
We present a combination of both pathologies.The fact that both pathologies are related to high values of proinflammatory factors allows us to think that COVID19 may be another triggering factor for the establishment of normoglycemic ketoacidosis.
References:
Brit Long et al. Euglycemic diabetic ketoacidosis: Etiologies, evaluation, and management, Am. J. Emerg, 44, 2021, https://doi.org/10.1016/j.ajem.2021.02.015.
Learning points: The high maternal-fetal morbidity of normoglycemic ketoacidosis in combination with the current pandemic situation due to COVID19 would present a serious health problem if such an association exists.

09AP03-13
Critically ill COVID-19: our experience during the first pandemic year

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Background: SARS-CoV-2 outbreak pushed European Intensive Care Units (ICU) to their limits. Experience sharing and information exchange among European hospitals may contribute to the improvement of patient care in our community.
The aim of this study is to describe clinical and demographic characteristics of critically ill COVID-19 patients admitted to the ICU of Gregorio Marañón General Hospital during the first pandemic year.
Materials and methods: This study was approved by the Ethics Committee of Gregorio Marañón General Hospital. We included all the adult patients admitted to the ICU, between the 2nd of March 2020 and the 19th of March 2021, with positive PCR for SARS-CoV-2. We obtained demographic data and clinical data from the medical record.
We used SPSS software to perform a descriptive analysis. We used the median (interquartile range) for quantitative variables, and relative percentage for qualitative variables.
Results: We included 506 patients, 362 men (71,5%) and 144 women (28,5%). Median age was 63 years (IR 53-70).
Their previous medical record is summarized on the next table:

BMI>25	Hypertension	Dyslipemia	Diabetes	Cardiovascular disease	Respiratory disease	CKD
431 (85,2%)	255 (50,4%)	238 (47%)	123 (24,3%)	162 (32%)	126 (24,9%)	61 (12,1%)

Only 74 patients had a normal wight (14,6%). 165 suffered overweight (32,6%), 148 class I obesity (29,2%), 41 class II obesity (8,1%), 31 class III obesity (6,1%), and only 1 was underweight (0,2%).
Among the patients with previous cardiovascular disease, 36 had ischemic cardiopathy (7,1%), 42 arrythmias (8,3%) and 5 previous cardiac surgery (1%).
The symptoms on the moment of COVID-19 diagnosis are summarized on the next table:

Fever	Dyspnea	Cough	Fatigue	Myalgia	Digestive symptoms	Thoracic pain	Head -ache	Anosmia	Other neurologic symptoms
435 (86%)	358 (70,8%)	338 (66,8%)	250 (49,4%)	166 (32,8%)	160 (31,6%)	87 (17,2%)	63 (12,5%)	47 (9,3%)	31 (6,1%)

Unfortunately, 165 patients died (32,6%), including 106 on the first month (64,2%). 3 of them died in the hospital after ICU discharge. The median days from admission to discharge was 25 days (IR 12-38).
343 (67,7%) patients were discharged from the ICU. The median ICU stay was 14 days (IR 8-34).
Conclusions: The most common illness reported on their medical record were obesity and hypertension.
The most frequent symptom on the moment of COVID-19 diagnosis was fever, followed by dyspnea and cough.
One third of the patients died, most of them on the first month of ICU stay. The median of stay was 14 days.

09AP04-01
Use of prognostic biomarker in COVID-19 venous-venous extra-corporeal membrane oxygenation patients: a possible role for mid-regional pro-adrenomedullin?

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Background and Goal of Study: Mid-Regional Pro-Adrenomedullin (MRproADM) is an endothelium-related peptide, used to predict mortality and multi-organ failure in sepsis and respiratory infections. During the pandemic, MRproADM was tested in severe SARS-CoV2 disease suggesting a correlation with the disease progression.
A subgroup analysis was performed in critically ill COVID-19 patients on veno-venous Extra-Corporeal Membrane Oxygenation (vv-ECMO), intrinsically affected by lymphocyte depletion and endothelium-related procedure activation, comparing it with C-reactive protein, procalcitonin, D-dimer, lactate dehydrogenase in predicting mortality.
Materials and Methods: All consecutive COVID-19 vv-ECMO adult patients admitted between September 2020 and June 2021 to the Intensive Care Units (ICUs) of 'Città della Salute e della Scienza' Hospital, Turin, Italy, were enrolled. MRproADM and laboratory tests were measured within 48 hours from ICU admission, on days 3, and 7. Univariate analysis variables were performed.
Results and Discussion: 47 patients were enrolled with an ICU mortality rate of 83%. MRproADM values were not statistically significant between survivors and nonsurvivors in the first 48h from ICU admission (Table 1), but its values seem to show a different trend (Figure 1). Only the lymphocyte count was significant (p=0.0471).

Values	Overall	Survivors	Nonsurvivors	P-value
MRproADM	1.66 (1.32)	1.27 (0.48)	1.75 (1.42)	0.562
D-dimer	7456 (12761)	3759 (4403)	8214 (13787)	0.436
LDH	918 (475)	736 (294)	956 (498)	0.130
CRP	131 (106)	132 (107)	131 (108)	0.966
PCT	1.73 (3.46)	1.37 (1.59)	1.81 (3.75)	0.365
Ly	1.0 (1.3)	2.0 (2.9)	0.8 (0.4)	**0.047**
IL6	409 (639)	29 (27)	447 (460)	0.123

Table 1.

Conclusion(s): Our preliminary results suggest that MRproADM at admission did not differ between surviving and nonsurviving COVID-19 vv-ECMO patients, although its values at days 3 and 7 hint at a difference between groups, even if not statistically significant (p=0.08).
The small sample size limits our analysis; other studies are needed to determine MRproADM trend over time, its prognostic role and possible confounding factors.

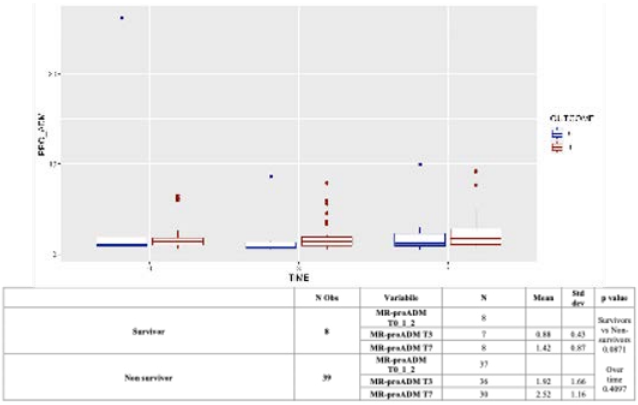

Figure 1.

09AP04-02
Pregnant patient with COVID-19 infection treated with emergency C-section and ECMO: 22 days long battle for survival

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Coronavirus disease, caused by SARS-CoV-2, was designated a global pandemic in March 2020. Pregnant women with severe COVID-19 infections have been reported to require ICU hospitalization, endotracheal intubation and extracorporeal membrane oxygenation (ECMO).
We present a case of a patient who developed respiratory failure due to SARs-CoV-2 infection, who was successfully treated with peri-partum VV-ECMO following emergency c-section delivery.
A 31-year-old COVID positive patient, without significant past medical history, with shortness of breath, cough and weakness was treated in hospital with high flow nasal cannula. She was 33 weeks pregnant when admitted. Interdisciplinary team including ICU and maternal-fetal medicine physician decided to proceed with emergent endotracheal intubation and c-section for potential maternal benefits. Following successful delivery of the viable neonate, intubated patient was transferred to the COVID-ICU.
Despite ventilator settings FiO2 of 85% and PEEP of 14 the patient's initial P/F ratio was 82, consistent with severe ARDS. The patient's respiratory status, despite mechanical ventilation in prone position, continued to worsen with P/F ratio of 70 and desaturations below 90%. VV ECMO circuit was connected with 28-French catheter inserted in the right femoral vein and a 22-French catheter inserted in the right jugular vein.
The patient ventilated with lung-protective volumes, targeting low plateau pressures, was maintained on VV ECMO with flows of 4-5 L/min. Intravenous heparin infusion was titrated to an activated partial

thromboplastin time ratio between 2 and 3 with thromboelastography analysis and Anti Xa level. FiO2 and PEEP were minimized. Daily trials, to assess readiness for ECMO decannulation, were performed. The patient was successfully weaned off and deccanulated after 9 days of VV ECMO and eventually extubated. Following 22 days of battle, mother and child were discharged home.

Discussion: When considering ECMO for pregnant patients, the risks and advantages for both the mother and the fetus must be weighed. In this situation, the fetus advanced gestational age was balanced against the mother's rapidly deteriorating clinical condition.

Learning points:

1. VV ECMO should be considered for both maternal and newborn benefit when needed.
2. Pregnancy should not be interpreted as a contraindication of ECMO use.
3. Anesthesiologists role as a leader of interdisciplinary team treating life threatening conditions.

09AP04-03
Early detection of acute kidney failure and need of renal replacement therapy in critically ill patients with COVID-19

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Background: Acute kidney failure is a common complication of critically ill patients, specially of those with severe COVID-19. Early detection of COVID-19 patients on risk of renal deterioration and need of renal replacement therapy (RRT) could improve their survival rate. The aim of this study is to analyse the early risk factors, detected on the emergency department, that could lead to acute kidney failure and need for RRT of patients with severe COVID-19.

Materials and methods: We included all the adult patients with positive PCR test for SARS-CoV-2, admitted to the Intensive Care Units of the Gregorio Marañón General Hospital, between the 2nd of March 2020 and the 19th of March 2021. We excluded patients with previous chronic renal disease.

We obtained demographic data and medical record, including cardiovascular risk factors, cardiovascular disease, respiratory disease, hepatic disease, immunosuppression, and any other pathology recorded. We registered previous medication, referred symptoms, clinical situation, laboratory panel on the admission to the Emergency Department (ED) and laboratory panel on the admission to the Intensive Care Unit (ICU).

We used SPSS software to perform a univariate analysis for the variable RRT. We compared the differences between the patients who received RRT and the ones who didn't, using the Mann-Whitney and Chi square tests.

We therefore performed a logistic multivariate regression for variables with p-value less than 0.1

Results: We included 440 patients. 24 of them (5.5%), needed RRT during their admission on the ICU. The univariate analysis showed differences for hypertension and cardiovascular disease, serum creatinine, CRP, FiO2, SpO2 and temperature in ED.

The only two independently associated variables detected at the moment of hospital admission as a risk factor for RRT on the ICU where creatinine values (OR 5,73. CI 95% 2,2-14,9) and previous cardiovascular disease (OR 3,08. CI 95% 1.4-6,9).

Conclusions: The need of RRT during the ICU stay for critically ill patients with COVID-19, can be early predicted in the Emergency Department with the evaluation of serum creatinine and history of cardiovascular disease.

References: Cheng Y, Luo R, Wang K et al. *Kidney disease is associated with in-hospital death of patients with COVID-19*. Kidney Int. 2020 May;97(5):829-838.

Gabarre P, Dumas G, Dupont T, et al.*Acute kidney injury in critically ill patients with COVID-19*. Intensive Care Med. 2020 Jul;46(7):1339-1348.

09AP04-04
Polymyxin-B hemoperfusion as adjuvant therapy for abdominal septic shock. Data from Gregorio Marañón General Hospital between 2015 and 2020

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Background: Polymyxin-B hemoperfusion (PMX-HP) is used as an adjuvant therapy for septic shock.

Surviving Sepsis Campaign guidelines[1] stated on 2021 a weak recommendation against its routinary use[2]. The present study analyses the mortality rate for the patients who received PMX-HP as treatment for abdominal septic shock during between 2015 and 2020 in Gregorio Marañón Hospital (Madrid).

Materials and Methods: We included all the patients treated with PMX-HP for abdominal septic shock between 2015 and 2020 in Gregorio Marañón Hospital. They received two PMX-HP of two hours with 24 hours.

We obtained the demographic and clinical data, and laboratory results from the patients' medical record.

Using SPSS software, we performed a descriptive analysis using mean (ED) and median (IR) for quantitative variables and relative percentage for qualitative variables.

We divided the patients in two groups depending on death on the first month. We compared both groups with Chi-square (qualitive variables) and Mann-Whitney (quantitative variables) tests.

Results: 105 patients were treated with PMX-HP. After excluding patients with insufficient data, we enrolled 93. The median age was 71,5 (IR 20). The mortality rate was 40,9%. The APACHE II mortality prediction was 70,9%. The median SOFA score on admission was 12 (IR 4). The variables that influenced mortality were chronic kidney disease (p= 0,025), chronic dyalisis (p= 0,04), SOFA score before PMX-HP (p=0,015), presurgical hemoglobin (p=0,041) and oliguria (p=0,008).

Patients presenting SOFA score between 8 and 13 obtained a 25% mortality. Patients with SOFA score >13 had a 53,5% mortality (p=0,025).

Conclusions: Polymyxin-B hemoperfusion is a controversial adjuvant treatment for septic shock.

Patients presenting CKD and anaemia on admission have a higher mortality risk and should receive a more aggressive treatment.

Intermediate risk patients, with SOFA score between 8 and 13, might benefit more from PMX-HP treatment.

References:

1. Evans L, Rhodes A, Alhazzani W, et al. *Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021*. Crit Care Med. 2021 Nov 1;49(11):e1063-e1143.

2. Dellinger RP, Bagshaw SM, Antonelli M, et al; EUPHRATES Trial Investigators. Effect of Targeted Polymyxin B Hemoperfusion on 28-Day Mortality in Patients With Septic Shock and Elevated Endotoxin Level: The EUPHRATES Randomized Clinical Trial. JAMA. 2018 Oct 9;320(14):1455-1463.

09AP04-05
Mitomycin-C associated Posterior Reversible Leukoencephalopathy syndrome (PRES)

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Background: Posterior reversible leukoencephalopathy syndrome (PRES) is characterized transient symptoms such as headache, seizures, and altered level of consciousness[1]
It has been described in the setting of hypertension, autoimmune disorders and the use of some cytotoxic drugs.
Only one case of mitomycin-C-induced PRES has ever been described[2]. We present one case of postoperative PRES in a patient who received hyperthermic intraoperativeperitoneal chemotherapy (HIPEC) withmitomycin C.
Case report: A 61-year-old woman, diagnosed with rectal adenocarcinoma with peritoneal carcinomatosis, underwent cytoreductive surgery and *HIPEC*with mitomycin*C*. She had no history of hypertension or renal dysfunction.
During the emergence from general anaesthesia, she suffered a generalized tonic-clonic seizure. She was transferred to the ICU, where she suffered a second seizure.
CT scan revealed vasogenic oedema on parietal and occipital lobes, and both thalamus, brain stem and cerebellum (Fig. 1).Laboratory tests were normal. On the first examination, she was unable to follow simple instructions. Hours later, she displayed upper limb paresis and cortical blindness. 72 hours after, she was extubated presenting only left arm paresis. MR revealed vasogenic oedema on parietal and occipital cortex, thalamus, brain stem and cerebellum. (Fig. 2). Once excluded more common causes, she was diagnosed with PRES. She was transferred to hospital ward on the 5th day after the intervention, showing only dysarthria.
Three months later she was fully recovered.
Discussion: We suspect the syndrome was unleashed by a combination of factors.
First, the patient received chemotherapy with FOLFOX one month before the surgery.
Second, HIPEC induces an important inflammatory state, leading to cerebral oedema.
Third, a large volume of fluid is administered during the hyperthermic phase.
Conclusions: PRES is characterized by non-specific neurological symptoms. In the postoperative period, it should be considered when common causes are ruled out.This syndrome is usually reversible after supportive care.
References:
1. Hinchey J, Chaves C, Appignani B, et al.*A reversible posterior leukoencephalopathy syndrome.*N Engl J Med. 1996
2. Makranz C, Khutsurauli S, Kalish Y, et al.*Neurological variability in chemotherapy-induced posterior reversible encephalopathy syndrome associated with thrombotic microangiopathy.*Mol Clin Oncol. 2018.

09AP04-06
A case of bilateral dilated, non-reactive pupils after a bolus of Rocuronium

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Background: Neuromuscular blocking agents (NMBA), namely Rocuronium, used in ARDS as continuous infusions have been reported to rarely cause bilateral dilated, non-reactive pupils.
Here we report a case of a patient with COVID-19 ARDS who developed reversible fixed, dilated, non-reactive pupils after a single bolus of Rocuronium.
Case report: A46 year old woman, known case renal transplant, hypertension and G6PD deficiency, had been in ICU for 23 days with COVID-19- Severe ARDS and multi-organ failure. She was sedated with propofol and fentanyl infusions. A bolus of 100mg intravenous Rocuronium was given prior to surgical tracheostomy.
A few minutes after the pupils were noted to be 5mm, fixed and non-reactive. They had been checked 4hours earlier, at which point they were 3mm and reacted briskly to light. There had been no episodes of hypotension or hypoxia in the interim, and renal replacement therapy anti-coagulation was paused in view of tracheostomy. A CT brain was performed, which was unremarkable. After 3hours the pupils were 4mm and reactive.
By the next day, the pupils were back to 3mm and brisk. The treatment given was reviewed, and no other drugs potentially resulting in pupil dilation had been used. The patient was weaned off sedation and did not show any focal neurological sequelae.
Discussion: Rocuronium bromide is an aminosteroid non-depolarizing NMBA. Under normal conditions, the polar molecule is unable to cross the blood-brain barrier (BBB), and therefore unable to cause fixed, dilated, non-reactive pupils. Haidar et al. showed how the BBB may become impaired in COVID-19 infection, thus allowing the drug to pass directly into the CNS (1). Two case reports report similar adverse effects of rocuronium infusion on the CNS (2,3).
We hypothesize that certain circumstances may enable rocuronium to cross the BBB and induce mydriasis. These circumstances may include inflammation and oxidative stress from COVID-19 ARDS as well as septic encephalopathy which possibly allowed the rocuronium to cross the disturbed BBB.
References:
1. Haidar et al. doi:10.1177/1073858420984106;
2. He et al. doi:10.1097/MD.0000000000021819;
3. Zakynthinos et al. doi:10.1016/j.jcrc.2021.07.005.
Learning points: Sudden unexplained mydriasis in a patient should lead clinicians to exclude the presence of cerebrovascular accidents. However, nondepolarizing NMBAs can cause fixed and dilated pupils in ARDS patients, even after a single bolus.

09AP04-07
Tetracycline ameliorates pulmonary inflammasome activation in patients with COVID-19 ARDS via blocking caspase-1

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Background and Goal of Study: COVID-19 is the most serious pandemic that has occurred for decades and is causing millions of deaths worldwide. COVID-19 related acute respiratory distress syndrome (ARDS) is characterized by deleterious pulmonary inflammation. The inflammasome-caspase-1 pathway is a major driver of ARDS via IL-1β and IL-18 production. A recent study showed the efficacy of tetracycline in acute lung injury by inhibiting caspase-1 and related cytokine production.
Therefore, we investigated whether:
i. inflammasome-caspase-1 dependent IL-1β and IL-18 production is also overactivated in the lungs of COVID-19 ARDS patients,
ii. pulmonic IL-1β and IL-18 concentrations are associated with disease severity in COVID-19 ARDS and;
iii. tetracycline could block IL-1β and IL-18 production in alveolar immune cells obtained from patients with COVID-19 ARDS.
Materials and Methods: ARDS was defined according to the Berlin Definition. Bronchoalveolar lavage (BALF) was performed in COVID-19 (n=37) and indirect (n=11) ARDS patients. BALF caspase-1, IL-1β and IL-18 levels were quantified by multiplex immunoassay and immunoblotting. BALF leukocytes were cultured ex vivo in the presence of tetracycline. Cytokines were analyzed by ELISA and caspase-1 via immunoblotting.
Results and Discussion: IL-1ß and IL-18 levels of COVID-19 ARDS patients were significantly increased compared to indirect ARDS patients ($p<0.0041$). IL-18 levels strongly correlated ($r=0.7138$, $p<0.0001$) with the Sequential Organ Failure Assessment Score (SOFA). Consistent, we found significantly higher levels of activated caspase-1 in COVID-19 compared to indirect ARDS patients ($p=0.0019$). Alveolar leucocytes from COVID-19 ARDS patients continued to produce IL-1ß and IL-18 ex vivo. Tetracycline significantly inhibited the production of both cytokines in a dose-dependent manner ($p<0.0256$). Further caspase-1 was highly activated in BALF leukocytes of COVID-19 patients. Consistent to prior findings, tetracycline decreased the activation of caspase-1 ($p<0.0286$).
Conclusion(s): Current findings suggest that the inflammasome-caspase-1 pathway is activated in the lungs of patients with COVID-19 ARDS, thereby contributing to disease severity. Tetracycline abrogated caspase-1 activation and subsequent production of IL-1ß and IL-18 in alveolar leukocytes ex vivo. Thus, tetracycline should be clinically evaluated as an immunomodulatory agent to reduce pulmonary inflammation in patients with COVID-19 ARDS.

09AP04-08
An increase in a generalized inflammatory response and the need for high-flow oxygenation as a result of the rapid withdrawal of methylprednisolone in patients with coronavirus pneumonia

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Background and Goal of Study: Many current protocols for the treatment of coronavirus pneumonia contain recommendations for the appointment of short courses of corticosteroids and their rapid withdrawal. Our attention was drawn to the possible association of rapid withdrawal of corticosteroids with a return of the systemic inflammatory response and an increase in the need for oxygen therapy.
Materials and Methods: A retrospective analysis of the treatment of 70 patients with severe coronavirus pneumonia requiring high-flow oxygenation or non-invasive ventilation was performed. All patients received conventional treatment, which included antiviral drugs, anticoagulants, interleukin-6 inhibitors, and standard doses of methylprednisolone.
Results and Discussion: The average time of oral administration of methylprednisolone in the observed group was 10-14 days. Simultaneous cancellation of methylprednisolone, in contrast to the gradual one, was accompanied by a deterioration in well-being, a return of shortness of breath, an increase in the need for respiratory support, the development of an anxiety-depressive syndrome, and in some cases, the development of adrenal insufficiency.
Such unfavorable clinical dynamics usually required an emergency return of glucocorticoid therapy, followed by a gradual dose reduction, a temporary stepwise increase in respiratory support parameters, and correction of glycemia and natremia.
Conclusion(s): 1. Rapid cancellation of glucocorticoid therapy, including methylprednisolone, can quickly and significantly worsen the condition of a patient with coronavirus pneumonia, cause a drop in saturation and an unexpected increase in the need for respiratory support.
2. Neglect of the classical rules of glucocorticoid therapy, the basic principles of endocrinology and rheumatology can lead to unexpected complications and seriously worsen the results of treatment of a new coronavirus infection.

09AP04-09
Transesophageal echocardiography as predictor of successfully extubation in the critically ill

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Background: Echocardiography offers real-time bedside diagnosis and hemodynamic monitoring in ICUs, like cardiac output or fluid responsiveness. Transesophageal echocardiography (TEE) is especially superior in this critical settings, in hemodynamically unstable patients mechanically ventilated[1].

We present the case of a finding not routinely monitored with TEE, which in our case conditioned the prognosis and therapeutic strategy.

Case report: A 47-year-old male admitted to the ICU for distributive shock secondary to SIRS after left total nephrectomy and acute respiratory distress syndrome. On the 3rd day of admission he presented good evolution with improvement of tissue perfusion, decreased vasopressor requirements and thermodilution IC 2.5. Respiratory weaning, PAFI > 300, FiO2 0.4%, PEEP 5, extubation was considered with the possibility of noninvasive mechanical ventilation (NIV) if required. Enteral nutrition in increasing doses, without detecting significant gastric retention in the nasogastric tube aspiration by turns, although he had not defecated either. Pre-extubation TEE was performed and incidentally revealed a dilated stomach with an estimated content >500ml. Given this finding, extubation was postponed for 48h to avoid subsequent NIMV. Enteral nutrition was suspended and triple prokinetic therapy was introduced.

Discussion: Pulmonary aspiration of gastric contents is one of the most feared perioperative complications. The incidental finding of a full stomach changed our strategy in this patient in which extubation and the possibility of NIMV would have had undesirable effects with a high risk of broncoaspiration. Although not having a regulated indication for evaluation of the amount of gastric contents[2], the potential role of TEE has been shown in our case. We suggest taking TEE into account as another useful tool in casesof respiratory weaning with suspected paralytic ileus.

References: 1.Point-of-care ultrasound: a pro-tean opportunity for perioperative care.*Can J Anaesth*. 2018. 2. Transgastric Abdominal Ultrasonography in Anesthesia and Critical Care: Review and Proposed Approach. Ane&Anal 2021.

Learning points: Echocardiography has evolved to become one of the most versatile modalities for diagnosing and guiding treatment of critically ill patients. Several studies have shown that ultrasonographic assessement gastric volume and content is a simple and non-invasive method to evaluate the broncoaspiration risk in the perioperative period.

09AP04-10
Predictive value of clinical observation (SOFA) compared to blood chemistry tests (PCT) in COVID positive patients receiving ECMO treatment

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Background and Goal of Study: Covid patients in ECMO treatment often experience a rapid worsening of their clinical conditions towards sepsis. We compared SOFA score variations with PCT values in 23 Covid Positive patients at Campus Bio Medico of Rome Covid Center, to demonstrate that SOFA score could reveal in advance a septic syndrome compared with PCT values rising, and allow to start an empiric treatment as recommended by the Surviving Sepsis Campaign.

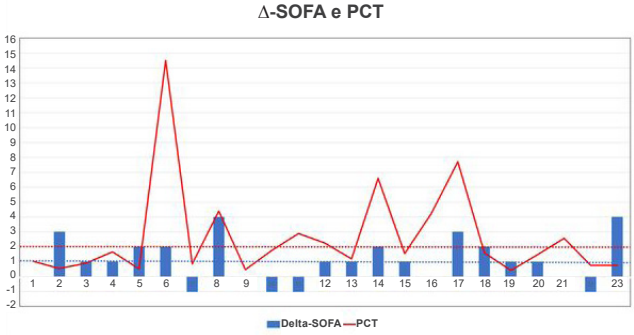
Materials and Methods: A retrospective analysis of laboratory, microbiological and clinical data of 23 Covid positive patients in ECMO treatment for more than 14 days, aged> 18 years and PCT values> or = 2 ng / ml was conducted after approval from ethical committee was obtained.

Results and Discussion: 17 patients were men (73.9%), 6 women (26.1%), mean age 54 years (33-67); 11 patients suffered from obesity, (BMI> 30, 47.8%), 8 from hypertension (34.8%), 2 from diabetes mellitus (8.7%), 3 did not have comorbidities (13%). There were 20 cases of VAP (86.9%), 12 bacteraemia (52.2%), 11 viral coinfections (47.8%), 10 fungal UTI (43.5%), 1 candidemia (4.3 %). Main isolated bacteria were: Acinetobacter Baumanii (18 cases) and Klebsiella Pneumoniae (14 cases).

The correlation for repeated measures was used in the Delta-SOFA / PCT comparison and a moderate (r = 54.28) but not significant (p-value = 0.08447) correlation was observed.

The analysis of SOFA variation over the 48h preceding the PCT peak (Δ-SOFA) and PCT values on the day of the peak, showed a mean variation of Δ-SOFA of 1.1 points (SD 1.5) corresponding to PCT of 2.6 ng/mL.

We observed that for the 13 patients who developed septic shock the Δ-SOFA corresponded to 3.5 points (SD 2.5) while only 7 of these patients had a PCT > 2 ng / ml.



Conclusion(s): There is a moderate correlation between SOFA score increase and PCT level and generally moderate SOFA variation correspond to mild PCT increasing revealing that clinical behavior of sepsis in long term ECMO assisted COVID patient corresponds frequently to organ failure instead of inflammatory serum patterns. SOFA score, in these patients, is a more reliable alarm tool than the PCT because it changes earlier.

09AP04-11
Cerebral/somatic oxymeter (INVOS™ system) as a monitoring tool complementary to neurological clinical evaluation for detecting acute neurological deterioration in patients with hepatic encephalopathy in situation of acute fulminant liver failure

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Background: Acute liver failure is associated to neurological deterioration due to the development of hepatic encephalopathy, which, in its late stages, could evolve into a coma state and develop cerebral edema as a serious complication.

On the other hand, severe coagulopathy in this context increases the risk of bleeding and intracranial hemorrhage. Drastic variations in the cerebral oxygen saturations might immediately indicate acute neurological deterioration.

This could, in turn, generate the need of clinical reevaluation or image tests, aiming to reach an earlier therapeutic management and treatment.

Case Report: 62-year-old hospitalized man in our Intensive Postsurgical Care Unit with acute fulminant liver failure with III grade hepatic encephalopathy and severe coagulopathy in Emergency 0 for liver transplantation.

We used the Glasgow coma score (GSC) for the neurological examination, as well as pupillary reflex response and cerebral/somatic oxygen saturation monitoring with INVOS™ system. The patient initially scored a GSC of 9 and an INVOS value of 25, which dropped to a GSC of 6 and an INVOS value of 20 in 12 hours.

Hence, we proceeded to his sedation, leading to no more changes in the parameters. Neither acute clinical deterioración nor significant decline from the baseline in cerebral oxygen saturations were observed since then, supported by the absence of edema or hemorrhage signs in cranial computed tomography scan after 24 hours.

Discussion: The possibility to have a cerebral, non-invasive monitoring tool could be useful in patients with hepatic encephalopathy who are waiting for a liver transplant due to the potential outcome of complications that could drastically change the prognosis, and in the case of hemorragia, the whole treatment.

References:

Ann Hepatol. 2019 Jul-Aug;18(4):543-552

Turk J Emerg Med.2019 Apr;19(2): 64–67

Learning points: A significant cerebral oxygen level decline from the baseline may be a sign of ongoing clinical deterioration associated with a decrease of cerebral perfusion. This variation might be immediately detected, in order to come up to an earlier diagnosis and treatment, being critically important in a pre-transplantation situation.

09AP04-12
The outcomes of transient hyperchloremia in critically ill

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Introduction and goal of study: Varying-disorders of water-electrolyte balance and, particularly, hyperchloremia are among the key laboratory findings in the most of the critical care patients including those with sepsis. There are multiple hypothetical associations between hyperchloremia and metabolic changes, organ failure and hydration. Goal of the study is to evaluate the dynamics of chloride concentration and the relationship of hyperchloremia with organ dysfunction in sepsis and septic shock in ICU patients.

Materials and methods: A retrospective analysis of all cases of receipts for 2018 – 2019 was carried out on the basis of the multidisciplinary ICU. The case histories and resuscitation records of 306 adult patients with an established diagnosis of sepsis and septic shock were studied.

Age, gender, source of sepsis, localization of organ dysfunction on the SOFA scale, duration of ICU stay and mortality were assessed. Changes in chloride concentration and organ functions were evaluated on the SOFA scale within 72 hours after admission.

Results and discussion: The study group included data from 306 patients. The average SOFA score at ICU admission was 8 (5–12) pts. 28-day mortality of patients with hyperchloremia 44.7%. Serum chloride concentration was retrospectively available at ICU admission in 81% of analyzed ICU patient population. Hyperchloremia (Cl– ≥106 mmol/L) was detected at admission in 17% of patients with sepsis and 15.3% with septic shock. 13.4% patients required renal replacement therapy affecting the primary electrolyte changes including hyperchloremia and were excluded from secondary analysis. Hyperchloremia was detected in 30% patients on day 2, and in 29% at Day 3.

Acute kidney injury was diagnosed in 69 (23 %) patients. Septic shock developed in 135 (44.1%) ICU patients with a mortality of 26.5%. ICU mortality was higher in patients with hyperchloremia and septic shock 7.8% in comparison with hyperchloremia and sepsis. 28-day mortality with septic shock 73.3%, with sepsis 26.3%. Acute renal injury in 64.2% with hyperchloremia.

Conclusions: The problem of hyperchloremia is relevant for intensive care patients. Acute renal injury is more common in patients with hyperchloremia. In the group of patients with septic shock, mortality on the 28th day is statistically significantly higher than in the group of patients without septic shock.

09AP05-01
Right heart failure during bridge-to-transplant VA-ECMO with fatal outcome in COVID-19 patient – a case report

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Background: The right ventricular (RV) dysfunction is common in ARDS due to an increase in pulmonary resistance induced by pulmonary hypoxemia. The 30-day mortality of patients with RV failure treated with ECMO is 88% (1).

Case Report: A 28-year-old male patient, otherwise healthy, was admitted to hospital on the 7th day of the onset of COVID-19 symptoms. Due to the progression of acute respiratory failure invasive mechanical ventilation and subsequently VV ECMO were started. The patient remained hemodynamically unstable. The echocardiography revealed significant dilation and dysfunction of the RV, whereas global LV EF was approx. 40-45%. Due to massive pulmonary involvement and progressing acute*cor pulmonale* the patient was qualified for a lung transplant. As pulmonary vasodilators (sildenafil, iNO) were ineffective after 2 days ECMO was converted to the VAV mode (Fig. 1). Despite improved haemodynamic parameters a multiorgan failure progressed and the patient died on day 25 of ECMO.

Discussion: RV failure may develop during ARDS on VV ECMO. Ineffective pharmacotherapy may require alternative ECMO configurations such as VAV. However, additional ECMO configurations to support RV were described: right atrium to the main pulmonary

artery (2) or pulmonary artery-to-left atrium mode (3).In our patient these configurations were not implemented, but in some cases they may be considered. Still, irrespective of the modality of the RV support patient's survival depends on the reversibility of the underlying disease.

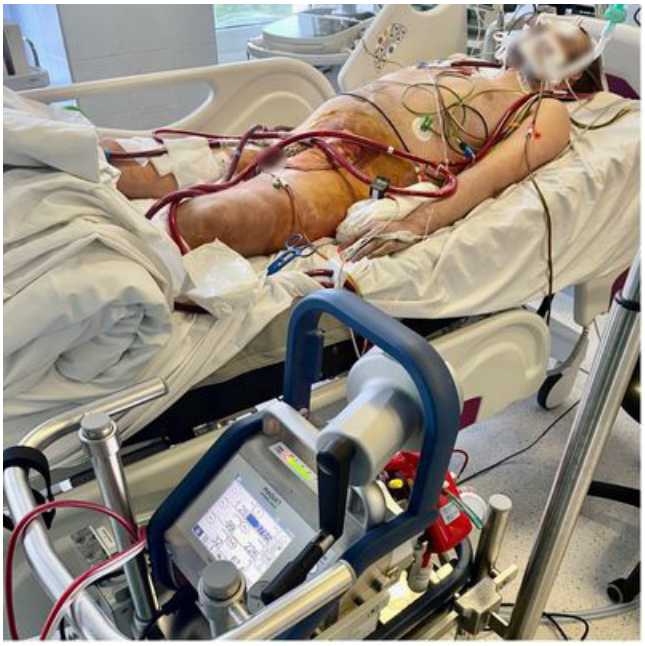

Fig. 1. VAV-ECMO cannulation configuration with distal leg reperfusion.

References:
1. Djordjevic I et al. J Card Surg. 2020 Jan
2. Oh DK et al. Acute and critical care. 2020.
3. Strueber M et al. Transplant Am Soc Transpl Surg. 2009 Apr

Learning points: Treatment with vasodilators in patient on ECMO with RV failure was not successful. In selected cases, the use of alternative ECMO cannulations in the course of RV failure may be considered.

09AP05-02
Collecting and structuring prospective data for alarm research

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Background and Goal of Study: Alarms in intensive care units inform about potential adverse events in patients but can lead to alarm fatigue if they are false positive, i.e., do not require medical interventions [1]. Systems using machine learning may help alleviate alarm fatigue, however, alarms need to be classified into actionable (requiring an intervention to counteract physiological deterioration [2]) and non-actionable beforehand. This study aims to gather prospective alarm and patient data to create a labelled alarm dataset and presents first concepts of the structured data collection process.
Materials and Methods: Based on medical expertise, use cases, relevant alarm types, and potential therapeutic interventions conducted within ten minutes of the alarm start were defined. REDCap was used to structure prospective alarm and intervention data. Mapping was done with SNOMED CT and stored in REDCap.
Results and Discussion: Five use cases, eight alarm types and four intervention groups were identified. Data collection forms using branching logic, defined values and text boxes for further information were created: one to collect general alarm and intervention data and four "repeating instruments" related to defined intervention groups.
135 unique pre- and 19 post-coordinated SNOMED CT expressions were used to map 155 items (variables or choices, after deletion of 87 repeating items). One item could not be mapped at all. With 19 items being mapped with postcoordination, SNOMED CT might benefit from new content and modelling changes.
To further foster standardization, REDCap's feature "ontology services" and the Rosetta Terminology Mapping, a non-vendor-specific terminology for point-of-care medical devices, may help.
Conclusion(s): With 154 of 155 items mappable with SNOMED CT and the possibility to store the expressions in REDCap, our study shows that these tools are suitable to structure and standardize the data collection. Practicality and accuracy tests are planned prior to prospective data collection.

References:
1. Sendelbach S, Funk M. Alarm fatigue: a patient safety concern. AACN Adv Crit Care. 2013 Oct Dec;24(4):378-86; quiz 387-8. doi: 10.1097/NCI.0b013e3182a903f9. PMID: 24153215.
2. Welch J. An evidence-based approach to reduce nuisance alarms and alarm fatigue. Biomed Instrum Technol. 2011 Spring;Suppl:46-52. doi: 10.2345/0899-8205-45.s1.46. PMID: 21599481.

09AP05-03
Improving targeted temperature management (TTM) in a neuroscience intensive care unit (NICU) in Singapore

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Background and goal of study: Persistent fever in patients with neurological injury is associated with worse outcomes such as increased mortality, morbidity and increased length of stay, especially in patient populations presenting with subarachnoid haemorrhage (SAH) , intra cerebral haemorrhage (ICH) and traumatic brain injury(TBI)
Materials and methods: Our local data revealed from audits that between January and March 2018, 64 out of 195 patients (33%) had persistent fever for more than 4 consecutive hours.
Issues identified included
1. No standard anti-shivering protocol
2. Lack of awareness among team of the importance of fever management in patients with SAH/ICH/TBI.
3. No invasive /external high technology cooling device available in the Intensive Care Unit.
A multidisciplinary collaboration improvement project was implemented to improvement TTM in NICU.

Interventions included developing a shivering protocol based on international guidelines.
Multiple educational talks to reinforce the importance of fever management , especially in a neuro-science ICU environment. The ICU also had a trial of both invasive and non-invasive cooling devices. We used the Artic Sun 5000 as our non invasive cooling device for TTM
Results and discussion: Over 6 months of the improvement project, we monitored hourly forecast body temperature for patients in TTM management.
The anti-shivering protocol was also made known to nurses and doctors at the bedside.
There was improved temperature monitoring compliance from baseline of 48% to 100% after intervention.
Incidence of persistent fever (defined as elevated temperature of 4 consecutive hours) was reduced from a median of 31.8% pre intervention to 19% post intervention.
Potential cost savings as calculated from reduced length of stay of 1.5 days was $2,800 per patient/days.
Conclusion(s): Targeted temperature management in NiCU is an important aspect of patient care.
Improved care processes and education lead to a significant improvement in TTM, patient outcomes and potential cost savings to patient and hospital.
References: Elevated body temperature independently contributes to increased length of stay in neurologic intensive care unit patients. Michael N Diringer et al
Acknowledgements: Tan Tock seng Hospital

09AP05-04
HFNO in COVID-19: a cross-sectional study

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Background and goal of study: High Flow Nasal oxygen (HFNO) has been promulgated for COVID-19 patients to potentially avoid mechanical ventilation.
The primary objective of study was to assess the success of HFNO in avoiding intubations and secondary objectives were to evaluate the risk factors for negative outcome and the validity of ROX and mROX indices in predicting outcome
Materials and methods: 307 adult critically ill COVID-19 patients who were taken on HFNO after failing trial of conventional oxygen therapy devices (nasal prongs / standard facemask / non-rebreather mask) were enrolled.
Those who were on prior non-invasive / invasive mechanical ventilation were excluded. A multivariate logistic regression model was constructed and Odds ratio (OR) for HFNO failure calculated. ROC curves were constructed for ROX and mROX indices and AUROC assessed.
Results and discussion: The median PF Ratio at the time of HFNO initiation was 66.4 (IQR 57.35 – 75.9), which was much lower than most of the other studies. 85 (27.7%) of these patients could still be weaned and prevented from intubation and mechanical ventilation, indicating a definite role of HFNO in the management of COVID-19 patients with even severe hypoxemia. While 222 (72.3%) patients had to be taken on non-invasive / invasive mechanical ventilation.
Our patients had a worse baseline respiratory status, thus possibly explaining the higher intubation rate.
Age [OR 1.0358; 95% CI 1.0106-1.0617], chronic kidney disease (CKD) [OR 6.9052; 95% CI 1.0693-44.5900], and the PFR (pO_2/ FiO_2) at HFNO initiation [OR 0.9375; 95% CI 0.9182-0.9573] were independent predictors of a negative outcome.
The ROX and MROX indices at 6 and 12 hours post HFNO initiation showed a weak correlation with HFNO outcome (AUROC ROX-6 : 0.656 (0.6-0.709); ROX-12 : 0.686 (0.63-0.739); MROX-6 : 0.664 (0.608-0.717); MROX-12 : 0.685 (0.629-0.738)). A possible explanation for this could be the relative inaccuracy in measuring the respiratory rate by clinicians.
Limitations: It was an observational study. A comparison of HFNO was not made with its peers - Non-invasive mechanical ventilation
Conclusion(s): HFNO CAN serve as an effective tool to avoid the need for mechanical ventilation among COVID-19 patients with even severe hypoxemia. The efficacy and benefits should be balanced against the risks of the requirement of emergency intubation and of high oxygen flows precipitating a logistic crisis.

09AP05-05
Are we effectively “listening” to our patients?

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Background: The critical patients provide us with huge volume of data, produced at high velocity and characterized with vast variety. Critical limitation for implementation of the data-driven science in clinical practice is to ensure the data veracity. Along with the cost reduction, the homogenization and filtration of data is vanishing great amount of (meta)data, thus reducing its value and compromising digital phenotyping.
Objective: To outline how we have integrated data streams from different diagnostic and therapeutic devices in the structure of our clinical and meta data and demonstrate key features in the end user interface design, contributing to personalized medicine and patient-centered outcomes.
Materials and methods: Our ICU Lab platform is based on market available, medical grade middleware and customizable licensed software. The raw data is generated by medical devices from different vendors. It is time-synchronized, integrated, and stored in our database, which is developed on mathematical arrays and location-centered with protected patient information reference. Researcher-centered approach is applied in the end user interface design. Different interactive dynamic graphical cause-effect visualization is applied as well as display of automatically calculated statistical parameters predefined by the user. Data export tool, supporting widely used file formats is implemented in the user interface.
Results and discussion: ICU Lab platform incorporates multimodal multi-parametric patient monitoring, device monitoring and data analytics, thus enhancing our patient status awareness. The heterogeneous raw (meta)data represents the diversity in physiological and pathophysiological processes in the patient, the activities of the health care professionals and the technical events occurring in the medical devices. With data acquisition frequency of 1κHz and variable depth(beyond usually displayed data), the system provides oppor-

tunities for retrospective or real-time analytics and machine learning, which contributes to the development of decision support systems. In contrast to the commonly used analysis of normalized derived datasets, our platform supports data mining of raw (meta)data.
Conclusion(s): Improvement in the outcome will occur if we craft, design, and apply already available technology to capture, analyze and display our patient data so we can carefully and effectively "listen" to our patients. They are telling us the diagnosis.

09AP05-06
Cerebral invasive aspergillosis after cardiac transplant surgery

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Background: Invasive aspergillosis (IA) is a rare entity and has a high mortality rate. Most of IA cases are lung-related illness, and other clinical presentation are exceptional. We present a cerebral invasive aspergillosis after cardiac surgery in a previously immunocompetent host.
Case report: A 54-year-old woman with congenital cardiopathy was admitted for a heart transplant. In the postoperative period, immusupressant therapy was initiated.
Five days later, the patient became septic. Bronchoalveolar lavage fluid (BALF) was positive to *Apergillus spp* and a possible pulmonary IA was suspected, despite thoracic and cerebral scans were normal. Voriconazole was immediately started. Serum levels (SL) remained infra therapeutic and galactomannan (GM) turned positive.
Neurologic status rapidly worsened with progressive cranial nerve palsy and died shortly after an urgent brain MRI was performed. Post-mortem report showed extense cerebral IA.
Discussion: Airway and sinus colonization by *Aspergillus spp* is prevalent in general population but invasive disease may be possible in immunodepressed patients. Out-of-lung invasion is anecdotical[1]. Cerebral nervous system (CNS) can be infected by haematogenous spread or by sinus continuity. GM in BALF is a good biomarker and its evolution is closely related to mortality[1].
Voriconazole is first-line therapy but has non-linear pharmacokinetics, wide interindividual variability and is liable to drug interaction, so SL monitoring is advised. Combined therapy is recommended as rescue therapy[2]. In our case, amphotericin B should have been added due to high CNS penetration[3], but CNS invasion was not diagnosed yet owing to lack of neurologic symptoms (which finally came out abruptly prior exitus) and normal scans.
Autopsy evidenced simple pulmonary colonization and right cerebral ischaemic stroke secondary to circle of Willis septic thrombosis.
References: 1. Thompson, G. & Young, J. Aspergillus Infections. *N. Engl. J. Med.* **385**, 1496–1509 (2021).
2. Ramírez, P. & Garnacho-Montero, J. Aspergilosis invasiva en el paciente crítico. *Rev. Iberoam. Micol.* **35**, 210–216 (2018).
3. Jenks, J. & Hoenigl, M. Treatment of Aspergillosis. *J. Fungi* **4**, 98 (2018).
Learning points:
- Cerebral IA is exceptional, and diagnosis is challenging with the current diagnostic tools.
- Serum voriconazole monitoring levels are imperative and combined antifungal therapy is required in refractory cases.
- Surgical debridement has to be performed when feasible.

09AP05-12
Stethoscope use in a major trauma centre intensive care unit (ICU): financial and potential clinical implications

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Background and Goal of Study: Nosocomial infection impacts ICU patient mortality globally and there is concern that stethoscopes contribute to clinically significant inter-patient infection transmission, who are at increased risk of nosocomial infection. Prevalence is estimated at 37% in European and American ICUs, correlating with increased mortality, morbidity and stay length. In neonatal ICUs, nosocomial infections account for 40% of mortality in resource-poor countries and stethoscopes are recognised key sources of nosocomially important bacteria. University Hospital Coventry, a trauma centre with 52 ICU beds, uses basic stethoscopes in its ICU which are meant to stay with patients during admission to reduce nosocomial infection spread and potential illness exacerbation - these stethoscopes have been identified as potential infection sources.
This audit investigates the distribution, condition and movement of stethoscopes between patients and the impact of this on ICU spending and staff usage.
Materials and Methods: Audit and questionnaire.
Results and Discussion: Of 30 bedspaces 73% had no stethoscope and 34% could not be seen within 10 seconds of bedspace surveying; concerning if a patient deteriorates and needs urgent examination. Approx. 10% of bedspaces had more than one stethoscope and 46% were soiled, implying mobility of stethoscopes across bedspaces, poor maintenance, increasing risk of nosocomial infection spread. Thematic analysis via questionnaire to 37 ICU staff (nurses, physiotherapists and doctors) showed that 70% felt basic stethoscopes were poor quality and difficult to use in correlating presentation to examination findings and that finding a stethoscope in emergencies was difficult and correlated with staff who used their own stethoscope.
We developed a case to replace basic stethoscopes with quality alternatives which:
- Improves staff ownership and confidence in identifying clinical signs, encouraging them to use these stethoscopes over their own and reducing a potential infection vector.
- Are engraved with details matching them to a specific bedspace, deterring inter-patient use.
- Are a distinctive green colour, therefore more visible in emergencies.

Conclusions: Encouraging staff ownership of high quality stethoscopes and including their inspection as part of daily checklists may reduced nosocomial pathogen transmission. By replacing basic stethoscopes with reusable alternatives, we estimate cost savings of c.£13,000 over 10 years.

Critical Emergency Medicine - Trauma and Resuscitation

10AP01-01
Acute myocardial infarction in polytraumatized patient with traumatic brain injury

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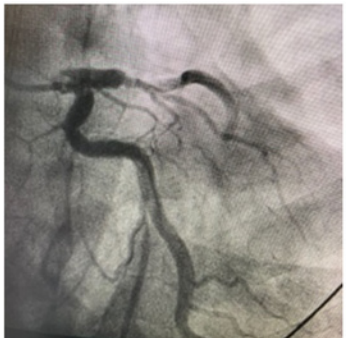
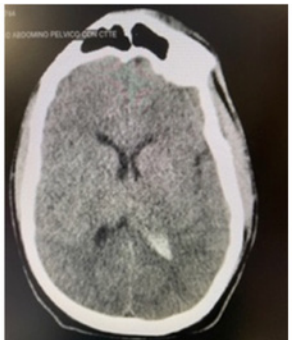
Background: Severe trauma is one of the leading causes of death worldwide. Early approach mainly focuses on ATLS concept, and surgical assessment may be required for damage control. Severe trauma can commonly correlate with traumatic brain injury (TBI) and cardiac damage.
Case report: A 30-year-old patient was brought to our ICU after a car accident. He had GCS 3 and arreactive left mydriasis. A CT scan showed multiple bone fractures and a left intraventricular hematoma. After damage control surgery he developed hemodynamic instability and myocardial infarction (MI). A percutaneous coronary intervention showed intramural thrombus in anterior descending artery. Successive artery dilations were made, persisting 80% stenosis, therefore, it was decided to implant a drug-eluting stent, after which cangrelor was started.





Discussion: After a high-speed vehicle collision, prompt attention and differential diagnosis of MI is crucial. MI is often unrecognized since the patient might be unconscious and elevation of troponins can be consequence of the contusion. Multiple conditions can trigger the MI, coronary artery spam due to sympathetic hyperactivity because of TBI or coronary dissection due to blunt chest trauma are the most common (1).
Treatment was discussed since antiplatelets (particularly clopidogrel) are associated with an increased risk of progression of the intracranial hemorrhage [2]. We decided to use cangrelor, a rapid-onset acting $P2Y_{12}$receptor inhibitor, that we could stop if signs of bleeding were shown.
References:
1. Marroush TS, et al. Myocardial Infarction Secondary to Blunt Chest Trauma. Am J Med Sci. 2018 Jan;355(1):88-93.
2. Fiorelli EM, et al. Incremental Risk of Intracranial Hemorrhage After Mild TBI in Patients on Antiplatelet Therapy. J Emerg Med. 2020 Dec;59(6):843-855.
Learning points: The principles of early approach to trauma patients should always be applied. Even if trauma-associated MI is uncommon, whenever suspected it has to be properly diagnosed and managed; revascularization must be done and antithrombotic therapy must be implemented with caution.

10AP01-02
A pilot, prospective, randomized trial of IntuBrite® versus Macintosh direct laryngoscopy for paramedic endotracheal intubation in out of hospital cardiac arrest

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Background and goal of study: Intubation in the case of out-of-hospital cardiac arrest (OHCA) is one of the most difficult procedures for Emergency Medical Services (EMS). The use of a laryngoscope with a dual light source is an interesting alternative to classic laryngoscopes. However, there are as yet no prospective data concerning the use of double light direct laryngoscopy (DL) by paramedics in traditional ground ambulance agencies in OHCA.
Our objective was to assess and compare the time and effectiveness of ETI attempts at paramedic endotracheal intubation for non-traumatic adult OHCA. We also estimated the degree of difficulty of the intubation attempts.
Materials and methods: We performed a randomized, cross-over, non-blinded trial in a single EMS in Poland within a group of 34 ground ambulances crews, comparing time and first pass success (FPS) for endotracheal intubation (ETI) in DL using the IntuBrite® (INT) and Macintosh laryngoscope (MCL) during cardiopulmonary resuscitation (CPR). We collected both patient and provider demographic information along with intubation details. The time and success rates were compared using both a per-protocol and an intention-to-treat analysis.
Results and discussion: Over a period of 40 months, a total of 86 intubations were performed using 42 INT and 44 MCL based on an intention-to-treat analysis. The FPS time of the ETI attempt (13.49 vs 15.55 seconds) using an INT which was shorter than MCL was used ($p<0.05$). First attempt success (34/42, 80.9% vs 29/44, 64.4%) were similar between INT and MCL.
Conclusion(s): We found a statistically significant difference in intubation attempt time when the INT laryngoscope was used. Intubation with INT had similar first attempt success rates as compared to MCL during CPR by Polish paramedics.
References:
Lesnick J.A. Moore J.X. Zhang Y. et al. Airway insertion first pass success and patient outcomes in adult out-of-hospital cardiac arrest: The Pragmatic Airway Resuscitation Trial.*Resuscitation.* 2021;158:151-156
Benger J.R. Kirby K. Black S. et al. Effect of a Strategy of a Supraglottic Airway Device vs Tracheal Intubation During Out-of-Hospital Cardiac Arrest on Functional Outcome. The AIRWAYS-2 Randomized Clinical Trial.*JAMA.* 2018;320:779-791
Risse J. Volberg C. Kratz T. et al. Comparison of videolaryngoscopy and direct laryngoscopy by German paramedics during out-of-hospital cardiopulmonary resuscitation; an observational prospective study.*BMC Emerg Med.* 2020; 23:22

10AP01-03
Effects of head-up versus supine CPR on cerebral oxygenation and metabolism during advanced life support in a porcine model

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Background: Several experimental studies showed an improvement in cerebral haemodynamics during cardiopulmonary resuscitation (CPR) in a head-up position (HUP) compared to a standard supine position (SUP)[1,2]. The aim of the current study was to investigate the effect of HUP versus SUP on cerebral oxygenation and metabolism during advanced life support (ALS) in a porcine model.
Method: A total of n=19 pigs were anaesthetized (n=10 HUP, n=9 SUP). After 5 minutes of cardiac arrest (CA), the pigs were resuscitated for 15 minutes in either 30° HUP or SUP. Resuscitation was performed with LUCAS2™, volume-controlled ventilation and continuous adrenaline administration. Hemodynamic parameters and cerebral variables were measured continuously. Cerebral microdialysis and blood samples were collected every 5 minutes.
Results/discussion: During ALS mean arterial pressure (MAP) was comparable in both groups (p=0.9682). Intracranial pressure (ICP) was significantly lower in HUP animals (p<0.021). Consequently, CePP was significantly higher in the HUP group (p=0.0107). However, relative brain tissue oxygenation ($P_{bt}O_2$)was significantly higher in the SUP group (p=0.0376). CePP is not a physiological parameter but is calculated from the difference between MAP and ICP. As such, it is prone to error and may not necessarily reflect the actual prevailing perfusion pressures. Furthermore, blood must be pumped "upwards" during HUP, necessitating sufficient forward blood flow. This is rarely the case during resuscitation.

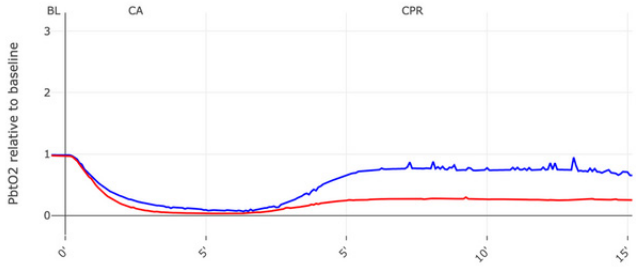

Fig. 1 Relative $P_{bt}O_2$ at baseline, CA and CPR. Red: HUP, blue: SUP (p=0.0376)

Conclusion: HUP during ALS lowers ICP which is associated with a perceived improvement in CePP. Despite higher CePP values, HUP does not improve cerebral metabolism compared to SUP and may even lead to a deterioration of cerebral oxygenation.
References:
1. Debaty G. et al. Tilting for perfusion: Head-up position during cardiopulmonary resuscitation improves brain flow in a porcine model of cardiac arrest. *Resuscitation*.2015;87:38-43
2. Ryu et al. The Effect of Head Up Cardiopulmonary Resuscitation on Cerebral and Systemic Hemodynamics. *Resuscitation*. 2016;102:29-34.

10AP01-04
Infectious events and their relation to mortality in cardiac arrest patients treated with target temperature management

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Background and goal of study: Infections are frequent complications in patients' hospitalization for cardiac arrest (CA) and traumatic brain injury. There is debate on the effects of target temperature management (TTM) on the incidence of infection and the infection associated outcome. We investigate the association between infectious events and mortality in cardiac arrest patients treated with TTM.
Materials and methods: This is a post hoc analysis of the TIME-CARD cohort, established in collaboration with 9 medical centers in Taiwan and was a retrospective cohort study of patients with return of spontaneous circulation (ROSC) and comatose status after cardiac arrest who were admitted to a critical care unit and received target temperature management less than 12 hours after ROSC between January 2014 and September 2019.
Results and discussion: A total of 539 patients were analyzed, of whom 237 (44%) patients had infectious events, including 153 (64.6%) developed pneumonia, 46 (19.4%) developed bacteremia, and 85 (35.9%) developed septic shock. Patients with infectious events were significantly older and had higher rate of heart failure and malignancy as well as lower rate of cardiac cause of CA. Besides, infectious patients had significantly lower goal of target temperature (≦33℃), shorter maintain duration, and longer rewarming duration. Patients with infectious events had both lower ICU (47.7% vs 56.3%, p=0.047) and hospital survival rate (37.1% vs 46%, p=0.038).
Infectious events were significantly associated with reduced hospital survival (OR=0.457, 95% CI: 0.27-0.78, p=0.004), driven by severe infection (OR=0.388, 95% CI: 0.2-0.77, p=0.006). Univariate analysis showed lower target temperature (≦33℃), and longer induction (4 hours) and rewarming duration (12 hours) associated with increasing risk of severe infection. After multivariate analysis, longer induction duration (OR=1.7, 95% CI: 1.03-2.78, p=0.037) and rewarming duration (OR=2.13, 95% CI: 1.14-3.98, p=0.018) were still independent factors associated with severe infection.
Conclusion(s): Infectious events were common after CA patients receiving TTM. Infectious events were associated with increased mortality, mainly driven by severe infection (bacteremia or septic shock). Longer induction and rewarming duration were associated with increased severe infection.

10AP01-06
CPR with restricted patient access using alternative rescuer positions – a randomised cross-over manikin study simulating the CPR scenario after avalanche burial

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Background and Goal of Study: The goal of this manikin study was to evaluate the quality of cardiopulmonary resuscitation (CPR) with restricted patient access during simulated avalanche rescue using over-the-head and straddle position as compared to standard position.
Materials and Methods: In this prospective, randomised cross-over study, 25 medical students (64% male, mean age 24) performed single-rescuer CPR with restricted patient access in over-the-head and straddle position using mouth-to-mouth ventilation or pocket mask ventilation. Chest compression depth, rate, hand position, recoil, compression/decompression ratio, hands-off times, tidal volume of ventilation and gastric insufflation were compared to CPR with unrestricted patient access in standard position.
Results and Discussion: Only 28% of all tidal volumes conformed to the guidelines (400-800 ml), 59% were below 400 ml and 13% were above 800 ml. There was no significant difference in ventilation parameters when comparing standard to atypical rescuer positions. Participants performed sufficient chest compressions depth in 98.1%, a minimum rate in 94.7%, correct compression recoil in 43.8% and correct hand position in 97.3% with no difference between standard and atypical rescuer positions. In 36.9% hands-off times were longer than 9 seconds.
Conclusion(s): Efficacy of CPR from an atypical rescuer position with restricted patient access is comparable to CPR in standard rescuer position. Our data suggest to start basic life-support before complete extrication in order to reduce the duration of untreated cardiac arrest in avalanche rescue. Ventilation quality provided by lay rescuers may be a limiting factor in resuscitation situations where rescue ventilation is considered essential.

10AP01-07
Time to CT scan for patients with acute severe neurological symptoms

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Background: Emergent brain computed tomography (CT) scan allows for identification of patients presenting with acute severe neurological symptoms in whom medical and surgical interventions may be lifesaving.
The aim of this study was to evaluate if time to CT from arrival at the emergency department exceeded 30 minutes in patients admitted with acute severe neurological symptoms.
Methods: This was a retrospective register-based quality assurance study. We identified patients admitted to the emergency department with acute severe neurological symptoms between April 1st, 2016 and September 30th, 2020. Data were retrieved from the database containing data from patient charts from all patients admitted to the emergency department. We considered that time to CT from arrival at the emergency department should not exceed 30 minutes in more than 10% of patients.
Results: A total of 559 patients were included. Median time from arrival at the emergency department until CT scan was 24 minutes (IQR 16-35) in children (< 18 years), 10 minutes (IQR 7-17) for adults (18-59 years), and 11 minutes (IQR 7-16) for elders (> 60 years).This time interval exceeded 30 minutes for 8.2% (95% CI 6.1-10.9) of all included patients, 35.3% of children, 5.9% of adults, and 8.6% of elders. Intracerebral haemorrhage was the most frequent discharge diagnosis in all age groups. No children died within 30 days. The 30-day mortality was 21.3% (95% CI 16.4-27) in adults, and 43.9% (95% CI 38.2-49.8) in elders.
Conclusion: Time from arrival at our emergency department until brain CT scan exceeded 30 minutes in 8.2% of all included patients but exceeded the defined quality aim in children and could be improved.

10AP01-08
Massive transfusion after a spontaneous splenic artery pseudoaneurysm rupture: an unusual cause of haemorrhagic shock

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Background: Visceral artery aneurysms (VAA) and pseudoaneurysms (VAPA) are an uncommon vascular disease, but its diagnostic may be vital. They are mostly asymptomatic and clinical expression is nonspecific but in 60% of patients debut as haemorragic shock with a 25 to 70% mortality rate[1].
Case Report: A 47-year-old healthy male was admitted into the emergency room after fainting while running. Clinical examination revealed slight abdominal pain, clear signs of hypovolemia, frank pallor and distal hypoperfusion. Initial hemoglobin level was 12g/dL but declined gradually even though blood transfusion was instaured. An abdomino-pelvic scan showed a huge haematoma in the transepiploic cavity, a large hemoperitoneum and a high arterial debit bleeding from a distal splenic artery psedoaneurysm. Endovascular intervention was rejected due to adverse anatomy[2] and urgent surgery was indicated. Massive transfusion protocol was activated. Coagulopathy treatment was guided by tromboelastography. Eight litres of blood and clots were aspirated and a splenectomy was performed. Patient was transferred to the postoperative care unit and was extubated 8h later.
Discussion: VAA and VAPA incidence varies from 0'1-2%, are more prevalent in 6th decade females and 60% are located at the splenic artery. Trauma and iatrogenia are known etiologies of VAPA. VAPA may present as Kehr sign, gastrointestinal bleeding or hemodynamic instability. Rupture could present abruptly or through the double-rupture phenomenon[1] (first bleeding episode at the transepiploic cavity and afterwards to the peritoneum), where clinical deterioration develops slower, as in our case. Whenever its possible, endovascular repair is advised but surgical treatment becomes imperative when anatomy is not favourable, there is hemodynamic in-

stability, or the shock cause is unknown. As CT imaging increases, incidental VAA and VAPA are diagnosed more promptly, allowing preventive treatment to be performed.

References:

1. Ibrahim, F, Dunn, J., Rundback, J., Pellerito, J. & Galmer, A. Visceral Artery Aneurysms: Diagnosis, Surveillance, and Treatment. *Curr. Treat. Options Cardiovasc. Med.* **20**, (2018).
2. Laganà, D. *et al.* Multimodal approach to endovascular treatment of visceral artery aneurysms and pseudoaneurysms. *Eur. J. Radiol.* **59**, 104–111 (2006).

Learning points:

1. VAA and VAPA are rare but devastating when faces out.
2. CT scan allows incidental diagnosis and its preemptive treatment.
3. Endovascular repair is recommended.

10AP01-10
Paroxysmal supraventricular tachycardia associated with Wolff-Parkinson-White in the prehospital setting: a case report and therapeutic management

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Background: Wolff-Parkinson-White syndrome is characterized by the presence of an abnormal electrical pathway in the heart and episodes of tachycardia. There are two main mechanisms of tachycardia: atrioventricular reentrant tachycardia and atrial fibrillation.

Case report: We report the case of a 32 years-old woman, with medical history of Rheumatoid arthritis and Wolff-Parkinson-White previously treated with catheter ablation, that requested prehospital emergency services for sudden cardiac palpitations. Upon arrival of the medical emergency team, the patient was conscious, and described an history of accelerated heartbeats with two hours duration, that persisted after vagal maneuvers.

Physical examination revealed a heart rate of 160 bpm, with blood pressure of 108/60 mmHg. Electrocardiogram reveled a pattern compatible with Supraventricular tachycardia, with a ventricular frequency of 160 bpm. Due to inherent constrains of the prehospital setting the patient was monitorized and transported accompanied with the medical team to nearest Hospital (7 minutes estimated time of arrival). Upon arrival in the emergency room an emergency cart with defibrillator was prepared and administration of Adenosine 6 mg achieved sinus rythm with success.

In a period of a month and a half, the patient went 15 times to Emergency Department with episodes of Paroxysmal Supraventricular tachycardia, despite being treated with antiarrhytmics (including beta-blockers). The patient was proposed to a second catheter ablation of accessory pathway, that was uneventful and successful, remaining asymptomatic thereafter.

Discussion: This case recalls fundamental features of Wolff-Parkinson-White syndrome and reviews the therapeutic management of supra ventricular tachycardia. Despite Adenosine being the standard option, it can be contra-indicated in antidromic supraventricular tachycardia and atrial fibrillation associated with Wolff-Parkinson-White syndrome. Specialized help is absent in the prehospital setting, and “scoop and run” strategies may be an option when risks outweigh benefits.

References: Eur Heart J. 2020 Feb 1;41(5):655-720; Circulation. 2012 May 15;125(19):2308-15.

Learning points: Wolf-Parkinson-White is an uncommon but potently life threatening condition, with specific electrocardiographic patterns.

Prehospital emergency and hospital teamwork is essencial for improving patient safety and outcome.

Respiration and Airway Management

11AP01-01
Successful airway management during one lung ventilation in a patient with Kartagener's syndrome

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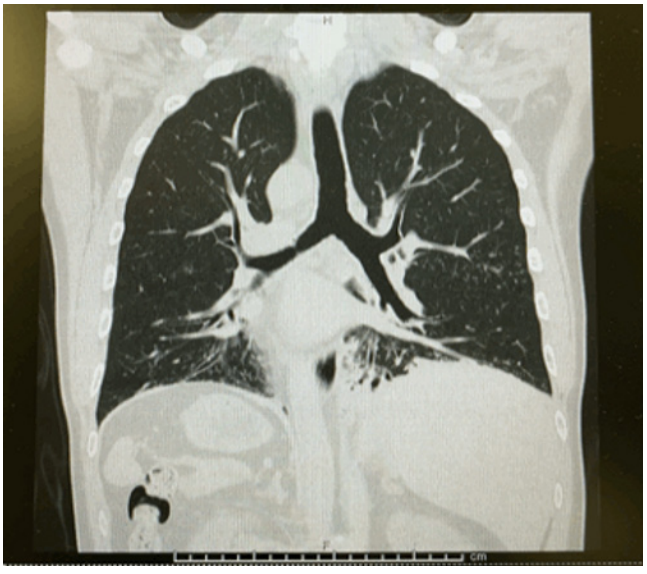
Background: Kartagener's syndrome (KGS) is rare, characterized with the triad of bronchiectasis, chronic sinusitis and complete situs inversus. In KGS patients who undergo the thoracic surgery requiring one-lung ventilation (OLV), special caution to achieve OLV is necessary. Here, we report successful airway management for OLV using the reinforced left sided double-lumen tube (DLT) in a patient with KGS.
Case report: A 45-year-old male diagnosed KGS came to the hospital complaining exacerbation of cough with bloody phlegm. Chest computed tomography (CT) revealed nodules in the right upper and lingular segment, then he was scheduled to undergo lung resection. After induction of general anesthesia with propofol, remifentanil and rocuronium, a reinforced left-sided 37Fr DLT (SILBRONCHO™, Fuji system, Tokyo Japan) was inserted under video-laryngoscopy and advanced into his anatomical right main bronchus under bronchoscopic guidance. There was neither resistance in insertion to the bronchus nor airway trouble intraoperatively, though secretion by bronchiectasis. The scheduled right lingulectomy was completely performed. He was immediately extubated in operation room and discharged uneventfully on the postoperative 4th day.



Discussion and learning points: A patient with KGS have inverted bronchi. Since no dedicated tube for complete situs inversus is available, we have to select the appropriate options to achieve OLV including DLTs, bronchial blockers, and single lumen tubes advanced into main bronchus. When conventional, hard left-sided DLTs are used inserted with turning into the right main bronchus, bronchial damages may occur due to the anticipated mismatch between the form of the DLT and the right main bronchus.
In our case, we could select appropriately the DLT and place it without any bronchial damages or ventilation failure. It is mostly because special DLT had reinforced and flexible bronchial tip and which had a connector capably adapted reversed right and left. We should take special caution to select appropriate devises for OLV in KGS patients. We will add educational review and literature of the airway management with KGS at the presentation.

11AP01-02
Measurement of continuous positive airway pressure generated by adjustable pressure limiting valve of the bain circuit on precision test lung

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Background: Pandemic could lead to shortage of ventilator & oxygen in suburban and rural areas of India.Bain Circuit (Modified Mapleson D) has been used to provide Continuous Positive Airway Pressure (CPAP) for critically ill patients in limited resource setting.[1]
We attempt to measure the CPAP generated by Adjusting Pressure Limiting (APL) valve using precision test lung.[2]
The materials are:
1. Ambu Cuff Pressure Gauge containing leur type tubing connection and the tube for cuff pressure gauge. It is manufactured by VBM Medizintechnik GmbH, Germany.
2. Portex tracheal tube (100/141/040) 4.0mm ID, 5.0mm OD with universal 15mm connector manufactured by Smith Medical International Ltd, USA.
3. Precision Test Lung with 15mm connector OD, resistance of 20cm H2O (60 LPM), compliance of 20ml/cm H2O manufactured by nice Neotech Medical Systems Pvt Ltd, India.
4. Bain circuit by Indo Surgicals, New Delhi, India.

Case report: To measure the CPAP generated by APL valve in Bain Circuit, we connected Bain circuit to common gas outlet with 9 litres of oxygen/min (1.5 times tidal volume of 6L). The patient end

was connected to the connector found in 4.0 size endotracheal tube which was connected to the tube for cuff pressure gauge with Ambu cuff pressure equipment as shown in the image.
The Precision Test lung was preferred instead of breathing bag as it offers normal resistance (of lung). The breathing bag is also known as reservoir bag is a low resistance bag which inflates even during expiration resulting in false pressure readings.
Discussion: The Bain circuit APL valve completely closes with 2 and a half turn of the valve. The CPAP generated was measured for each half turn of the APL valve. The results on pressure gauge were,
Half turn – No pressure detected
1 turn – 15cm of H2O as shown in image
1 & half turn – 30cm of H2O
2 turns – 60cm of H2O
2 & half turns - >60cm of H2O
With this study we wanted to show the importance of turns in APL valve in Bain circuit and quantify the pressure generated.
Learning points: Bain Circuit is effective to provide CPAP between 1 and 1 & half turn.
Drawback is multiple manufacturer products are available and needs to be tested.

11AP01-03
High respiratory rates generate end-expiratory lung volumes in the same way as applying a positive end-expiratory pressure in a bi-compartment lung model

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Background and goal of study: During mechanical ventilation and general anaesthesia, formation of atelectasis is common in the dependent lung regions, which can be prevented by application of positive end-expiratory pressure (PEEP) (1). Auto-PEEP can be generated by increasing the respiratory rate. (2) The aim of our study was to investigate if ventilation with higher respiratory rate (RR) could increase the end-expiratory lung volume (EELV) in a similar way as PEEP.
Materials and methods: We built a lung model with one high-compliant and one low-compliant test lung, 23,6 and 5,9 ml/cmH_2O respectively. The high compliant lung reflected non-dependent lung and the low-compliant lung dependent lung (Accu Lung precision test lung. Fluke Biomedical). Tidal volumes and pressures were measured separately in the two test lungs (Fluke VT 900A and VT650. Fluke Biomedical). EELV of each of the two lungs were measured from a ruler scale calibrated with different tidal volumes during volume control ventilation.
The lung model was ventilated in volume control mode with a Servo-U ventilator (Maquet, Solna, Sweden) at a respiratory rate of 20/min during PEEP 0, 5, 10, 15 and 20 cmH2O steps, and withPEEP 0 during RR of 20, 40, 60 and 80/min.
Results and discussion: EELV increased linearly when increasing PEEP. At first only in the higher compliant test lung but with higher PEEP, even the lesser compliant test lung received an EELV.
By increasing the RR, intrinsic PEEP was generated. The volume of the EELV generated by higher RR was equal to the volume generated by applying a PEEP. The distribution of the EELV between high- and low-compliant parts of the model was also similar (Fig. 1).

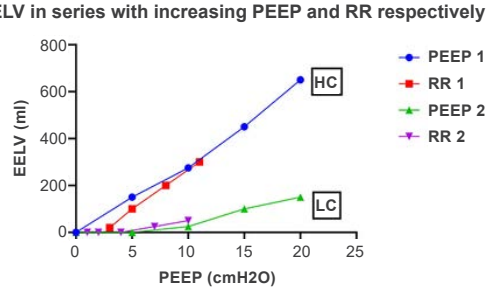

Fig. 1. End-expiratory lung volume (EELV) in high compliant (HC) test lung in series with increasing PEEP (PEEP 1) and in series with increasing respiratory rate (RR 1). EELV in low compliant (LC) test lung in series with increasing PEEP (PEEP 2) and in series with increasing respiratory rate (RR 2).

Conclusions: In this lung model high RR can generate an EELV in a similar way as applying a PEEP.
References:
1. Tokics L et al. Lung collapse and gas exchange during general anesthesia: effects of spontaneous breathing, muscle paralysis, and positive end-expiratory pressure. Anaesthesiology. 1987;66:157-167
2. Marini JJ et al. Dynamic hyperinflation and auto-positive end expiratory pressure: lessons learned over 30 years. Am J Respir Crit Care Med. 2011;184:756-62

11AP01-04
Distribution of ventilation in low and high-compliant lungs during increases of respiratory rate. A lung model study

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Background and goal of study: During mechanical ventilation the tidal volume (V_T) is distributed mainly to non-dependent lung regions. By applying positive end-expiratory pressure (PEEP) the V_T is redistributed to more dependent regions, usually improving gas exchange (1). Intrinsic PEEP can be generated by increasing respiratory rate (RR) (2).The aim of our study was to investigate if ventilation with high RR could redistribute V_T to dependent lung regions with low compliance at lower end-expiratory pressure than by application of PEEP in the ventilator.

Materials and methods: We built a lung model with one high-compliant (24,6 ml/cmH2O) and one low-compliant 6,1 ml/cmH2O) test lung (Accu Lung precision test lung. Fluke Biomedical). Volumes and pressures were measured separately in the two test lungs (Fluke VT900A and VT650. Fluke Biomedical).

The lung model was ventilated in volume control mode with a Servo-U ventilator (Maquet, Solna, Sweden) at a RR of 20/min during PEEP 0, 5, 10, 15 and 20 cmH_2O steps, and with PEEP 0 during RR of 20, 40, 60 and 80/min.

Results and discussion: Application of PEEP caused a minor difference in distribution of V_T from the high-compliant test lung (VT1) towards the low-compliant test lung (VT2). The ratio VT2/VT1 increased from 0,49 to 0,54 when PEEP was increased from 0 to 20 cmH_2O.

Increasing RR from 20 to 80/min generated intrinsic PEEP with 11 cmH_2O, while the tidal volume was redistributed from the high-compliant to the low-compliant test lung. At baseline PEEP of 0 cmH_2O and a RR of 20/min a V_T of 350 ml was distributed with VT2 of 74 ml and VT1 of 276 ml, i.e. a VT2/VT1 of 0.42. At a RR of 80/min, which generates an intrinsic PEEP of 11 cmH2O, VT2 increased to 156 ml.

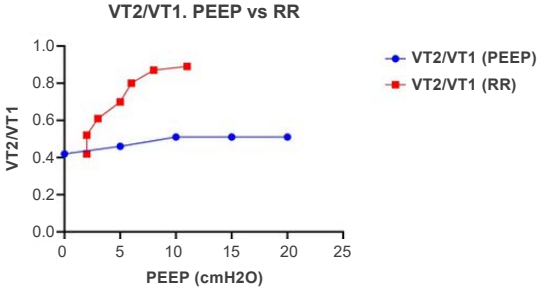

Fig 1. Quota of tidal volume in low compliant test lung (VT2) and the tidal volume in high compliant test lung (VT1) in series of increasing PEEP and in series of increasing intrinsic PEEP due to higher RR respectively.

Conclusions: Ventilation with high RR changes distribution of ventilation from high-compliant to low-compliant lung at low end-expiratory intrinsic pressure, while twice as high ventilator PEEP only caused minor redistribution.

References:

1. Gattinoni L et al. Am J Respir Crit Care Med 1995;151:1807-14
2. Marini JJ. Am J Respir Crit Care Med. 2011;184:756-62

11AP01-06
Airway management of a paediatric patient with Goldenhar syndrome

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Background: Goldenhar syndrome is a rare congenital syndrome involving oculo-auriculo-vertebral dysplasia.(1)Airway management is challenging and a major cause of anaesthesia-related morbimortality. We present a case in which inadequate equipment checkout increased the difficulty and duration of airway approach.

Case report: A 14-year-old male with a history of Goldenhar syndrome, Chiari malformation, severe obstructive sleep apnoea and thoracic scoliosis was admitted for elective placement of bilateral mandibular osteodistractors. He presented with left hemifacial microsomia and left microtia, and previous intubations had been successfully performed with fiberoptic bronchoscopy. The airway assessment showed a reduced and asymmetric mouth opening, micrognathism, reduced cervical mobility, class B jaw protrusion test and a Mallampati III.

Topical oropharyngeal anaesthesia was performed with 2% nebulized lidocaine, and inhalational anaesthetic induction was started with sevoflurane and remifentanil infusion. A ketamine bolus was also administered. Due to inadequate equipment checkout, only the neonatal fiberoptic bronchoscope was immediately available. After a failed intubation attempt, a successful intubation was performed with the appropriate paediatric bronchoscope. The patient was always on spontaneous ventilation and ventilatory assistance was possible using a two-handed face mask ventilation technique. Correct placement of the nasotracheal tube was confirmed and propofol infusion was used for maintenance of anaesthesia. The surgical procedure and the anaesthetic emergence were uneventful.

Discussion: In patients with Goldenhar syndrome, the presence of craniofacial and vertebral anomalies increases the likelihood of a difficult airway. Scoliosis, micrognathia and cervical extension restriction are risk factors for a difficult intubation. Reduction of functional, residual capacity and total lung capacity can also lead to ventilation problems.(2)

References:

1. DOI: 10.1093/bjaceaccp/mku004
2. DOI: 10.15406/jaccoa.2015.02.00065

Learning points: This case report highlights:

1. the importance of adequate planning and the necessity of equipment checkout in all situations, especially if difficult airway is predictable;
2. the challenge of maintaining spontaneous ventilation in the airway management of paediatric patients with Goldenhar syndrome.

11AP01-07
A rare cause of airway obstruction in minor trauma – a case report

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Background: Prevertebral and retropharyngeal haematomas are a rare and difficult to identify pathology. These can lead to life-threatening airway compromise and need timely recognition and management to gain successful outcomes.
We present the case of a woman who presented following a fall from standing, sustaining a cervical spine fracture leading to a prevertebral and retropharyngeal haematoma.
Case report: A 68-year-old female was brought in by ambulance following a fall and was initially alert but complaining of pain in her throat. During transfer to the emergency department she developed stridor with subsequent loss of consciousness.
On admission to the emergency department the patient was stridulous with saturations of 88% on 15L oxygen, tachycardic, hypertensive and had a GCS of 6. Initial ventilation using a Mapleson C-circuit required high pressures to obtain air entry, suggesting partial airway obstruction. Significant anterior neck swelling and bruising was noted, and anaesthesia was induced using a modified rapid sequence induction approach.
On inspection of the airway using a Macintosh blade videolaryngoscope, the glottis could not be visualised due to apparent swelling and distorted anatomy. Despite this, an endotracheal tube was secured via a bougie.
Computerised tomography (CT) revealed a fracture of the anterior component of the C4 vertebral body, associated with a large prevertebral and retropharyngeal haematoma causing anterior displacement of the larynx.
Following discovery of the diagnosis she was transferred to a tertiary trauma centre. Dual-phase CT revealed no arterial injury or active bleeding and she was admitted to the intensive care unit for conservative management. She was successfully extubated after 48 hours and stepped down to a ward. Her C4 fracture was managed conservatively and her admission was complicated by Covid-19 pneumonitis and acute cognitive impairment.
Discussion: Prevertebral and retropharyngeal haematomas are rare and can be an insidious cause for fatal airway obstruction. Patients classically present with features of 'Capps triad' which include compression of the trachea and oesophagus, displacement of the trachea anteriorly and bruising over the neck (1).
Learning point: This case report highlights the importance of judicious recognition and the anticipation of difficult airway management in these cases.
References:
1. Muñoz A, NJ Fischbein, de Vergas J, J Crespo, J Alvarez-Vincent. AJNR 2001; 22.6;

11AP01-08
Implementation of video laryngoscopes: the impact on airway management strategy and the prevalence of difficult tracheal intubation. A national cohort study

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Background and goal of study: We aimed to determine the development in the use of video laryngoscopy over a nine-year period, and its impact on airway planning and management.
Materials and methods: We retrieved 822 259 records of tracheal intubations recorded from 2008 to 2016 in the Danish Anaesthesia Database. The circumstances regarding pre-operative airway assessment, the scheduled airway management plan and the actual airway management concerning video laryngoscopy were reported for each year of observation. Further, the association between year of observation and various airway management related outcomes was evaluated by multivariate logistic regression.
Results and discussion: There was a significant increase in airway management with 'advanced techniques successfully used within 2 intubation attempts' from 2.7 % in 2008 to 15.5% in 2016 ($p<0.0001$), predominantly reflecting increased use of video laryngoscopy (Fig 1A). The prevalence of tracheal intubations 'scheduled for video laryngoscopy' increased from 3.5% in 2008 to 10.6% in 2016 ($p<0.0001$) (Fig 1A).

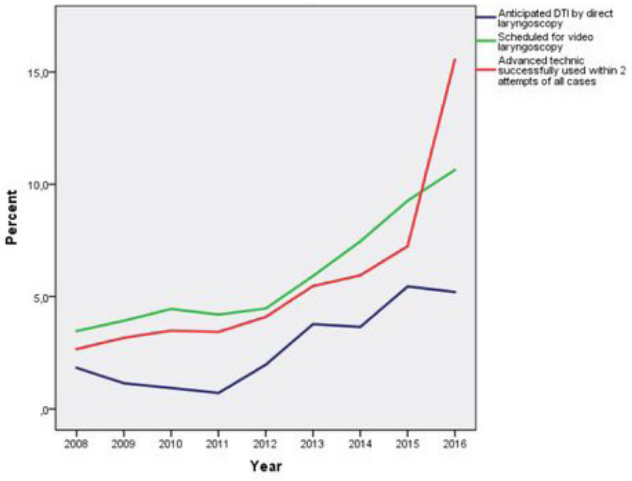

Fig 1A. Pre-operative airway assessment, scheduled- and actual airway management.

We found a significant increase in the prevalence of anticipated difficulties with intubations by direct laryngoscopy from 1.8% in 2008 to 5.2% in 2016 ($p<0.0001$) (Fig 1A). The prevalence of failed tracheal intubations decreased from 0.14% in 2008 to 0.05% in 2016 ($p<0.0001$) (Fig 1C).
Conclusion: From 2008 to 2016, a period of massive implementation of video laryngoscopes, a significant change in airway management behaviour was recorded. To a large extend the video laryngoscope is becoming a first choice device for both acute and elective airway management. Most importantly, we found a substantial and statistically significant reduction in failed intubation over the time of observation.

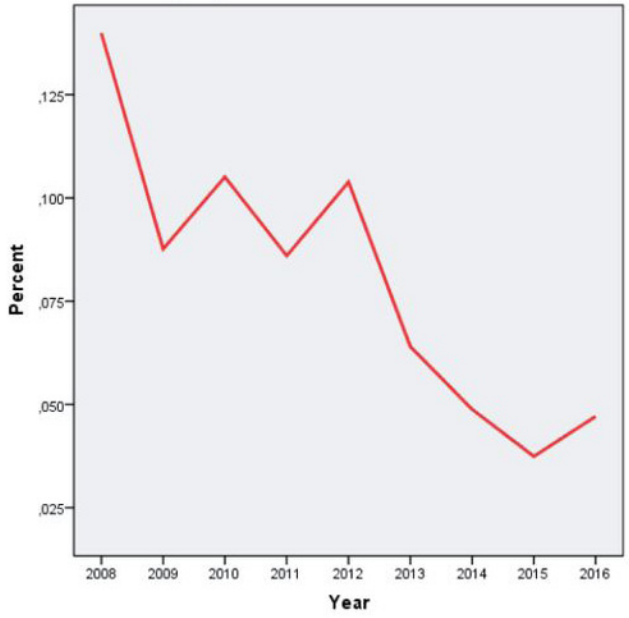

Fig 1C. Failed tracheal intubation.

11AP01-09
Comparison of tidal volume between paediatric anaesthesia and paediatric intensive care patients (TIVAC): retrospective cohort trial

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Background and goal of study: Protective positive pressure ventilation (tidal volume ≤6 mL/kg) in adult intensive care is considered as a standard of care. It is associated with morbidity and mortality reduction. Only limited data related to the ideal tidal volume in paediatric patients are currently available and therefore, the tidal volume for children should be limited between 5 and 8 mL/kg (Kneyber et al)[1]. The aim of this retrospective observational trial was to compare the mean tidal volume in paediatric patients undergoing general anaesthesia and paediatric patients admitted to intensive care unit.
Materials and methods: In this retrospective observational trial data from mechanically ventilated paediatric patients under general anaesthesia and patients in paediatric intensive care unit in tertiary paediatric anaesthesia and intensive care centre were analysed (1.1.2018 until 31.12.2018). Primary goal is to evaluate the size of the tidal volume in paediatric patients in anaesthesiology department and in patients in intensive care department. The tidal volume has been calculated per kg of body weight. Secondary aim was to evaluate the modified driving pressure (Pmax-PEEP) in paediatric patients undergoing general anaesthesia and paediatric patients admitted to intensive care unit.
Results and discussion: Overall, 2797 patients who underwent general anaesthesia or had been admitted to intensive care department were analysed and 1992 patients were included into final analysis. The mean tidal volume in mechanically ventilated patients in intensive care was 6.6 mL/kg (min. 5.4 mL/kg, max 9.5 mL/kg) compared to 7.6 mL/kg (min 4.1 mL/kg, max 14.1 mL/kg) in patients undergoing general anaesthesia was . The mean driving pressure in intensive care was 13.02 cm H2O (min. 5 cm H2O, max 21 cm H2O) compared to 7.53 cm H2O (min 2 cm H2O, max 17 cm H2O) in patients in general anaesthesia group.
Conclusion(s): Mean tidal volume in mechanically ventilated paediatric patients during anaesthesia was 1mL/kg higher compared to patients in intensive care with higher minimal and maximal deviation from recommended tidal volume.
References:
1. Kneyber MCJ, et al. Intensive Care Med. 2017 Dec;43(12):1764-1780. doi: 10.1007/s00134-017-4920-z. Epub 2017 Sep 22.
Acknowledgements: Financial support and sponsorship: this work was supported by Specific University Research provided by MŠMT (MUNI/A/1166/2021, MUNI/A/1178/2021), supported by MH CZ - DRO (FNBr,65269705).

11AP01-10
Airway management in patients with supermorbid obesity refusing awake intubation in whom neuroaxial anaesthesia is not possible. A case report

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Background: Awawake intubation in presence of difficult airway predictors have a high success rate, few relative contraindications, and the only absolute contraindication being the patient's refusal. The problem arises when the patient refuses, regional anaesthesia does not allow surgery to be performed, and surgery cannot be delayed because it is oncological.
Case report: We present the case of a 61 year old woman with BMI 57, scheduled for FIGO grade 3 endometrioid adenocarcinoma.
Mallampati 4, thyro-mental distance <6.5 cm, Neck Mobility <80º, Inter-incisor distance <4 cm, impossibility to prognate, bad teeth, short neck with diameter >40 cm, and 28 Arne Index score . CT scan described a previously unknown intrathoracic goitre with tracheal compression of up to 50%.
We proposed awake intubation to the patient. However, she "doesn't want general anesthesia, and wants to be awake during the surgery". In pre-anaesthesia she was told "surgery could be performed with neuraxial anaesthesia, like for pregnant women" (confirmed). Important trendelemburg will be necessary, with shoulder caps, and surgery can't be performed with neuroaxial anaesthesia alone.
In view of this, plan A was airway preparation as awake intubation, but induction using sevofluorane and maintenance of spontaneous ventilation plus apnoeic oxygenation. Access with Airtraq with camera for passage with bronchoscope (C-Mac) and intubation (combined technique). Plan B was attempt intubation with the videolaryngoscope. Plan C was awaken the patient and schedule awake intubation another day.
Intubation was successful at the first attempt without incident.
Discussion: When tracheal intubation is expected to be very difficult and/or rescue techniques are difficult, the safety margin should be increased by performing tracheal intubation while the patient is awake.

Awake intubation or sufficiently conscious and breathing spontaneously involves securing the airway and applying topical anaesthesia. Awake intubation has a high success rate and a low risk profile, although underutilised, with a failure rate of around 2% of cases.
Although a flexible bronchoscope is commonly used, videolaryngoscopes are also useful.
Learning points: The failed or unsuccessful tracheal intubation algorithm is a guide for the rare occasion where successful tracheal intubation has not been achieved in 3 + 1 attempts.
Videolaryngoscopes can improve tracheal intubation success rates in cases of difficult tracheal intubation, so the first attempt at tracheal intubation in this scenario should be with a videolaryngoscope.

11AP01-11
Extubation of superimorbid patients. Planning, management and implementation. A case report

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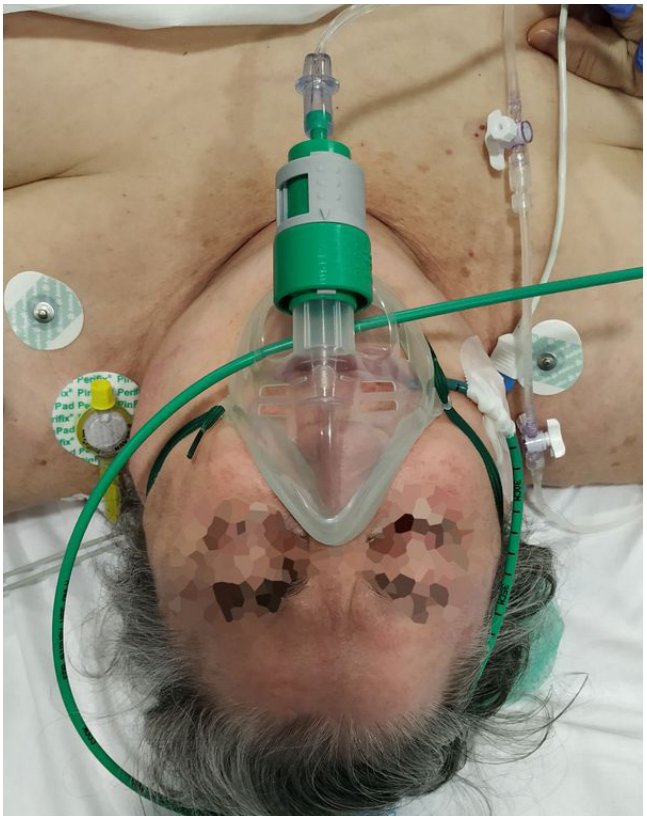
Background: Tracheal extubation is always an elective procedure, and there must be time for careful preparation. However, the incidence of unplanned extubation is as high as 35% in adults, and up to 30% of major airway management complications occur at extubation or in the recovery room, with a mortality rate of 5%.
Super-morbid obese patients should be considered and managed as a difficult airway patient and extubation should be planned assuming the risk of failure and re-intubation.



Case report: We present the case of a 61 year old woman with BMI 57, AHT and type 1 diabetes both with bad control, and CKD, scheduled for FIGO grade 3 endometrioid adenocarcinoma.
On airway examination Mallampati 4, Thyromental distance <6.5 cm, Neck mobility <80º, mouth opening <4 cm, inability to prognathize, bad teeth, short neck with diameter >40 cm. Arne Index score was 28. CT scan described an intrathoracic goitre with compression of up to 50% of the trachea previously unknown.
Patient was successfully intubated on the first attempt with inhalation induction maintaining spontaneous ventilation, and a combined technique (Airtraq + C-Mac videobronchoscope).
Extubation was performed in the operating room using an extubation catheter without incident. Catheter was left in the resuscitation room for 4 hours until a good level of consciousness, good muscle strength and correct blood gases were ensured.
Discussion: Extubation is always an elective procedure, there must be time for careful preparation. A safe extubation must ensure an uninterrupted supply of oxygen and have a back-up plan for tracheal reintubation in case of failure of tracheal reintubation.
Risk factors in this patient include functional airway obstruction due to goitre, muscle weakness or impaired cognitive status, anatomical obstruction for oedema, or secretions, and cardiopulmonary problems such as compromised functional residual capacity due to obesity.
Learning points: Lack of adequate planning for unforeseen difficulty/failure of intubation or extubation is relatively common, with overall reintubation rates around 70% after unplanned extubation.
Airway exchange catheters are recommended for extubation in an at-risk patient where reintubation may be difficult, but the practitioner should be experienced in this technique.

11AP02-01
A comparison of Vie-Scope and standard Macintosh blade laryngoscopes for intubation in morbidly obese patients

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Background and goal of study: Morbidly obese patients may be considered as potentially difficult to intubate, especially in emergency cases [1].
Tracheal intubation is performed after direct laryngoscopy using Macintosh laryngoscopes (MCL) as standard, but visualization of the glottis may be inadequate. The VieScope (Adroit Surgical, OK, USA) as a new type of laryngoscope consisting of a straight, shielded, illuminated tube is to perform intubation via a bougie with paraglossal technique (Fig. 1).

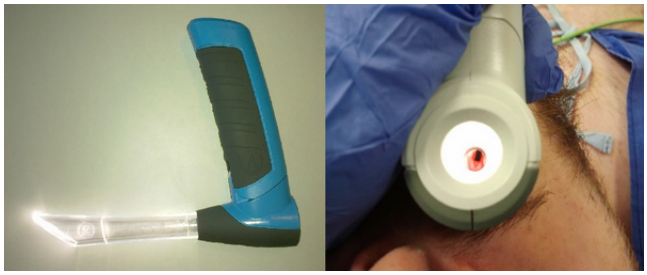

Fig. 1

In the prospective, non-randomised study the research hypothesis that use of VieScope laryngoscope (VS) may improve visualisation of entrance to larynx comparing to MCL was evaluated.

Materials and methods: 57 morbidly obese patients (BMI>40 kg/m2) were included into study. After induction to anesthesia with propofol, ketamine, lidocaine and rocuronium the evaluation of visualisation of glottis in direct laryngoscopy using Cormack-Lehane scale (CL) in the same patient was performed using two laryngoscopes: first MCL and then VS. Intubation was performed using VS. During intubation efforts patients received oxygenation via nasal CPAP to maintain proper oxygenation [2] and additional dose of propofol was administrated after 1 min. Because of study design time of intubation was not measured. First pass intubation success was noted only for VS.

Results and discussion: Mean demographic data were: age 41.9 ±8.2 yrs, hight 171.2 ±10.2 cm , weight 129.9 ±21.6 kg. Obtained view of entrance to larynx was for MCL: CL 1 in 34/57 cases; CL 2 in 7/57; CL 3 in 12/57; CL 4 in 4/57. This means that CL 3 and 4 was observed in 21% of cases when using MCL. For Vie-scope in all cases CL score was 1. First pass intubation success was in 56/57 of patients using VS. No complications were observed.

Conclusion: The use of Vie-scope laryngoscope for endotracheal intubation in paraglossal technique significantly improves visualisation of entrance to larynx in morbidly obese patients comparing to intubation using standard Macintosh laryngoscope.

References:

1 . Cook T et al. *Br J of Anaesth 2011;5(106): 617-631*

2 . Gaszynski T. Anesth Analg2019 Jul;129(1):e34. doi: 10.1213/ANE.0000000000004176.

11AP02-02
Efficacy and safety of three inflation methods of the laryngeal mask airway Ambu AuraOnce®: a randomised controlled study

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Background and goal of study: Laryngeal mask (LMA) is commonly used for airway management. A hyperinflation of the cuff was associated with complications, poor ventilation and increased risk of gastric insufflation. This single-center, prospective, randomized, double-blind, 3-arm, trial was performed to compare 3 cuff inflation methods of AuraOnce® LMA during bronchoscopy and Ebus procedures.

Materials and methods: 210 consenting patients scheduled for general anesthesia using AuraOnce® LMA were included. Before insertion, the LMA cuff was randomly filled with a cuff inflating method: half the maximum inflation volume (group MV), resting volume after opening the pilot balloon valve to equalize with atmospheric pressure (group RV) or unchanged volume group (group NV). Parameters regarding insertion, intracuff pressure (IP), airway leak pressure (OLP), leakage volume (LV) and positioning of LMA with fiberscope view (1 to 4 score) were collected. Postoperative complications (PC) were assessed.

Results and discussion: 201 of210 included patients completed the study. Patients in MV group presented lower mean IP than those in groups RV and NV (MV: 59.4±32.4 cm H_2O; RV: 75.1±21.1 cm H_2O; NV: 83.1±25.5 cmH_20; p<0.01), with a mean IP difference of 15.6±4.6 cmH_20 (p=0.02) between groups MV and RV, and 23.7±4.6 cmH_2O (p<0.01) between groups MV and NV. The incidence of IP >60 cmH_2O was lower in the MV group compared to the other two (MV: 20/65(30.8%); RV:47/69 (68.1%); NV 48/67 (71.6%); p<0.01).

There were no differences between groups concerning the ease of insertion, insertion time or maneuver for LMA adjustment. The first-attempt placement rate was similar between groups (MV: 93.8%, RV:84.1% and NV:89.6%; p=0.38). The overall insertion success rate was 96.7% (203/210), and 89,6% (180/201) at first attempt.

Patients had acceptable fiber-optic view scores of 3 or 4 [94%(189/201)] with no significant difference between groups (p=0,46). The requirement for adjustment maneuver after the insertion of the LMA was associated with a worse fiber-optic view (p=0,016). The OLP (p=0,53) and LV (p=0,26) did not differ between groups despite the significant differences in IP. The incidence of PC did not differ between groups and were not correlated with the IP (p=0,16).

Conclusion(s): When a cuff manometer is not available, the partially inflated cuff method of AuraOnce® LMA, using half the maximum recommended inflation volume seemed the best option.

Trial Registration: ClinicalTrials.gov: 04769791

References:

1. Min-Soo Kim. Am J Emerg Med. 2014 Mar;32(3):237-42.

2. Ruananukun N. BMC Anesthesiol. 2020 May 7;20(1):108.

11AP02-03
Development of machine learning system for airway prediction from facial image with mobile device

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Goals: A reliable prognostic tool for a difficult airway (DA) may enhance patients' safety during orotracheal intubation by decreasing unanticipated DAs.We aim to examine the applicability of an Artificial Intelligence-Deep Learning (AI-DL) algorithm to measure airway's anatomy, and to predict DA based on published models.

Materials and methods: Observational prospective cohort study with n=503 patients recruited at Galdakao-Usansolo and Basurto University Hospitals (Biscay, Spain) between 2018 and 2020. Two pre-operative photos for each patient were collected: a frontal view, in which patients were instructed to open their mouth completely; and a lateral view, with head in vertical extension.

Smartphones with general-purpose cameras were used, and a cue card was added to the scene as reference. Patients' medical records were logged. After intubation, HAN score and IDS-ASA criteria for intubation difficulty [1] were collected.

Our anaesthesiology team defined a set of relevant orofacial landmarks, whereas our data-science team developed an AI-DL algorithm, trained to identify locate them automatically within the images. In a previous evaluation, the system achieved an accuracy comparable to the consensus of two human annotators [2]. Landmark positions output by the AI-DL method were subsequently used by

the system to extract two anatomical measurements: thyromental distance and interincisor gap. Finally, these two were integrated into a published model for DA prognosis: Naguib et al. 2006 [3], which also employed patients' height and Mallampati score.

Results and discussion: The estimated incidence of DA was 6.36% (32 out of 503 patients) according to the IDS-ASA criteria. Naguib's model, when used in combination with our automatic AI-DL based measurements, achieved 53.12% sensitivity and 79.83% specificity; compared to clinicians' subjective assessment, who obtained 25.00% sensitivity and 93.63% specificity.

Conclusion(s): In this work, we evaluated an AI-DL method to predict DA for intubation, with two pre-operative photos and Naguib's model. Our results complemented expert judgements' predictive ability in terms of sensitivity, substantially lowering false negatives; at the expense of a restrained loss in specificity (false positives).

Thus, our proposal may provide anaesthesiologists with an automatic, objective and accessible decision support tool for the prognosis of DAs.

11AP02-05
Epiglottic cyst – a "silent" cause of unpredictable difficult airway

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Background: Unexpected difficult airway is the most important cause of major anesthesia-related morbidity.

Case report: A 57-year-old male patient, ASA II (smoking history) was scheduled for elective open right hemicolectomy under combined anesthesia (lumbar epidural block plus balanced general anesthesia).

On the pre-anesthesia examination, the patient denied respiratory symptoms. Airway examination was unremarkable as we did not find any difficult airway predictors. General anesthesia was induced with propofol and fentanyl. Shortly after the administration of the neuromuscular blocking agent, mask ventilation became progressively more difficult, yet it was possible to maintain adequate ventilation and oxygenation. Direct laryngoscopy resulted in a Cormack-Lehane grade 3 with a large, floppy epiglottis, lying in complete apposition to the posterior wall of the pharynx, blocking the view of the glottis and being unable to be lifted.

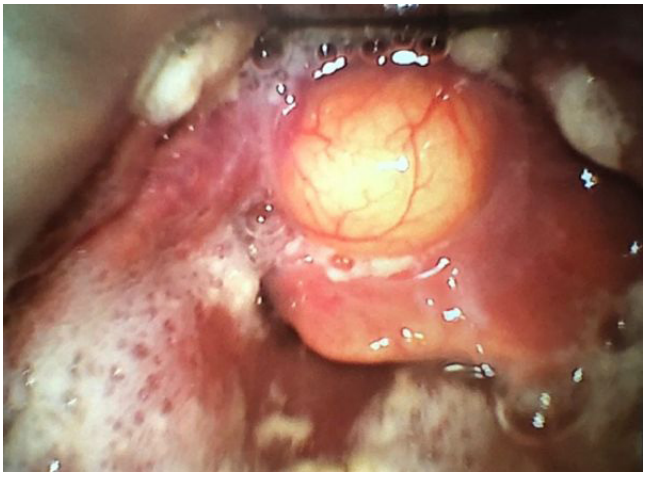

Fig1. Epiglottic cyst visualized during videolaryngoscopy.

Face mask ventilation was resumed and a second attempt was performed with the hyperangulated blade of videolaryngoscope that highlighted a round, yellowish structure in the lingual aspect of epiglottis. The posterior commissure of laryngeal inlet was visualized and orotracheal intubation was successfully performed.

At the end of the surgery, the patient was extubated uneventfully, and no respiratory difficulty occurred postoperatively. Further evaluation by the otorhinolaryngologist confirmed the diagnosis of epiglottic cyst.

Discussion: Epiglottic cysts constitute only 5% of all benign laryngeal lesions. However, their actual incidence is unknown as most epiglottic cysts in adults are asymptomatic and discovered incidentally during workup, induction of general anesthesia or at postmortem.[1] They are potentially dangerous as they can cause airway obstruction, which may lead to difficulty in ventilation, intubation or both.

References:

1. Lam HC, Abdullah VJ, Soo G. Epiglottic cyst. Otolaryngol Head Neck Surg 2000;122:311PMID:10652415.

Learning points: Anesthesiologists must be knowledgeable of this entity as a potential cause of unpredictable difficult airway.

11AP02-06
Perioperative management of a patient with Madelung's disease and undiagnosed obstructive sleep apnoea syndrome – a case report

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Background: Madelung's disease (MD) is a rare clinical entity characterised by accumulation of adipose tissue in a diffuse and symmetric manner, affecting upper trunk, thighs, and cervical region. This tissue may compress aero-digestive structures resulting in dyspnoea, dysphagia, hoarseness and obstructive sleep apnoea (OSA) signs.

Case report: We report a case of a 66-year-old man diagnosed with MD, proposed for elective surgical cervical lipectomy. He had alcoholic habits and symptoms of dysphonia and hypersomnia, presenting bilateral large cervical masses. The airway evaluation showed several signs predicting a difficult airway and the baseline saturation was 95% on room air. CT scan showed marked adipose content occupying almost all cervical spaces.

An awake nasal fibroscopy was proposed to the patient. Airway rescue plans were established after an airway ultrasound scan. Topical anaesthesia with lidocaine 1% was performed while preoxygenation was initiated. During fibroscopy we could observe the dynamic collapse of the airway with ventilation. After checking the correct tube positioning, induction of general anaesthesia was performed with propofol and remifentanil. No incidents were recorded during surgery.

On the postanesthetic unit, several episodes of desaturation were noticed during sleep periods (minimum observed SpO_2: 65%), restored to basal oxygen saturation levels with verbal stimulation of the patient and return to wakefulness. Given the high risk of respiratory complications, the patient was transferred to an intermediate care unit and nocturnal continuous positive airway pressure (CPAP) was started with a progressive improvement of the desaturation periods. Polysomnography was requested for diagnostic confirmation after hospital discharge.

Discussion: In this case, we decided to use only topical anaesthesia to improve airway permeability and to keep spontaneous breathing. We also used drugs with short duration of action and with elimination not dependent on alveolar ventilation, to minimize their residual effect. However, given the OSA signs presented, our patient needed CPAP treatment.
Learning points: This case highlights the importance of a detailed assessment of airway deformities and compression symptoms in patients with MD. Even though anaesthetic plan should minimize factors that contribute to postoperative respiratory complications, the typical localization of fat tissue masses constitutes a serious concern to anaesthetic practice.

11AP02-07
Airway management of a child with giant nasoethmoidal encephalocele

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Background: Encephalocele is a rare congenital midline defect of cranial bone fusion characterized by herniation of the brain and meninges through the bone defect. The estimated incidence of encephalocele is 1 to 4 in 10,000 births worldwide with only 15 % sincipital origin and of those only one third are nasoethmoidal encephaloceles (NE).
Other than the challenges of managing a major neurosurgery procedure on a pediatric patient, airway management in this group of patients can require advanced skills and a difficult airway should be assumed in every patient.
Case report: A twelfth month-old lactent ASA II, with a postnatal diagnosis of a frontoethmoidal meningoencephalocele presented for a craniotomy and encephalocele resection and craniofacial reconstruction. The meningoencephalocele was soft, covered with intact skin and extended from the patient's glabella to her nasal alae. The remainder of her airway examination was unremarkable and there was no neurological deficit and no other congenital abnormality.
In the operating room we placed the patient in supine and placed an adult mask (size 5) over the patient's entire face, incorporating the encephalocele and therefore, we were able to induce anesthesia with sevoflurane and spontaneous ventilation. The facemask was rotated 180 degrees in an attempt to contour the skull and seal along the frontal bones, zygomatic bones, and mandible. No direct pressure was applied to the globes. After we confirmed the ability to ventilate the patient, muscle relaxation was achieved using rocuronium 1mg/Kg and we proceeded to an uneventful videolaryngoscopy.
Discussion: Frontoethmoidal and frontonasal encephaloceles may be difficult to bag mask ventilate in up to 19% of patients and therefore represent an anesthetic challenge requiring careful and imaginative solutions when planning the airway approach.
References:
Lowe LH, Booth TN, Joglar JM, Rollins NK. Midface anomalies in children. Radiographics.
Leelanukrom R, Wacharasint P, Kaewanuchit A: Perioperative management for surgical correction of frontoethmoidal encephalomeningocele in children: A review of 102 cases. Paediatr Anaesth
Mahajan C, Rath GP, Dash HH, Bithal PK: Perioperative management of children with encephalocele: An institutional experience. J Neurosurg Anesthesioloy

Learning points: We bring awareness to the importance of safe practice of anaesthesia and reinforce preventive measures during careful airway examination and planification of different strategies.

11AP02-08
Submental intubation – a new endotracheal tube that offers the best of both worlds

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Background: The submental route of endotracheal intubation was first described as an alternative for tracheostomy, Altemir in 1986.[1]This technique consists of passing the free end of an endotracheal tube (ETT) through a submental incision following routine orotracheal intubation. The advantage of this technique is to provide a secure airway and optimal surgical field while avoiding the drawbacks of tracheostomy.
Report: The tubes most commonly used to undertake submental intubation include the regular cuffed ETT and the Mallinckrodt cuffed reinforced ETT. (Fig.1) The advantage of regular ETTs is that the 15mm connector is easily removable. This allows the clinician to pass a slim profile tube through the submental incision without the need for a large incision.The significant drawback of a regular ETT is that it may easily kink which precludes its use for any prolonged submental intubations. This drawback is overcome by the Mallinckrodt reinforced tube. (Fig.1)

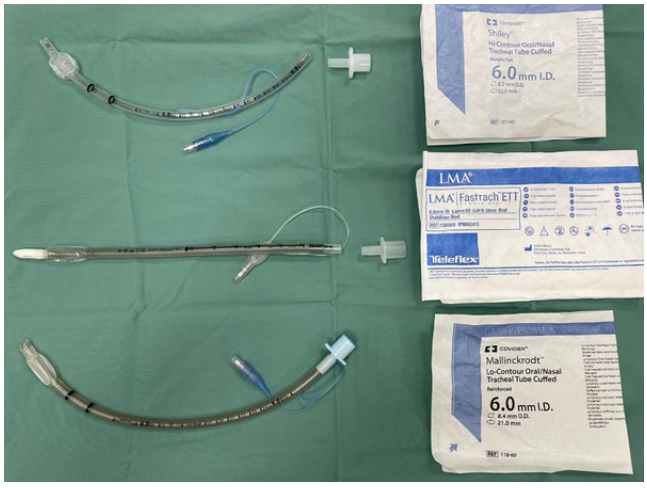

Figure 1

Reinforced tubes contain stainless-steel, spiral-wound, reinforcing wire within the tube wall and bonded 15mm connectors. While they overcome the risk of tube kinking, their bonded 15mm connector means that their passage through the submental space is more difficult and requires a larger incision. This increases the risk of complications, including increased time to pass the larger connector through the submental space or damage to local structures.
Discussion: We propose a novel use of the LMA fast trach ETT for submental intubation. (LMA® Fastrach™ ETT, Teleflex Medical Europe Ltd.) (Fig1) These tubes are available in sizes 6.0, 6.5, 7.0, 7.5 and 8.0. They have the dual advantage of having a reinforcing wire within the tube wall and also a removable 15mm connector so that the slimmer ETT can be passed through the submental space.

Conclusions: There are many advantages of submental intubation and we believe that use of the of LMA® Fastrach™ ETT offers many advantages, allowing submental intubations to be undertaken in a wider variety of clinical scenarios.

References:

1. Altemir, (1986). The submental route for endotracheal intubation. A new technique. J Maxillofacial Surgery, 14(C), 64–65.

11AP02-09
Prospective development and validation of a multivariable diagnostic model to grade difficult videolaryngoscopic intubation: the VIDIAC classification

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Background and Goal of Study: Although videolaryngoscopy is widely used for airway management, a prospectively developed specific classification system to grade difficulties during videolaryngoscopic intubation has not been established. The VIDIAC study aimed to develop and validate a multivariable diagnostic model to classify difficult videolaryngoscopic intubation and compare it against the Cormack-Lehane classification.

Materials and Methods: This single-center prospective observational diagnostic model development and validation study was designed in line with the TRIPOD statement and included patients scheduled for ear, nose and throat or oral and maxillofacial surgery with expected difficult airway management and clear indication for first-line videolaryngoscopy. Three independent observers systematically assessed procedural factors during tracheal intubation via Macintosh videolaryngoscopy.

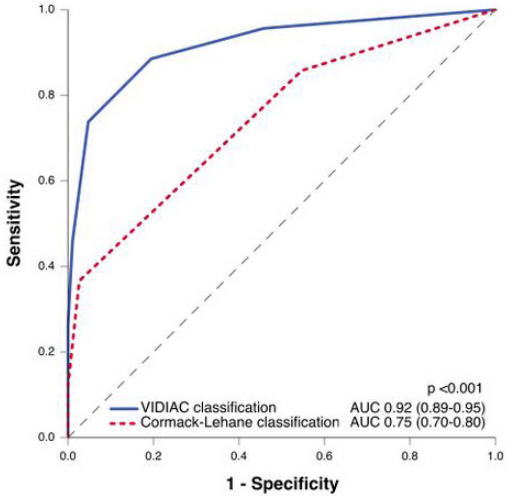

Figure 1. Receiver operating characteristic curves of the VIDIAC and Cormack-Lehane classifications for difficult videolaryngoscopic intubation.

Results and Discussion: Within the study period 2,958 cases were enrolled; 374 episodes of anesthesia (observations) in 320 patients were analyzed. A 'difficult videolaryngoscopic intubation alert' (primary endpoint) was noted in 48.9% [183/374] of observations, and in 20.3% [76/374] anesthetists transitioned to a hyperangulated blade. Random forest and lasso regression analysis identified six relevant predictors for the final multivariable lasso regression model: 'impaired epiglottic movement', 'increased lifting force required', 'direct epiglottic lifting required', 'vocal cords clearly visible', 'vocal cords not visible', and 'enlarged arytenoids' that were used to develop the VIDIAC classification.

Internal validation was performed by a ten-fold cross-validation with twenty repetitions. The areas under the ROC curves for the primary endpoint differed between the VIDIAC and Cormack-Lehane classifications (AUC: 0.92; 95% CI: 0.89–0.95 and 0.75; 0.70–0.80; P <0.001). The AUC for the prediction of a 'transition to a hyperangulated blade' was 0.95; 95% CI, 0.93–0.97.

Conclusions: The VIDIAC classification demonstrated high diagnostic performance when classifying difficult videolaryngoscopy and outperformed the Cormack-Lehane classification.

11AP02-10
Delayed airway obstruction following carotid endarterectomy: a case report

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Background: Upper airway obstruction after carotid endarterectomy is a rare, but potentially fatal, complication of this intervention. The etiology includes direct tracheal compression by wound hematoma and edema secondary to direct mucosal trauma. We report a case of a patient that developed an airway obstruction on the first postoperative day of carotid endarterectomy.

Case Report: 83-year-old male, ASA III, with history of hypertension, dyslipidemia and cerebrovascular disease was scheduled for carotid endarterectomy due to critical right carotid stenosis. In the intraoperative course the patient was submitted to total intravenous anesthesia, intubated with videolaringoscopy without difficulties and the procedure was uneventful. In the following post-operative 24 hours patient was monitored in the intermediate care unit remaining hemodynamically stable and spontaneously breathing and was transferred to vascular surgery ward.

Four hours later he presented stridor, hoarseness, dysphagia, drooling and difficulty breathing with a clean surgical wound and minimal surgical drainage. Due to an increased risk of airway compromise a cervical CT scan was performed that documented pharyngo-laryngeal edema that caused a marked reduction of airway caliber.

An awake oral fibroscopy examination revealed airway structural distortion and epiglottic edema resulting in glottis closure.It was decided to intubate the patient in the operating room with topical anesthesia and analgesia with remifentanil maintaining spontaneous ventilation and effective oxygenation thorough the whole procedure.

He was transferred to the ICU with favorable clinical evolution under corticotherapy, extubated 48 hours later without complications and discharged from hospital eight days later.

Discussion: In this case, the patient showed clear signs of airway obstruction representing "red flags" that the multidisciplinary team recognized promptly. Even though cervical hematoma formation is present in some cases of airway narrowing after carotid endarterectomy, the problem is more often caused by diffuse neck edema which occurred in this patient.

Thus, imagiological evaluation confirmed airway compromise so awake fiberoptic intubation seemed the most suitable plan to safely secure the airway.

Learning points: Airway obstruction is a life-threatening condition all staff potentially interacting with patients undergoing this surgery should be trained to recognize and manage this emergent situation.

11AP02-11
Shuttlescope®, a novel laryngoscope: one-handed endotracheal intubation is possible

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Background and Goal of Study: Although videolaringoscopy has greatly improved airway visibility during laryngoscopy, endotracheal intubation (ETI) is still always a two-handed procedure, with the second hand required for the actual placing of the endotracheal tube (ETT). Shortage of healthcare professionals during the COVID-19 pandemic has increased awareness of the need to optimize human resources during procedures such as ETI.

Shuttlescope® is a novel laryngoscope that permits both laryngoscopy and ETT placing using only one hand, thus reducing the need for assistance during ETI. We designed a randomized cross-over simulation study to compare the efficacy of one-handed intubation with the Shuttlescope® videolaryngoscope to that of standard ETI using a Macintosh laryngoscope.

Materials and Methods: We conducted a randomized cross-over trial in high-fidelity manikins to assess efficacy of one-handed intubation using the Shuttlescope® VL, compared to standard intubation with a Macintosh laryngoscope in a manikin model (AirSim, TrueCorp®).

Primary endpoints included time to intubation and intubation success rate. Three attempts per operator were made with each laryngoscope/technique: Macintosh laryngoscope/both hands (standard technique); Shuttlescope VL/both hands; and Shuttlescope VL/ one hand. All operators were anesthesiologists from the Hospital Universitario Araba (Vitoria, Spain) without prior exposure to the new device and technique except for a 5-minute standardized training session before the trial.

Results and Discussion: A total of 14 operators participated in the study. After randomization, 7 anesthesiologists started ETI with the Shuttlescope® and 7 started with the Macintosh, completing a total of 42 intubations with Macintosh Laryngoscope, 42 with Shuttlescope® VL (both hands), and 42 with Shuttlescope® VL (one hand). The mean time for ETI was 8,7 sg [3-20] with Macintosh laryngoscope, 8,6 sg [4-14] for the Shuttlescope® (both hands) and 9,1 sg [4-21] for the Shuttlescope® with only one hand (p=non-significant). The ETI success rate was 100% in all scenarios.

Conclusion(s): Shuttlescope® is a novel videolaryngoscope that permits safe and easy ETI while leaving the right hand of the operator free during the procedure, which may be a major advantage in many situations such as shortage of trained healthcare professionals in pandemics and emergency scenarios.

11AP03-01
The value of pressure support ventilation on lung function in patients under spontaneous breathing across laryngeal mask airway: a randomised clinical trial

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Background and Goal of Study: Postoperative respiratory complications are among the most common adverse events after general anaesthesia and mechanical ventilation. Spontaneous breathing with or without pressure support is routinely used in clinical practice. We compared perioperative changes in lung function in patients breathing spontaneously through laryngeal mask airway with or without pressure support.

Materials and Methods: Forty adult (41±13 years old) female patients scheduled for elective gynaecological surgery in lithotomy position were randomly assigned to the continuous spontaneous breathing group (CSB, n=20) or to the pressure support ventilation group (PSV, n=20). Lung function measurements were carried out before anaesthesia and postoperatively. End-expiratory lung volume (EELV) was assessed by the multiple breath nitrogen washout test. Respiratory mechanics were measured by the forced oscillation technique and parameters reflecting the peripheral airway resistance (R_5-R_{19}) and respiratory tissue elasticity (AX) were calculated.

Results and Discussion: The decrease in EELV was more pronounced in the CSB group than that in the PSV patients (16.6±12.8 % 8.2±11.1 %, p<0.001). Patients in the PSB group did not exert an increase in R_5-R_{19}, whereas airway resistance in the Group CSB elevated significantly (-7±63 % vs. 75±140 %, p<0.05) (Figure 1.). A smaller change in AX was also observed in the PSV group (p=0.042).

Conclusion(s): These data suggest that pressure support ventilation may be beneficial over continuous spontaneous breathing for patients undergoing general anaesthesia with LMA. Pressure support ventilation protected from the postoperative lung volume loss and increased peripheral airway resistance.

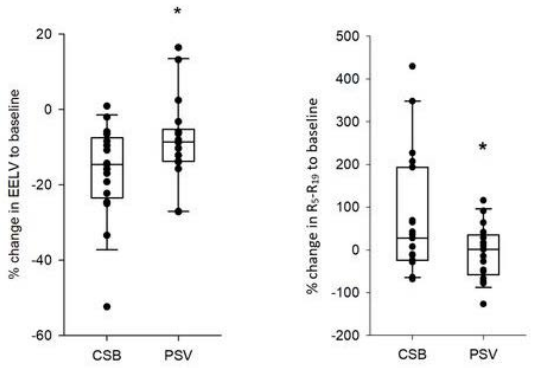

*Figure 1. Changes in EELV and R_5R_{19} after anaesthesia compared to baseline in the two protocol groups. *: p<0.05*

11AP03-02
Craniofacial abnormalities and orthognathic surgery: do you know the (air)way?

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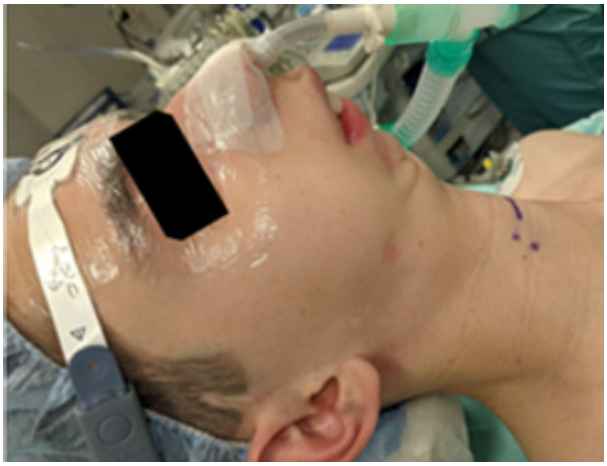
Background: Syndromes with airway malformations can challenge pediatric anesthesia. This case reviews the airway management of a child with oculo-auriculo-vertebral syndrome, a craniofacial developmental disorder that among other issues presents a difficult airway scenario.
Case Report: A 17-year-old male was admitted for mandibular distraction surgery.Airway assessment showed mandibular hypoplasia with ankylosis, marked micrognathia and restricted mouth opening (<1cm), limiting nutrition to semi-solid/liquids. Thyromental distance was very small and Mallampati score impossible to assess. Previous anesthetic records described a mouth opening of 2 finger breadths, no longer present and the use of a supraglottic device. The airway plan was discussed, anticipating inability to cooperate and was known by all members.
Plan A: Nasal fiberoptic intubation with spontaneous ventilation using inhalation anesthetics.
Plan B: Surgical airway, as there was no space for a supraglottic device as rescue.
After ultrasound-guided cricothyroid membrane marking,inhalational induction was initiated with sevoflurane and nitrous oxide but interrupted by a vomiting episode. Oral suction was promptly done, hampered by almost absent mouth opening and antiemetics were given. After this episode, inhalational induction was restarted with sevoflurane/O2. Nasal fiberoptic intubation was achieved, using a reinforced size 6 endotracheal tube and anesthesia maintained with intravenous agents. Surgery was uneventful, and extubation successful after confirming neuromuscular block reversal and spontaneous ventilation.
Discussion/Learning points: Craniofacial abnormalities present real challenges in airway management. Fortunately, most difficult airways in children are anticipated. The key to success is evaluating the airway, defining a strategy and being prepared for the unforeseen. Anesthetic records should be read carefully and critically, since airway dynamics and dimensions may change significantly over time. A golden rule in difficult airway management was carried out-maintainance of spontaneous ventilation. Preoperative briefing with the whole team about the airway plan and cricothyroid membrane signaling were also crucial.



11AP03-03
Case series of ultrasonography utilisation as airway imaging adjunct in patients with anticipated difficult airway

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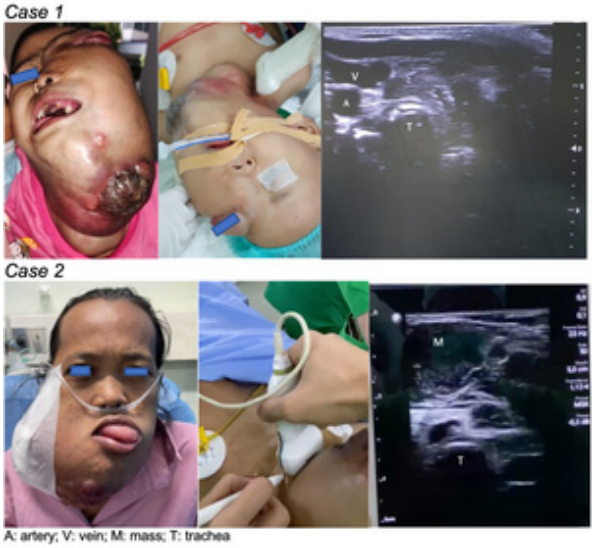
Background: Ultrasonography (USG) demonstrated valid and reliable imaging in comparison to computed-tomography (CT) scan.[1] However, patients with large head and neck tumour most likely had deviated anatomical position and unable to tolerate supine position for CT-scan due to compromised airway. The use of USG in these patients has not been described. Herein, we describe the role of USG in two anticipated difficult airway patients planned for secondary tracheostomy.
Case Report: Case 1 is 4-year-old girl with olfactory neuroblastoma sizing 13x17 cm. Previous CT-scan examination showed no tracheal deviation. We confirmed an estimated 5-cm tracheal deviation from the midline and estimated no. 5.0 endotracheal tube (ETT) would fit through using USG. Case 2 is 38-year-old female with mandible tumour extending to hypopharynx region sizing 22x15 cm. Patient unable to tolerate supine position for CT-scan evaluation. USG confirmed slightly deviated trachea, narrowing tracheal lumen above the cricoid level and estimated no. 6.5 ETT to fit through.
Discussion:Difficult airway cases should be planned up to the worst case scenario, cannot intubate cannot ventilate, which prompt for emergency front neck access. In these patients with deteriorated head and neck structures, USG is a simple, reliable non-invasive technique for real-time airway anatomy assessment to identify surrounding structures and best approach to avoid nearby blood vessels, therefore contributing to safer airway management.[2]



References:
1. Abdallah FW, Yu E, Cholvisudhi P, Niazi AU, Chin KJ, Abbas S, et al. Is ultrasound a valid and reliable imaging modality for airway evaluation? an observational computed tomographic validation study using submandibular scanning of the mouthand oropharynx. J Ultrasound Med. 2017;36(1):49–59
2. Kundra P, Padala SRAN, Jha AK. Ultrasound guided tracheal intubation with a styleted tracheal tube in anticipated difficult airway. J Clin Monit Comput. 2021;35(2):285–7

Learning points:
USG provides quick reliable assessment of airway structure, we recommend routine assessment in anticipated difficult airway despite previous CT imaging.

11AP03-04
Diaphragm dysfunction after cardiac surgery: challenges and opportunities for therapy (clinical case)

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Background: Dysfunction of diaphragm complicates up to 10% of cardiac operations (1). There are multiple reasons for diaphragm weakness but the optimal diagnostic and therapeutic options are still unsettled.
Case report: An 82-year female was admitted in ICU after elective aortic valve replacement. The time of cardiopulmonary bypass and surgery was 90 and 180 min, respectively. The first postoperative day (POD) was uncomplicated: the patient was extubated at 6 hrs after ICU admission, the blood gases, hemodynamics and organ functions were stable.
However, at 24 hrs the fatigue and dyspnoe have appeared. During 40 hrs, the patient received noninvasive ventilation. After cognitive decline on POD 3, she was re-intubated and tracheostomized on POD 7 due to inability of ventilator weaning. The muscle strength of patient was sufficient for sitting and eating, but the spontaneous breathing did not exceed 60 min/day due to dyspnoe with hypercarbia and emotional stress. On POD 16, we revealed dysfunction of diaphragm by ultrasound and decided to start phrenic nerve stimulation both for diagnostic and therapeutic purposes. On POD 20, after 10-min ultrasound-guided phrenic nerve stimulation with 0,5-1 mA and 1-6 Hz (Stimuplex, BBraun) for each side, we confirmed myopathic cause of diaphragm weakness.
The patient expressed “burst of strength” and emotional improvement followed by tidal volume increase, however this effect was transient. During next three procedures, spontaneous breathing periods reached 12 hrs/day, and the patient was successfully weaned from ventilator. In parallel, we achieved increase of diaphragm thickening index (measured by ultrasound) from 0 to 20%, muscle thickness from 10 to 17 mm, and diaphragm excursion from 5 to 9 mm. The patient was decannulated on POD 30 and discharged from ICU on POD 33 with ability of full self-service.
Discussion: Dysfunction of diaphragm is an underestimated cause of respiratory failure after cardiac surgery. The challenges include insufficient diagnostic modalities, limited treatment options and complexity of specialized pacing devices (2). Novel therapies of myopathy could optimize patient rehabilitation and improve outcomes.
References:

- Bazylev VV et al. Diagnostic radiology and radiotherapy 2017;1:52-63.
- DiMarco AF Clin Chest Med 2018;39:459-71.

Learning points:Diaphragm pacing via phrenic nerve stimulation may attenuate myopathic respiratory failure and optimize ventilator weaning in selected patients.

11AP03-05
Postoperative severe apnea attacks in a patient with joubert syndrome undergoing cleft lip repair

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Background: Joubert syndrome (JS) is a rare autosomal recessive congenital disorder with important implications for the anesthesiologist. It is characterized by severe psychomotor developmental delay, abnormally ‘jerky’ eye movements, ataxia and especially in early infancy, recurring spells of marked tachypnea or ‘panting’ respirations punctuated by apnea[1]. We aimed to discuss the perioperative management of JS who underwent cleft lip repair.
Case report: The 13-month-old patient diagnosed with JS, who applied for cleft lip repair, had cleft palate/lip, microphthalmia, polydactyly, seizure history, molar tooth sign in cranial imaging andhypotonia. Difficult airway preparation was made, ENT surgery team was informed in case of a possible CICO(cannot intubate cannot oxygenate) situation.
Following routine ASA monitoring and uneventful inhalation induction, two-hand mask ventilation was successful. The patient was intubated with Glidescope LoProS2 in the first attempt. Surgery was completed, neuromuscular blockade was reversed, the patient’s trachea was extubated and she was transferred to PACU. During her observation, she developed apnea attacks that last about 15 seconds and cause severe decreases in $SpO_2$and heart rate.
During these periods balloon-valve mask ventilation was needed. In order to decrease the possibility of upper airway obstuction due to her large tongue, tongue suture was placed. Considering her respiratory instability, she was transferred to the pediatric intensive care unit (PICU). During her transportation balloon-valve maske ventilation had to be performed once more. She was followed in PICU for 24 hours and transferred to inpatient care.
Discussion: Panting tachypnea followed by apnea is the leading concern during anaesthetic management of cases with JS, especially in the neonatal period. Although opioids are primarily blamed for the exacerbation of perioperative apnea attacks, life-threatening attacks had also been reported
with inhalational agents, even nitrous oxide alone.[1]Our patient also developed severe apneas,which might lead to cardiopulmonary arrestif not treated urgently, although we didn’t administrate opioids. Therefore, we think that JS patients should be considered for ICU follow-up during early postoperative period.
References:
1. Darko J. Vodopich MD,Gregory J. Gordon MD,Anesthetic management in Joubert syndrome, Pediatric Anaesthesia, 09/2004

11AP03-08
Airway management for lateral fixation of vocal cord in patient with bilateral vocal cord paralysis after total thyroidectomy: a case report

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Background: The vocal cord paralysis can be caused by compression of reccurent laryngeal nerve by enlarged thyroid gland. We present the case of acute respiratory failure after total thyroidectomy in patient with preoperative right vocal cord palsy.
Case Report: A 62-year-old woman was scheduled for total thyroidectomy. Anesthesia and operation went uneventful. Inspiratory stridor was developed 10 minutes after extubation, followed by decreasing of SpO2 to 50%. Therapy for laryngospasm and bronchospasm was administered by attending anesthesiologist (corticosteroids and bronchodilators), as well as supplementation of oxygen via face mask. Residual activity of opiods and midazolam was suspected and antidotes were given. Breathing mechanics failed to improve and the patient was intubated and manually ventilated with self-inflated bag during 10 minutes until she regained consciousness and spontaneous respiration. Airway exchange catheter was introduced through endotracheal tube in order to provide airway patency and oxygenation after extubation. Upon extubation, fiberoptic evaluation by ENT surgeon revealed edema and hematoma of both vocal cords. Patient was immediately reintubated. Endo-extralaryngeal laterofixation of right vocal cord according to Lichtenberger was done in general anesthesia (Figure 1).
Extubation was well tolerated and patient was referred to ENT ward with airway exchange catheter that was removed two hours later. In the following days, endoscopic findings showed significant reduction in vocal cord edema and movement of both vocal cords.
Discussion: In this urgent ENT surgery anesthesiologist showed readiness to extubate this challenging patient providing faster recovery of vocal cords' function. Furthermore, urgent tracheostomy was avoided due to cooperation of anesthesia and ENT surgical team.
References:
1. Bayhan Z, Zeren S, Ucar BI et al. Emergency thyroidectomy:Due to acute respiratory failure.Int J Surg Case Rep.2014;5(12):1251-3.
Learning points: Postoperative laryngeal spasm after general anesthesia, in previously established vocal cord paralysis, should rise high suspicion on vocal cords lesion which demands emergency ENT surgery.

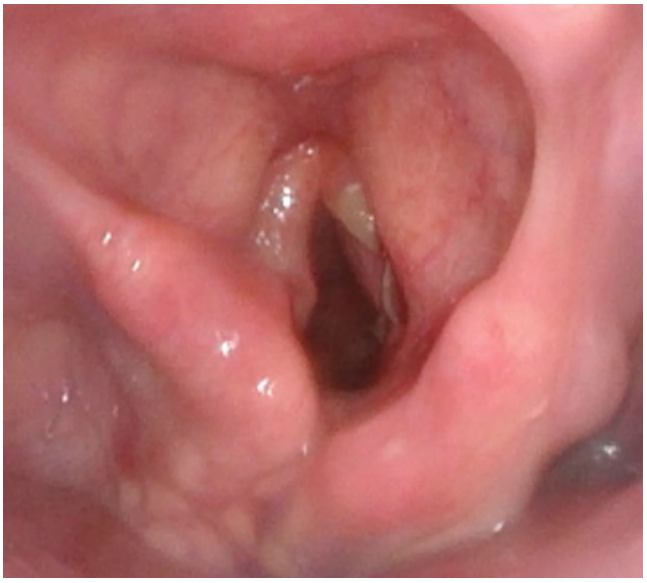

Figure 1

11AP03-10
Mechanical power and ventilatory efficiency during flow-controlled ventilation in severe COVID-19 ARDS

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Background and Goal of Study: The prevention of ventilator-induced lung injury (VILI) is the mainstay of the management of mechanical ventilation in patients with ARDS. Mechanical power, which represents the total inflation energy transferred from the mechanical ventilator to the lungs, including flow and respiratory rate, is associated with VILI and mortality in patients with ARDS. Flow-controlled ventilation (FCV) is a ventilation mode that provides low, constant flow throughout both inspiration and expiration without pauses implemented by the Evone® ventilator (Ventinova Medical, Eindhoven, The Netherlands). By avoiding high peak flows and reducing respiratory rate, FCV may lead to the minimization of applied and dissipated energy in order to attenuate VILI in ARDS patients.

	C1	F	C2	C1	F	C2	C1	F	C2	C1	F	C2	C1	F	C2	C1	F	C2	C1	F	C2
Patient	Respiratory rate (breaths/min)			Minute ventilation (L/min)			Driving pressure (cmH2O)			Inspiratory flow (L/min)			Mechanical power (J/min)			PaO2/FiO2 (mmHg)			Ventilatory ratio		
1	28	17	21	11.76	7.07	8.82	12	12	12	25.87	15.00	26.46	25	10	17	103	112	133	2.1	1.3	2.0
2	28	18	28	12.90	7.92	12.32	12	11	10	25.80	15.00	24.64	24	11	25	130	107	80	3.6	1.3	3.7
3	27	16	24	12.96	8.00	11.52	13	13	13	25.92	15.00	23.04	27	14	24	118	125	103	2.6	1.5	2.6
4	25	16	25	12.5	8.32	12.50	10	11	12	27.50	15.00	27.50	26	15	25	140	190	152	2.5	1.4	2.6
5	26	20	25	11.18	7.40	10.75	12	11	11	27.95	14.00	21.50	21	11	20	134	142	150	2.3	1.4	2.4
6	22	11	22	9.46	5.50	9.46	11	14	12	18.92	11.00	18.92	19	10	19	127	142	153	1.9	1.0	1.6
7	22	14	21	9.24	5.60	8.61	14	14	14	18.50	11.00	17.22	20	11	18	133	202	157	1.3	1.1	1.6

For each variable, three values are reported: the last value before the transition to FVC (column C1), the values at the end of the FCV cycle, after about 240 minutes of FCV (column F), and the last values recorded for the patient, 120-180 minutes after the transition back to CMV (column C2) system.

11AP03-10 Table. Ventilatory settings, respiratory mechanics, and gas exchanges

Materials and Methods: FCV was used when the arterial partial pressure of oxygen to inspired oxygen fraction ratio was lower than 150 mmHg during conventional volume-controlled ventilation, despite neuromuscular blockade and prone positioning longer than 12 hours, in 7 patients patients admitted to the ICU because of severe ARDS secondary to coronavirus disease-19. We registered the changes in ventilatory settings, respiratory mechanics (including driving pressure and mechanical power), and gas exchanges during the transition from conventional volume-controlled mechanical ventilation (CMV) to FCV and back.
Results and Discussion: During FCV, the decreased inspiratory flow was associated with an overall decreased respiratory rate and minute ventilation, in comparison with CMV. During FCV, despite similar driving pressure and compliance, the mechanical power was overall lower, as compared with CMV. Moreover, we observed an overall lower ventilatory ratio during FCV.
Conclusion: Our findings suggest that FCV may reduce mechanical power and increase ventilatory efficiency in patients who remain severely hypoxemic after the optimization of CMV.

11AP03-11
Hypercapnia of unknown origin: pneumoscrotum due to inguinal hernia in laparoscopic cholecystectomy

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Background: Hypercapnia during laparoscopic surgery can be a potentially serious complication. A quick differential diagnosis should be made between its possible causes.[1]
In our case, after ruling out other origins, pneumoscrotum due to inguinal hernia with continuous reabsorption of CO_2inside was observed as the cause of maintained hypercapnia.
Case report: 81-year-old male, with no relevant medical history, scheduled for laparoscopic cholecystectomy. Anesthetic induction and start of surgery were uneventful. After 60 minutes of intervention, a progressive increase in EtCO2 up to 65mmHg was detected, without hemodynamic involvement.
After ruling out respiratory or metabolic causes, it was decided to stop laparoscopic, with no improvement in hypercapnia. In the search for other forms of inadvertent CO_2reabsorption, pneumoscrotum was observed, the origin of which was explained by a previous inguinal hernia.
After its mechanical reduction a progressive decrease in $EtCO_2$ was observed. A compressive bandage was applied to prevent a new passage of CO_2into the scrotum, and laparoscopy was restarted without incident, maintaining normocapnia.
Discussion: We describe a rare case of hypercapnia due to pneumoscrotum in laparoscopic surgery. In the case of high hypercapnia at laparoscopy, the pneumoperitoneum should be stopped and a differential diagnosis of its origin made between serious causes such as malignant hyperthermia, pneumomediastinum, and gas embolism.[2]
Once discarded, another source of CO_2 extravasation was sought. The patient was uncovered and pneumoscrotum was observed, which explains the inadvertent reabsorption of CO2 through the peritoneum of the inguinal hernia, with resolution of hypercapnia after its mechanical reduction.

References:
1. Raymond H, Sunil K. Intraoperative complications of laparoscopic cholecystectomy. Can J Anaesth. 1993;40:459-64.
2. Hsin-Lun, Kwok-Hon.Severe Carbon Dioxide Retention During Second Laparoscopic Surgery for Urgent Repair of an Operative Defect from the Preceding Laparoscopic Surgery.Acta Anaesth taiwan. 2008;46:124-128.
3. Gautam D, Min Y. Critical manifestations of pneumoescrotum. Curr Urol. 2015;9:62-66.
Learning points: In the presence of sustained severe hypercapnia, after ruling out its main causes at laparoscopy, other rare sources of CO2 extravasation should be sought.[3]The rapid diagnosis and resolution of the cause avoids potentially serious consequences associated with hypercapnia.

11AP04-01
Airway management for a montgomery t-tube insertion following tracheoplasty

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Background: Airway management for tracheal surgery often presents a challenge for the anesthesiologist. We report the successful management of a Montgomery tube placement in a patient with subglottic stenosis. Montgomery tube is a “T-shaped”, non-cuffed tube, used as a combined stent (upper limb) for subglottic lesions and as a mean to ventilation (lower limb).
Case report: 76-yr-old woman, ASA III, with a previous mandibular reconstruction and tracheostomy due to a mandibular carcinoma. She developed a tracheal stenosis, being scheduled for a tracheoplasty. An intravenous anesthesia was carried out with remifentanil, propofol and rocuronium.
After pre-oxygenation and anesthesia induction we removed the tracheostomy tube and introduced a 6 mm cuffed microlaryngeal tube guided by a Bougie. Since the surgical team couldn’t access the stenosed segment of the trachea through upper airway, we proceeded to fiberoptic oral intubation with a 5 mm endotracheal tube, and removed the microlaryngeal tube, allowing surgical access to the lesion through the tracheostoma.
Also, using the fiberscope, we shared both surgical field and airway view with ENT surgeons, providing optimal surgical exposure. With direct visualization of the upper part of the lesion, they could remove the granulation tissue causing the stenosis and generate space for T-tube placement.
We ventilated the patient with 100% O2 for 3 minutes and then the T-tube insertion was done in a period of apnea and connected to the ventilator using an adaptor. Correct placement was confirmed with the presence of capnography. Sugammadex was administered and intravenous anesthesia was stopped.
Patient became conscious and was breathing spontaneously, with adequate tidal volumes and end tidal CO2, maintaining oxygen saturation of 97% on room air. Her recovery was uneventful.
Discussion: There are few reports regarding anesthesia management for a Montgomery tube insertion. Because of the underlying clinical problem and the shared airway, potential risks include intraoperative airway loss, disconnection, or obstruction due to bleeding and surgical debris, as well as post-operative airway compromise. Thus, anesthetists must have knowledge of this technique.

References:
BJA,Volume 87, November 2001, Pages 787-790
Learning points: This case enlightens the importance of a multidisciplinary approach. Efficient communication with the surgical team is critical for the surgical outcome and to avoid potential complications.

11AP04-02
Awake fibre-optic intubation under high-flow nasal oxygen to improve oxygenation and intubation condiditions

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Background: Normally, low flow oxygen-delivery devices are used during awake fiber-optic intubation (FOI). However, high-flow nasal oxygen (HFNO) should be the technique of choice, since it reduces dead space, reduces inspiratory resistance, generates positive airway pressure, improves apneic oxygenation time, and is usually well tolerated. It is particularly beneficial in obese patients, and those having a history of obstructive sleep apnea. Here we report the successful management of a FOI under HFNO.
Case report: 69-yr-old man, scheduled for a suspension microlaryngoscopy and laryngeal biopsy because of an arytenoid lesion extending to the epiglottis. He had history of smoking, class 2 obesity, and severe obstructive sleep apnea. Preoperative evaluation was suggestive for difficult airway and we planned awake FOI. Baseline SpO2 was 92% in room air. HFNO at 45L/min was started and after 1-minute SpO2 was 100%.
To reduce patient discomfort while maintaining spontaneous breathing, a continuous infusion of remifentanil was set at 0.15 mcg/kg/min. Two oropharyngeal puffs of lidocaine (10mg each) were applied. Using an atomizer, 20 mg of lidocaine were administered near epiglottis, followed by gargling. A modified Guedel was placed.
Fibroscopy showed a glottic stenosis. 20mg of lidocaine were administered locally. Passage through the vocal cords caused no discomfort to the patient. Lumen visualization and capnography curve confirmed correct tracheal placement. Intravenous propofol and rocuronium were administered. Surgical procedure was performed as planned. After sugammadex administration and stopping infusions, the patient was breathing spontaneously with adequate volumes and end-tidal CO2. He was extubated and HNOF was restarted, being transferred to the post-anesthesia care unit. The perioperative period was uneventful.
Discussion: Using HFNO and mild sedation, we performed an optimized FOI, with an optimally oxygenated patient, increasing our safety in case of hypoventilation, apnea, or loss of the airway. There where no episodes of desaturation or hypercapnia. Patient reported a comfortable experience with this device.
References:
BJA;115(4):629-32
Learning points: Considering the aforementioned advantages, this enlightens the clinical potential of HFNO use in anesthesiology daily practice.

11AP04-03
Comparison of BlockBuster laryngeal mask with Air-Q intubating laryngeal airway as a conduit for intubation in children: a prospective randomized study

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Background and goal of study: Air-Q intubating laryngeal airway (ILA) has proven efficacy for intubation when compared with other supraglottic airway devices (SGAD) in children. The performance of BlockBuster laryngeal mask (BB LM) has not been evaluated in the children as of now although its efficacy has been proven by various studies in adults.
Materials and methods: After Institute ethics committee approval, CTRI registration and parental consent, 60 children (6 months to 12 years) with normal airway were recruited. Children were randomised into group A (Air-Q) and group B (BB). After administration of general anaesthesia, an appropriate size LM (1.5/2.0/2.5) was inserted according to the groups. Time to intubate through LMA, first insertion success rate**,**overall insertion success rate, time and ease of LMA insertion, oropharyngeal leak pressure (OLP), glottic view, number of attempts of intubation, time to remove SGAD after intubation and any perioperative complications were recorded.
Results and discussion: Demographic parameters were comparable. The mean time taken to intubate in group A [62.4 (17.18) sec] was comparable to group B [60.8 (18.6) sec]. Mean time for LM insertion for group A [14.57 (3.2) sec] was comparable to group B [16.67 (5.39) sec]. However, OLP in the group B [14.57 (5.04) cmH_2O] was significantly lower than group A [19.57 (4.04) cmH_2O]. Ventilatory parameters, first attempt LM insertion success rate, ease of LM and gastric tube insertion were comparable between the groups. Mean time to SGAD removal in group A [20.17 (5.82)] was comparable to group B [22.5 (12.85) sec]. The glottic view showed only larynx in 23/30 children in group B compared to 25/30 children in group A. No complication was noted in either group. Air-Q ILA has been used as conduit for blind or fibreoptic guided intubation in children and has proven efficacy for the same. It has various modifications to facilitate SGAD guided intubation like removable connector to accommodate larger ETT, a shorter, wider airway tube and an elevating ramp to direct ETT towards glottis. Newer sizes of BB LM have recently been introduced for use in children. Therefore, these two devices were compared in this study.
Conclusion(s): BB LM is equally good as Air-Q ILA when used for fibreoptic guided intubation with comparable first attempt success rate, ventilatory parameters and glottic views. Therefore, it can be used as a conduit for fibreoptic guided intubation.

11AP04-04
Ultrasonographic skin to epiglottis distance measurement as a predictor of difficult laryngoscopy: a diagnostic test accuracy meta-analysis

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Background and goal: The results of studies investigating ultrasonographic(US) neck soft tissue measurements for difficult laryngoscopy prediction are controversial due to methodological differences.

This meta-analysis aimed to investigate the diagnostic test accuracy (DTA) and develop a standardization of the US measured skin-epiglottis distance(DSEM) in for prediction of difficult laryngoscopy.

Materials and methods: After PROSPERO registration (No:CRD42021236511,19/03/2021), publications reporting data on US DSEM in difficult laryngoscopy prediction in adults with normal airway undergoing tracheal intubation were searched in PubMed, Cochrane Library, Embase and Google Scholar between January 2005 and March 2021. A DTA meta-analysis was performed to calculate the pooled sensitivity, specificity, positive/negative likelihood ratios(LR+/LR-), diagnostic odds ratio(DOR) and hierarchic summary receiver operating characteristics' area under the curve(HSROC AUC).

Results and discussion: The analysis included 1234 patients in nine studies.

Pooled sensitivity: 0.68[0.39 - 0.87 %95 CI(Q=51.93,I^2=%84.60)], specificity: 0.76[0.68-0.83 %95 CI(Q=50.25,I^2=%84.08)], LR+:2.87 [2.20-3.73 %95 CI(Q=11.21, I^2=%0.00)], LR-:0.42 [0.20-0.87 %95 CI(Q=99.45, I^2=%91.96)], DOR:6.80[2.72-17.3 %95 CI(Q=97.90, I^2=%91.83)], and HSROC AUC:0.79(0.75-0.82) were the results.

There was no threshold effect (r=0.53,p=0.137) and publication bias (p=0.54). To the best of our knowledge, this is the first DTA meta-analysis that investigated and standardized measurement of US DSEM in difficult laryngoscopy prediction. Although these results are clinically valuable, heterogeneity must be considered.

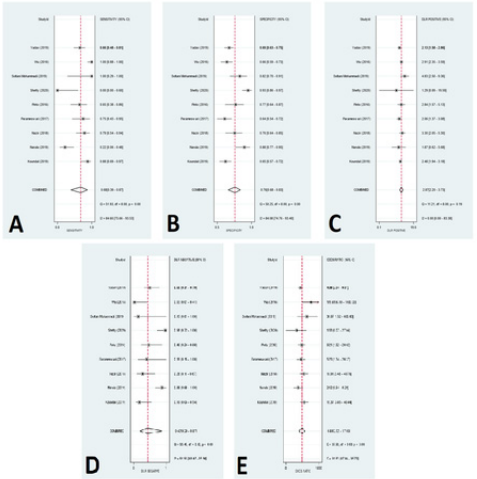

Figure 1: Forest Plot of Sensitivity, Specificity, LR+, LR- and DOR

LR+:Positive Likelihood Ratio; LR-: Negative Likelihood Ratio; DOR: Diagnostic Odds Ratio; CI: Confidence Inverval. A: Sensitivity, B: Speqifity, C: LR+, D: LR- and E: DOR; pooled results are 0,68 (0,39-0,87, 95% CI), 0,76 (0,68-0,83, 95% CI), 0,42 (0,20-0,87, 95% CI), 2,87 (2,20-3,73, 95% CI) ve 6,80 (2,72-17,03, 95% CI), respectively. A and B: Each study represents with sensitivity and specifity and its 95 %CI. The wider %95CI, the higher instability. Due to the sum of sensitivity and specifity is less than 1.5, utility of US DSEM is limited. C and D: LR+ describes how many times more likely positive US DSEM results were in difficult intubation group compared to easy intubation group and LR- describes how many times less likely negative US DSEM results were in the difficult intubation group compared to easy intubation group. E: DOR is the summary estimate of how many times higher the odds are of obtaining a positive US DSEM results in a difficult intubation patient rather than a easy intubation patient. If the DOR is less than one, the test has no clinical value.

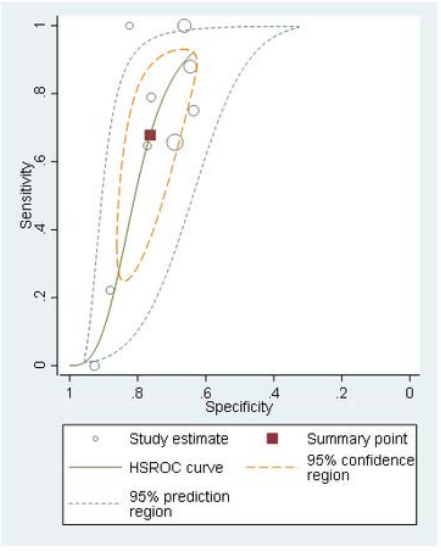

Figure 2: HSROC Curve and AUC

HSROC: Hierarchical summary receiver operating characteristic curve; AUC: area under curve. Each circle represents one study's sensitivity and specifity. The green line means HSROC curve, orange dashed line represents 95% CI and blue dashed line represents 95% prediction region, red square represents summary point of analysis of all studies. According to this HSROC graphic, US DSEM has a good predictive value of prediction of CL 3-4 patients (AUC 0,79 (0,75-0,82)). Studies that lies out of the 95% prediction zone points out heterogeity. Interpretting of this graphic, this can be seen meta-analysis has heterogeneity.

Conclusion: This meta-analysis showed that US DSEM is accurate and has diagnostic value. Further researches are needed that involving a large number of patients with a combination of preoperative screening tests.

11AP04-05
Is it really safe to use intrathecal opioids in spinal anesthesia?

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Background: Patients with obstructive sleep apnea (OSA) may be more sensitive to opioids given even intrathecally. Herein we present our anesthetic management of a 43-year-old morbidly obese patient at 30-week gestation with OSA and established difficult airway for an emergent C/S due to fetal bradycardia.

Case report: The patient had severe hypertension and uncontrolled type 2 diabetes mellitus. Further history revealed over five years of witnessed snoring, awakening from sleep several times at night suggestive of severe OSA and heavily smoking (40 packs/year). She had thyroidectomy surgery 10 years ago in which she was told to have difficult airway. Airway examination revealed, difficulty in airway management was anticipated.Pre-induction SpO_2 was 90% with 3 lt/min oxygen via facemask.

Following standard monitoring, single shot spinal anaesthesia was performed in the sitting position with 22 G Quincke needle from L3-L4 interval. 9 mg heavy bupivacaine and 10 mcg fentanyl were administered.A maximum of T5/T6 sensory level was achieved. A healthy male baby was delivered in 1 min.

After that, progressive decrease in SpO_2values was obtained, mask ventilation was prompted.Due to the worsening in oxygenation, increase in airway pressures and difficulty in mask ventilation, laryngeal mask was inserted in emergent conditions. Sufficient ven-

tilation couldn't be obtained due to high airway pressures and the patient's trachea was intubated with 6,5 cuffed ETT using videolaryngoscope. The oxygenation improved gradually. Cardiac instability didn't occur during this period. The surgery was completed promptly and she was transferred to ICU. Her trachea was extubated in 3 hours and CPAP was applied. She was transferred to ward after 48 hours.

Discussion: Obstetric cases are usually complicated by the presence of morbid obesity and the difficult airway scenario associated. Although respiratory depression after administration of lipophilic opioids in C/S is very rare; risk factors are determined as; advanced age, morbid obesity, OSA, concurrent administration of systemic opioids.Respiratory depression in our patient was probably due to intratechal fentanyl use. Considering neuraxial techniques in a patient with OSA and anticipated difficult airway; anesthetists should have a preplanned strategy for inevitable respiratory complications to save lives.

References:

Respiratory depression after neuraxial opioids in the obstetric setting.Carvalho B.Anesth Analg. 2008 Sep;107(3):956-61.

11AP04-06
Difficult airway prediction based on artificial neural networks use

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Background and goal of study: Artificial neural networks (ANN) are applied in medicine in order to create prediction models in clinical trials. ANNs possess the ability to be trained from data and are used for model extraction providing information for valid predictions. A model for difficult intubation prediction as estimated by Cormack-Lehane (C-L) classification was the aim of this study.

Materials and methods: 409 consecutive patients scheduled for general anaesthesia were assessed preoperatively and at induction for several indices, both quantitative and qualitative; sex, age, weight, height, BMI, Mallampati classification, ability for jaw protrusion(ULBT), neck mobility and circumference, mouth opening, thyromental distance(TMD), snoring, sleep apnoea history, history of previous difficult intubation, beard or artificial dentures presence, bag mask ventilation difficulty, number of intubation attempts, BURP maneuver, use of advanced airway tools and years of clinician's experience. Data were separated as training and test data and Waikato Environment for Knowledge Analysis (WEKA) software was used for analysis.Two methodologies were used, J48 and Random Forest.

Results and discussion: C-L classes were correlated with El Ganzouri Risk Index (EGRI) in order to define which indices work better for C-L class prediction. Due to lack of an adequate number of instances for each C-L class as well as missing values, our results provide partial credibility. The indices that best correlate with C-L prediction are: bag mask ventilation ease, EGRI score, female sex, presence of beard, sleep apnoea history, Mallampati class, ability for jaw protrusion, neck mobility, history of difficult intubation, TMD, dentures, mouth opening and snoring. Specifically, a more credible prediction is achieved for C-L I, in which the majority of instances was classified. The characteristics that contribute most in order of importance are: easy bag mask ventilation, low EGRI score, female sex, absence of beard, absence of sleep apnoea, low Mallampati class, ability to protrude the jaw, adequate neck mobility, no history of previous difficult intubation, TMD≥ 6,5cm, mouth opening ≥ 4cm and absence of snoring.

Conclusion(s): ANNs are able to predict the ease of intubation at least for C-L class I.ANN may prove a useful tool for the anaesthesiologist. Nevertheless, bigger population data and more research are necessary in this field.

11AP04-07
Tritube use in 12 year girl underwent scheduled laryngeal papilloma resection

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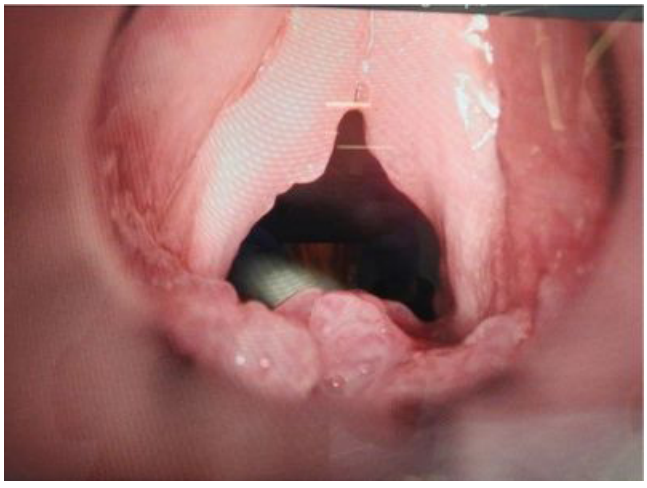
Background: Recurrent respiratory papillomatosis (RRP), caused by human papillomavirus, is the most common benign laryngeal tumor in children. It may cause symptons such as aphonia and respiratory distress. It is usually placed in the vocal cords and it often requires surgery, challenging airway control.

Case Report: A 12-year-old girl diagnosed with RRP was scheduled for resection of laryngeal papillomas due to dysphonia. She had been operated four times due to recurrence. In the last intervention the diameter of the TET prevented the visualization and removal of the lesions located in the medial aspect of the arytenoids. In this surgery we placed the tritube, TET with an external diameter of 4.4 mm, in combination with the Evone continuous flow ventilator, allowing the surgeons to resect all the lesions.

Discussion: There are few publications on the use of tritube TET in cases of laryngeal papillomatosis, mostly on its use for severe stenosis and not for previous failure of surgery. Here we describe how by using tritube we achieve an adequate ventilation as well as an optimal visualization of the surgical field, allowing a better access to the laryngeal lesions, which increases the possibilities of complete resection of the lesions.



References:

1. Carifi, M., Napolitano, D., Morandi, M., & Dall'Olio, D. (2015). Recurrent respiratory papillomatosis: current and future perspectives. Therapeutics and clinical risk management,11, 731.

2. Piosik, Z. M., Todsen, T., Balle, J. S., Abildstrøm, H., & Kristensen, M. S. (2018). Ultra-narrow 2.4 mm id Tritube® together with Evone® ventilation allows surgical access and controlled ventilation even in case of severe stenosis. Trends in Anaesthesia and Critical Care,23, 20.

Learning points:In space-occupying lesions of the larynx, we must use an anesthetic technique that facilitates the surgeon's work by visualizing the tumors to be treated and being able to ensure their correct ventilation.

We consider the use of the tritube ETT with continuous flow ventilation as the only effective alternative in the case described.

11AP04-08
Voice changes after short term endotracheal intubation in head and neck surgery

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Background and Goal of Study: Endotracheal intubation is an airway management procedure commonly performed under general anesthesia. The effect of endotracheal intubation on voice is not very well investigated, but significant changes of voice characteristics and quality were reported.[1,2]

The aim of this prospective cohort study was to evaluate the effect of endotracheal intubation on short term functional voice outcomes and voice quality after head and neck surgery.

Materials and Methods: The study included 60 patients who were operated at the Department of Otolaryngology, Head and Neck Surgery, Zagreb, Croatia in 2021. All patients underwent scheduled operations under general anesthesia with endotracheal intubation up to 3 hours. None of these patients suffered from previous laryngeal pathology.

We analyzed the voice outcomes of 40 thyroidectomy patients and 20 patients who underwent parotidectomy or ear surgery. The procedure of anesthesia was standardized. Voice Handicap Index (VHI), GRBAS score and acoustic analysis of voice (*lingWAVES SLP Suite Pro VPR*) were used for evaluation of voice quality and characteristics. Evaluation was done preoperatively, 2nd postoperative day, 2 weeks and 1 month after the surgery. Videostroboscopy was recorded pre and postoperatively. Paired t-test was used to analyze normally distributed continuous variables, and the Wilcoxon signed-rank test for normally distributed ones. Statistical significance was accepted for values of $p < 0.5$.

Results and Discussion: In the early postoperative period, a statistically significant increase was detected in both groups on VHI scale, all parameters of GRBAS score and parameters of acoustic voice analysis (increase of *jitter*,*shimmer*and intensity). There is a signal that patients after total thyroidectomy have poorer results on all measured variables, but it could not be confirmed on this small sample size. No long term voice changes were observed in any group of patients.

Conclusion(s): Endotracheal intubation is a safe method of airway management during head and neck surgery, although it can temporarily alter a patient's voice quality. Patients should be informed about this, especially if they are voice professionals.

References:

1. Hong KH, Kim YK (1997) Phonatory characteristics of patients undergoing thyroidectomy without laryngeal nerve injury. Otolaryngol Head Neck Surg 117:399–404
2. doi: 10.1007/s00405-018-5145-7.
3. Wevosys medical technology. LingWAVES Voice Protocol norms.

11AP04-09
Evaluation of a novel ventilation device for bearded patients: a randomized controlled clinical trial

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Background and Goal of Study: A beard has been identified as a leading independent predictor of difficult or impossible mask ventilation because it interferes with the seal between the mask and face. The Institute for Research in Military Medicine (IRMM) developed a novel intra-oral Bag-Valve-Guedel Adaptor (BVGA) that enables a direct connection between a manual resuscitator and a Guedel oropharyngeal airway without the need for a facemask.

We found that it provides a better seal during spontaneous respiration in healthy, awake, bearded volunteers[1]. The current study was designed to evaluate the efficacy of the BVGA in anesthetized bearded patients.

Methods: This is a single-session, randomized, crossover trial (NCT04376918). Patients with American Society of Anesthesiology (ASA) score 1-2, scheduled for elective surgery were recruited. Each was ventilated by a consultant anesthesiologist using the BVGA and a facemask (both with a Guedel oral airway), each for 2 minutes. End-tidal CO_2 ($EtCO_2$) and expiratory tidal volume (TV) were recorded. Adequate ventilation was defined as $EtCO_2 > 25$ mmHg or TV>5 ml/kg of ideal body weight (IBW).

Primary outcome was the fraction of adequate ventilation cycles (AVC) delivered out of 14 respiratory cycles studied.

Results and Discussion: 38 bearded patients were included. The order of interventions did not affect TV or $EtCO_2$ significantly ($p>0.49$) justifying pooling of the data.

Ventilation with the BVGA was found to be superior to the face mask by $EtCO_2$ and not inferior by TV (BVGA vs Mask, mean [95%CI]: $EtCO_2$ [mmHg], 33.0 [31.6,34.3] vs 27.2 [25.5,28.8], $p<0.001$; TV [ml/kg IBW], 8.1 [7.4,8.9] vs 6.9 [6.0,7.7], $p=0.11$).

When comparing the %AVC, we found that the BVGA was superior to the mask by both $EtCO_2$ and TV (BVGA vs Mask, mean [95%CI]: $EtCO_2$, 91%[83,100] vs 73%[61,85]; TV 99%[97,100] vs 70%[56,83], $p<0.01$ for both).

The BVGA required significantly fewer hands and significantly fewer maneuvers of jaw thrust or chin lift compared to the mask ($p\leq0.002$). After securing the BVGA, ventilation was possible without hands in 74% of the cases - clearly impossible with the facemask.

Conclusions: The BVGA is more effective and more convenient than the facemask in bearded patients. A follow-up study with less-experienced clinical personnel is underway in order to test whether replacing the face mask with the BVGA will improve effectiveness and ease of field ventillation by first responders.

Reference:

1. Mil Med 2020 185(7-8)

11AP04-10
Anesthetic management of a patient undergoing laryngocele excision

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Background: Laryngocele is an abnormal dilatation or herniation of the laryngeal saccule that extends upward within the false vocal fold in communication with the laryngeal lumen(1). It is a rare benign lesion of the larynx and may cause difficulty in ventilation and intubation during anesthetic management of patients.

Case Report: A 3 months-old, 5 kg(<3p) patient was diagnosed with laryngocele due to inspiratory stridor, wheezing and difficulty in feeding. ENT examination and CT have showed a cystic mass extending from right aryepiglottic fold to hypopharynx. The laryngocele was also filling up the right ventricular band.

The patient was admitted to the operating room with a transoral excision plan. According to the difficult airway plan made by the team, the first choice of airway management was decided as mask ventilation and intubation with Glidescope LoProS2. Emergency tracheotomy was planned as the rescue technique in case of airway obstruction secondary to the laryngocele.

Following routine ASA monitoring and preoxygenation, inhalational anesthesia induction was performed. Mask ventilation was considered adequate. Laryngeal view was evaluated as Cormack Lehane grade 3a (Figure 1) and the patient was intubated at the first attempt with Glidescope LoProS2.

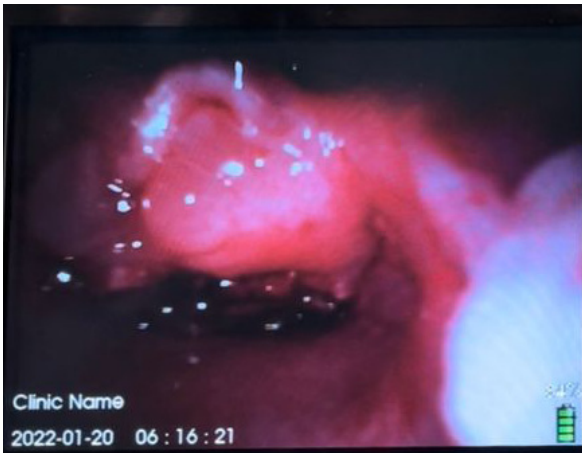

Figure 1

After supraglottic surgical excision, the patient was extubated fully awake and with the administration of sugammadex to reverse the neuromuscular blockade.

Her upper airway edema needed to be treated with nebulized epinephrine and she was discharged from hospital without any complaints the next day.

Discussion and Learning Points: Laryngeal cysts are rarely seen in children, however upper airway obstruction can complicate anesthetic management during induction. Acute angled video laryngoscopes, designed for pediatric use, can improve glottic view and intubation success as in our patient. Although relief is expected following surgical excision, it's important to keep in mind that patient's airway would be at risk for edema and laryngospasm.

References:

1. Ear Nose Throat J. 2017 Mar;96(3):133-138. doi: 10.1177/014556131709600313.PMID: 28346644

11AP04-11
Conventional vs. video-assisted laryngoscopy in perioperative endotracheal intubation - protocol for a randomized, controlled, patient-blinded multicentre trial (COVALENT)

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Background and Goal of Study: Data on the routine use of video-assisted laryngoscopy in peri-operative intubations are rather inconsistent and ambiguous. Failed or prolonged intubation procedures are a reason for relevant morbidity and mortality.

This study aims to determine whether video-assisted laryngoscopy (irrespective of the shape of the blade) is at least equal to the standard method of direct laryngoscopy with respect to the first-pass success rate.

Furthermore, validated tools from the field of human factors will be applied to examine within-team communication and task load during this critical procedure.

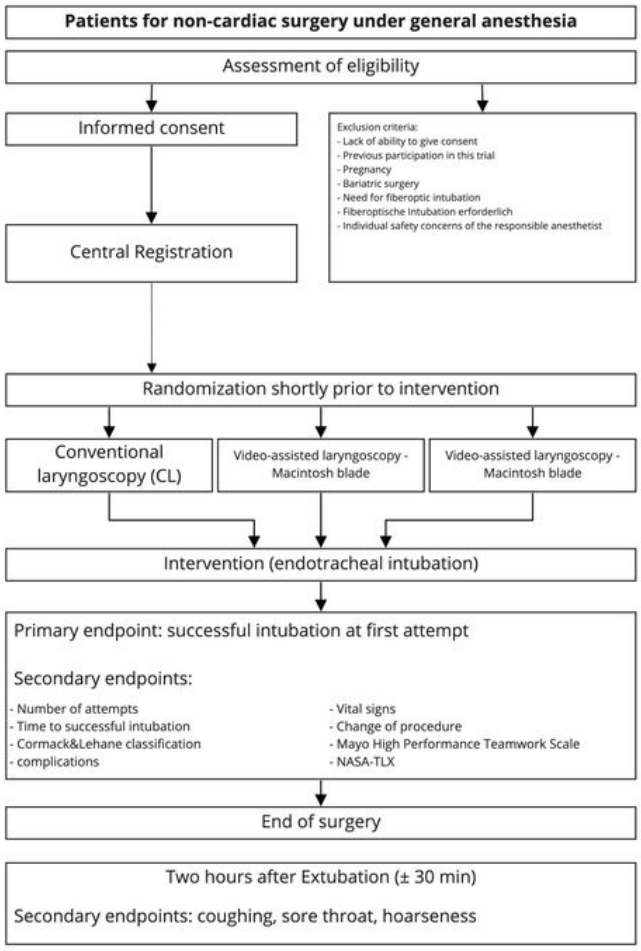
Materials and Methods: In this randomized, controlled, three-arm multi-centre trial, a total of approx. 2500 adult patients scheduled for perioperative endotracheal intubation will be randomized. Sample size calculation was performed assuming a first-attempt success rate (primary outcome) of 90% in the control group, a 5% margin of non-inferiority for the intervention(s) as well as desired power of 90% at .05 significance. In equally large arms, video-assisted laryngoscopy with a Macintosh-shaped or a hyperangulated blade will be compared to the standard of care (direct laryngoscopy with Macintosh blade).

In a pre-defined hierarchical analysis, we will test the primary outcome for non-inferiority. Subsequently, the design also allows for testing for superiority of the interventions.

Results and Discussion: This randomized controlled trial will provide a solid base of data in a field where reliable evidence is of major clinical importance. With thousands of endotracheal intubations performed every day, every bit of performance improvement translates into increased patient safety and comfort and may eventually prevent significant burden of disease.

Therefore, we feel confident that a large trial like this has the potential to considerably benefit patients and anaesthetists alike. Also, we put great effort into precise and efficient trial design to keep the recruitment goal achievable within reasonable time.

Acknowledgements: The COVALENT trial is supported by the German Society for Anaesthesiology and Intensive Care (DGAI). Registry: NCT05228288



11AP05-01
A four-step ultrasound examination for airway management

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Background and Goal of Study: Clinical airway screening tests intend to predict difficult airways, but none has a high predictive value [1]. Recent systematic reviews correlate ultrasound with difficult laryngoscopy [2 3]. We propose a systematic examination with 4 of the most reliable parameters for pre-operative airway ultrasound assessment, the "Hy-S-Hy-E-VC" protocol.

Materials and Methods: Preoperatively, we perform four-step examination. The first is to measure the Hyomental distance (Hy), the second is the distance from the Skin to Hyoid bone (S-Hy), the third is the distance from the Skin to Epiglottis (S-E) and the last one is the distance from the Skin to Vocal Cords (S-VC).

Results and Discussion: Several studies and reviews show that thicker pretracheal tissues measured by ultrasound result in an increased difficulty of laryngoscopy [2 3].

Conclusion(s): We propose not only a clinical examination of the upper airway but also an advanced examination using a bedside available technology for best patient care: the ultrasonography. 3D/4D ultrasound imaging could be a breakthrough in airway management too.

References:

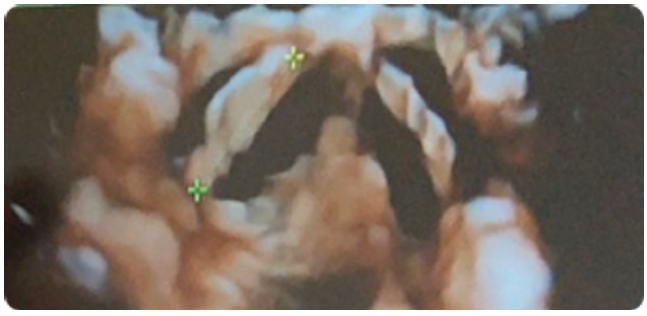
1. Detsky ME, Jivraj N, Adhikari NK, Friedrich JO, Pinto R, Simel DL *et al.* Will This Patient Be Difficult to Intubate? *JAMA* 2019; **321**: 493–503.

2. Sotoodehnia M, Rafiemanesh H, Mirfazaelian H, Safaie A, Baratloo A. Ultrasonography indicators for predicting difficult intubation: a systematic review and meta-analysis. *BMC Emerg Med* 2021; **21**: 76.

3. Gomes SH, Simões AM, Nunes AM, Pereira M V., Teoh WH, Costa PS *et al.* Useful Ultrasonographic Parameters to Predict Difficult Laryngoscopy and Difficult Tracheal Intubation—A Systematic Review and Meta-Analysis. Front. Med. 2021; **8**. doi:10.3389/fmed.2021.671658.

Acknowledgements: none

Image 1: in progress
2D image: the hyomental distance. 3D/4D image
Image 2: in progress
2D image: distance from skin to hyoid bone. 3D/4D image
Image 3: in progress
2D image: distance from skin to epiglottis. 3D/4D image
Image 4: in progress
2D distance from skin to vocal cords. 3D/4D image



This is an example of a 3D vocal cords image.

11AP05-02
Variable positive end-expiratory pressure (PEEP) improves lung function in a model of acute respiratory distress syndrome (ARDS): a randomized experimental study

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Background and goal of study: Mechanical ventilation in the presence of acute respiratory distress syndrome (ARDS) is often associated with gas exchange disturbances, atelectasis, and high risk of ventilator-induced lung injury. Physiologically variable ventilation (PVV), a mode that mimics the variability of spontaneous breathing, has proven beneficial to improve lung function in models of ARDS.
We investigated if cycle-by-cycle variability in the positive end-expiratory pressure (PEEP) has benefits on lung function compared to constant PEEP in a model of ARDS.
Materials and Methods: ARDS was induced in adult rabbits (n=19) by combining iv lipopolysaccharide, surfactant depletion and injurious ventilation. The severity of ARDS was assessed through blood gas analysis (PaO_2/FiO_2). Animals were randomised to a 6-hour period of protective ventilation in pressure-controlled mode (PEEP 7 cmH_2O; tidal volume 7 mL/kg, titrated FiO_2), with either constant PEEP or variable PEEP (coefficient of variability 21.4%, standard deviation 1.5 cmH_2O, range 4-10 cmH_2O).
Lung function was assessed by measurements of blood gas parameters, end-expiratory lung volume (EELV) using helium-dilution method and respiratory mechanics using forced oscillation technique after ARDS induction (H0) and every hour thereafter (H1 to H6).
Results and Discussion: The triple-hit model elicited a moderate-to-severe ARDS in both groups at H0 (mean PaO_2/FiO_2 160 ± 124 vs 202 ± 117 mmHg in constant and variable PEEP groups, respectively, p=0.21). After 6 hours of ventilation, comparing H0 to H6, the EELV increased in the variable PEEP group (+12.4 ± 19.3%) whereas it decreased with constant PEEP (-9 ± 12 %), p =0.049.
In comparison to H0, the oxygenation was maintained in the variable PEEP group at H6 (-5.9 ± 28.7%), while a deterioration was observed in the constant PEEP group at H6 (-20.4 ± 16.4%), p = 0.06. Respiratory tissue compliance at H6 was significantly higher in the variable PEEP group compared to the constant PEEP group (p=0.023).
Conclusions: Preliminary results demonstrate the value of cycle-by-cycle variability in PEEP during pressure-controlled ventilation in improving lung volume, respiratory mechanics and oxygenation in an experimental model ARDS. For the same levels of average driving pressure, variable PEEP likely improves lung compliance and recruitability in comparison to constant PEEP.
Ethics approval: Animal Welfare Committee of the Canton of Geneva, GE/144/20.

11AP05-03
Awake nasal fiberoptic intubation of a patient without a secure airway alternative: a nightmare in the Emergency Care Unit

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Background: The inexperience and fear of being unable to manage complications or failure can cause clinicians, who do not perform awake tracheal intubation (ATI) routinely, to avoid practicing ATI. We present an acutely deteriorating patient whose only opportunity was ATI, to highlight the importance of practicing ATI technique by all anesthetists, as well as, the professionals of difficult airway management.
Case Report:A 52-year-old female with a history of bilateral mastectomy and radiotherapy to the neck and chest was admitted to the emergency department at night shift with respiratory distress and stridor. The neck and chest were extremely stiff with no movement, mandibular joint was immobile with mouth opening <1 cm.
The Departments of Anesthesiology and ENT Surgery were consulted for urgent airway management. The fiberoptic evaluation revealed bilateral edematous and immobile vocal cords. She was in a 90-degree sitting position, breathing hard and a little confused due to respiratory acidosis. Face-mask ventilation, supraglottic airway device placement and video laryngoscopy were impossible. Fiberoptic nasal ATI was planned. Awake front of neck access was considered difficult due to impalpable anatomical landmarks. ENT surgeons got ready as scrubbed, cautious *spray as you go* technique was used for topicalization avoiding sedation. A 6,5 mm ID endotracheal tube (ETT) was advanced into the trachea and was fixed by suturing to the nasal septum without any complication. The patient was sedated after two-point check of ETT placement and transferred to ICU. A few days later, she was taken to the operating theatre for tracheotomy, which was difficult to complete within an hour as predicted.
Discussion: Cognitive aids, like sTOP (sedate, Topicalize, Oxygenate, Perform) are recommended to support decision making and increase safety.[1]
The limited opportunity for ATI training is a practical reality. As successful performance is related to experience rather than seniority[1], airway leads should facilitate continuing education and strive to make ATI a part of clinical practice, as long as patient consents. Active training and using cognitive aids can be lifesaving as were in our patient.
References:
1. Ahmad I, et al. Anaesthesia 2020;75:509-28.
Learning points: In difficult airway management, there may be situations where there is no safe airway alternative except ATI. Therefore, active training of all anesthetists on ATI and using cognitive aids can be lifesaving.

11AP05-04
Evaluation of mentum angle and mandibular profile angle for prediction of difficult laryngoscopy

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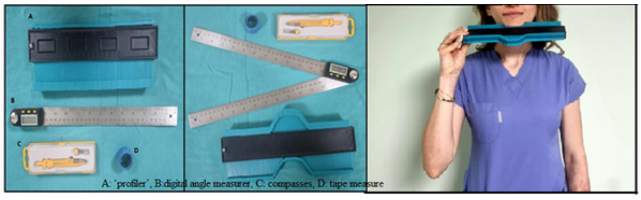
Background and Goal of Study: This prospective study evaluates the "mandibular profile angle" and "mentum angle", which are two new parameters as predictive tests for difficult laryngoscopy in terms of sensitivity, specificity and positive/negative prediction according to the Cormack-Lehane Score.
Materials and Methods: Having received informed consent and ethics committee approval, 1001 patients with ASA I-III physical status aged 18-80 years who would undergo tracheal intubation for general anaesthesia were included in the study.
Before the anaesthesia induction Modified Mallampati Test (MMT), mouth opening, upper lip bite test, thyromental distance, sternomental distance, neck circumference, and newly defined "mentum angle" and "mandibular profile angle" measurements were determined. Mandibular mental angle and mandibular profile angle measurements were performed using a profile contour meter, digital protractor, compass, and ruler.
"Mentum angle" was defined as the angle between the mandibular mentum and the two ends of the mandibular arch. "Mandibular profile angle" was defined as the angle between the lateral ends of the mandible where the profile gauge ends and the mentum of the mandible. After induction of anaesthesia during laryngoscopy, Cormack-Lehane grades were recorded by a blinded anaesthesia consultant.
Results and Discussion: The study was completed with 1001 patients. The number of patients with Cormack-Lehane 3-4 laryngeal images was 168 (16,8%). The sensitivity of MMT was 46%; specificity 91%; positive predictive value (PPV) 51%; negative predictive value (NPV) was 89%. Sensitivities of predictive values of mandibular profile angle and mentum angle were 83%-88%, specificity 86%-82%, PPV 55%-50%, NPV was found to be 96%-97%, respectively.
Conclusion: Mandibular profile angle and mentum angle measurements predict difficult laryngoscopy with higher sensitivity and specificity than MMT, with comparable positive and negative predictive values.



11AP05-05
Preoxygenation: non invasive ventilation versus high flow nasal oxygenation

H. Elaskri[1], H. Bouguila[1], A. Ksila[1], I. Naas[1], N. Hichri[1], M. Ferjani[1]
[1]Military Hospital Of Tunis, Dept of Anaesthesiology & Intensive Care, Tunis, Tunisia

Background and Goal of Study: High flow nasal cannula is widely used in prevention of intubation in intensive care. The aim of this study was to compare preoxygenation by HFNC versus non-invasive ventilation (NIV) versus face mask (FM) in terms of changes in saturation during the period of apnea after induction in general anesthesia.
Materials and Methods: The study was prospective and randomized. Adult patients with ASA1 or ASA2 class were included. Were not included patients with a body mass index >=30 kg/m^2, with difficult intubation or ventilation. The pre-oxygenation was carried out for 3 minutes with 100% FiO_2. In the HFNC group: it was done at a flow rate of 45L/min. In the NIV group: a pressure support and a positive end expiratory pressure were applied.
After 3 minutes of cisatracurium, a video-laryngoscopy was done, if the patient presented a Cormack-Lehane I or II grade, the patient was intubated without ventilation, if he presented a grade III or IV, he was excluded. The period of apnea without desaturation (PAWD) was obtained when the pulse oximetry saturation reached 95% or a maximum of 6 minutes of apnea.
Results and Discussion: 90 patients completed the study, they were divided into 3 groups of 30. The three groups were comparable with regard to demographic criteria, patient history and type of surgery. There was no significant difference for PAWD between HFNC (288.67s) and NIV (290s) p=0.94. PAWD was longer in these two groups compared to the control group (249.5s) p=0.04.
Heart rate (HR) was more stable during pre-oxygenation with HFNC compared to NIV (at 2min: HFNC -3%, NIV +3.17% p=0.027, at 3min: HFNC -2.2%, NIV + 3.93% p=0.18).
HR and mean arterial pressure (MAP) were more stable at 1 and 2 minutes of apnea compared to NIV. After ventilation, MAP was more stable compared to NIV and FM. There was no difference in the End Tidal O_2 and End Tidal CO_2between groups after ventilation.
Conclusion(s): We did not find a significant difference for the PAWD between HFNC and NIV. Further studies, particularly on obese patients, would be needed to prove the usefulness of this technique in elective surgery.
References:
1. Baillard C, et al.N oninvasive ventilation improves preoxygenation before intubation of hypoxic patients. Am J Respir Crit Care Med. 2006;174(2):171-7.
2. Chanques G, et al. Comparisonof three high flow oxygen therapy delivery devices: a clinical physiological cross-over study. Minerva Anestesiol. 2013;79(12):1344-55.

11AP05-06
Impact of facial morphology as a predective criterea of difficult mask ventilation in patients undergoing general anesthesia: a prospective observational study

H. Elaskri[1], A. Ksila[1], I. Naas[1], N. Hichri[1], I. Labben[1], F. Mustapha[1]
[1]Military Hospital Of Tunis, Dept of Anaesthesiology & Intensive Care, Tunis, Tunisia

Background and Goal of Study: General anesthesia is associated with loss of airway protection reflexes. Intubation and artificial ventilation are required. Mask Ventilation is the primary technique of ventilation before tracheal intubation or insertion of any airway device. The ability to establish adequate mask ventilation has, therefore, become a major branch point in any difficult airway algorithm. Some Facial morphotypes are frequently reported as a sign of difficult mask ventilation but never analyzed. The aim of this study is to evaluate the impact of facial morphology on mask ventilation under general anesthesia.
Materials and Methods: We performed a prospective observational study including patients admitted in 5 of grand Tunis hospitals. The study included all patients who underwent surgery under general anesthesia and who have benefited from a anesthesia consultation and didn't have classic predictive difficult ventilation criteria.

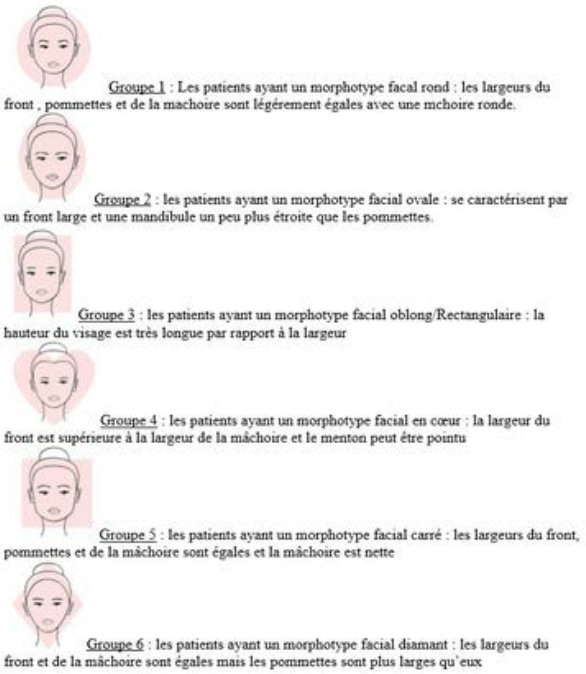
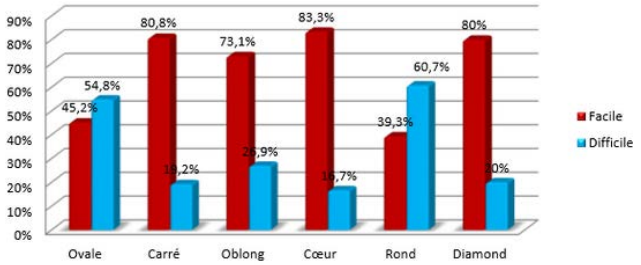


Figure. Classification de Yutskovskaya Y.A. et al des morphotypes facials

Results and Discussion: 200 patients were recruited. 48% of patients were difficult to ventilate without any predictive signs. Patients were classified according to their facial morphology in 8 groups: oval, round, square, oblong, triangle, inverted triangle, diamond, and rectangle. Facial morphotypes mostly linked to difficult mask ventilation were: inverted triangle (76%), oblong (71%), and rectangle (65%). Square, round, oval and triangular face shape were not linked.



Conclusion(s): The place of the facial morphology in the prediction of difficult mask ventilation in the operating room is obvious from the results obtained. Therefore further studies to search for other criterea may be needed because the actual ones seems to be not very specific.
References:
1. Kheterpal S, Han R, Tremper KK, Shanks A, and al. Incidence and predictors of difficult and impossible mask ventilation. Anesthesiology 2006;105:885–91

11AP05-07
Blind tracheal intubation through iLTS-D versus direct laryngoscopy by novice intubators during manual in-line neck stabilization: a randomized controlled trial

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Background: In the prehospital setting, tracheal intubation (TI) is a standard of care[1]. Low success rates of TI by untrained intubators were frecuently reported. Possible reasons are the requirement for in-line stabilization of the neck and the inexperience of the provider[2]. We tested the hypothesis that when compared with Direct Laryngoscopy (DL), blind TI via the intubating laryngeal tube suction–disposable (iLTS-D) would increase the success rate of intubation during manual in-line stabilization of the neck.
Methods: The study was conducted after the approval of the Institute Ethics Committee and signed consent forms of the participants and the performers were obtained, a randomized controlled trial was performed comparing TI via iLTS- D® with TI using DL. The successful insertion of iLTS-D to the patient's oropharynx was followed by blind TI.
Participants independently performed two intubation attempts using DL or via iLTS-D on the patient.
The primary outcome was defined as successful TI within a maximum of two attempts.
The secondary outcome was the duration of TI.
Results: The success rates of TI via iLTS-D and DL were 13/39 (33.3%) and 17/40 (42.5%), respectively. The similar low success rates of TI with both methods did not present statistical difference.
Our study revealed a high success rate (84.6%) of iLTS-D placement in the oropharynx, associated with effective ventilation as confirmed by capnography.
The time to obtain successful iLTS-D placement in the oropharynx was 42 s, which is 2.5 times shorter than the time to achieve TI with DL or via iLTS-D.
Conclusions: Our findings suggest that novice intubators can use the iLTS-D as the first airway intervention in trauma patients or in difficult airway patients who require immediate airway management.

However, regarding TI via iLTS-D and DL, we presume both methods require a long learning curve learning to untrained care providers.

References:

1. Eastridge BJ, Mabry RL, Seguin P, Cantrell J, Tops T, Uribe P, et al. Death on the battlefield (2001-2011): implications for the future of combat casualty care. J Trauma Acute Care Surg 2012;73:S431–7.
2. Ruetzler K, Guzzella SE, Tscholl DW, Restin T, Cribari M, Turan A, et al. Blind intubation through self-pressurized,disposable supraglottic airway laryngeal intubation masks: an international, multicenter, prospective cohort study. Anesthesiology 2017;127:307–16

11AP05-08
Anaesthetic management of tracheal resection and stoma revision in a patient with Stickler syndrome

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Background: Stickler syndrome is a connective tissue disorder which includes opthalmoorofacial abnormalities, micrognathia, cleft palate and flat midface. We would like to present a case with Stickler syndrome with multi-level airway obstructions.

Case report: A 5-month-old, infant with Stickler syndrome had dropped ears, frontal bossing, micrognathia and cleft palate. Tracheotomy was performed following repeated prolonged intubations and failure of weaning attempts in the NICU. She still had signs of airway obstruction and frequent desaturation episodes. She was transferred to our hospital for tracheotomy revision of narrowed stoma, not allowing even aspiration of secretions. Tracheotomy cannula was connected with a t-tube, SpO2 was 94% with 4 lt/min of O2 support. Inhalational anesthesia through tracheotomy was performed after appropriate preoxygenation and standard monitoring. EtCO2 was significantly high (50-60 mmHg) due to obstructive airway. We administered iv rocuronium and steroids directly after iv cannulation. Arterial blood gas sample result showed respiratuary acidosis and we weren't able to ventilate the patient properly with standard ventilation modes. She was manually hyperventilated with low tidal volume and allowing expiration with a senior anesthesiologists. Glottic area was nearly totally closed by granulation tissue at direct laryngoscopic examination, so there wasn't an option of ventilating through an oral ETT during stoma revision. Tracheotomy cannula (3,5 mm ID) was carefully changed with uncuffed ETT with 3.5 mm ID. Intermittent apneic technique was used during tissue excision around the tracheotomy and fixation of the trachea with sutures to the surrounding tissues. EtCO2 was normalized by switching to an ETT with 4.0 mm ID after stoma revision. An obstruction distal to tracheotomy was also detected by fiberoptic examination via the stoma. One tracheal ring was excised. Finally, she was transferred to PICU with an uncuffed tracheotomy cannula of 4,5 mm ID, fully awake and weaned from mechanical ventilation.

Discussion: Intermittent apneic techniques are still widely used for small pediatric patients during laryngotracheal surgeries. It's critical for the anesthesia and surgery teams to work in harmony and to be ready to switch in between different airway methods when necessary, to ensure effective gas exchange in surgeries where the airway is shared.

References:

Anesthesia for Genetic metabolic & dismorphic Syndromes of Childhood.

11AP05-09
Airway management in a patient with cervical chordoma

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Background: The cervical chordoma is a rare slow-growing malignant bone tumor. Given its location and aggressive nature, this tumor can be accompanied by airway obstruction or cervical instability[1]. We present the case of a patient with a C2 chordoma with successfully airway management by the anesthesiology team.

Case report: A 56-year-old man, ASA II, scheduled for surgical excision of a cervical chordoma. Airway examination revealed a Mallampati1, thyromental distance (TMD) > 6.5cm and adequate mouth opening. Cervical mobility was limited and painful. MRI showed a lytic lesion in C2 which protruded over the oropharynx causing stenosis (Figure 1).

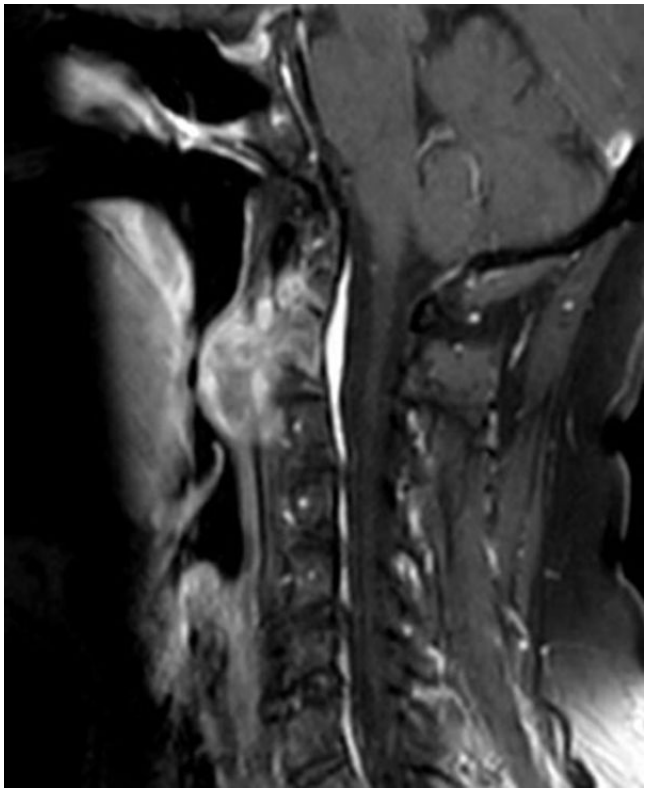

Figure 1.

An awake percutaneous tracheotomy (PCT) was considered as first option to secure the airway. However, the patient reported feeling anxious and shortness of breath when lying in supine position, so a fiber-optic-guided awake nasotracheal intubation was decided to deal with the airway and once it was secured, an experienced anaesthesiologist performed a PCT.

Discussion: Because of the location, size and character of the mass, these type of tumors are considered as a predictor of difficult airway as one can find a limited extension of the neck and difficult to visualize anatomical structures as well as placing devices towards the glottis. Therefore, a thorough preoperative assessment and team discussion are necessary to optimize our approach.

In pathology involving the head and neck, the usefulness and importance of consulting the images with a radiologist prior to surgery should be emphasized[2]. The information provided through this consultation helped us to carry out a better and safer planningfor this case.

References:
1. Walcott B et al.Chordoma:Concepts,management,and future directions.Lancet Oncol.2012;13:69–76
2. Yao J et al.Airway management:Utilizing radiologist and neuroimaging with head and neck masses.J Clin Anesth.2017 Nov;42:96-97

Learning points: A cervical chordoma can distort the airway anatomy and narrow the pharyngeal space leading to a difficult airway management. Team discussion and anaesthetic planning are paramount for a safe approach of the airway management in this type of pathology.

11AP05-10
HFNO in difficult airway approach

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Background: Patients requiring urgent airway management are at greater risk of hypoxemic events. High-flow nasal oxygen (HFNO) applications include preoxygenation, management of difficult airway and treatment of acute hypoxic respiratory failure, by extending safe apneic time, facilitating CO2 elimination and reducing work of breathing. This case report describes the use of HFNO during the airway management of a patient with oral cancer.

Case Report: A 56-year-old male with smoking and drinking habits was admitted for investigation of a progressive intraoral growth. Neck CT-scan showed an expansive lesion of the base of tongue, suggestive of squamous cell carcinoma. Surgery was scheduled but during hospital stay, he deteriorated,developing respiratory distress and hypoxia. An urgent tracheostomy was proposed. Considering the previous description, the airway strategy was elaborated and communicated to all team members:

Plan A - Combined awake videolaryngoscopy with fiberoptic intubation under light sedation to optimize visualization of a distorted anatomy.

Plan B - Awake fiberoptic intubation.

Plan C - Surgical tracheostomy.

Patient was monitored according to ASA standards, HFNO was used (FIO2 of 1.0; 60L/min) for pre-oxygenation with oxygenation improvement and reduced work of breathing. Oropharynx was topicalized and remifentanil was titrated, ensuring spontaneous ventilation. Plan A began but the patient couldn't tolerante the videolaryngoscope blade, despite adequate topicalization.

We proceeded with Plan B: fiberscopy showed extreme anatomic distortion with epiglottic deformation and friable tissues. Despite technical difficulties, the patient was successfully intubated with a size 6 reinforced tracheal tube. Oxygen saturation remained above 93% throughout induction and surgery was uneventful with tracheostomy done

Discussion/Learning points: Airway management in patients with tumors involving the oral cavity is challenging and requires a meticulous airway assessment due to the risk of trauma, bleeding and aspiration. Awake fiberoptic intubation is the gold standard for anticipated difficult airway management. Compared to traditional oxygen-delivery devices, HFNO improves oxygenation and decreases the risk of desaturation, increasing intubation's safety. This case illustrates the importance of having a strategy when facing a difficult airway and reporting it to team members. Maintenance of spontaneous ventilation and selection of the adequate equipment were crucial to the success of this case.

11AP05-11
A novel surgical mask can reduce oxygen gas flow by improving oxygen delivery

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Background and Goal of Study: Oxygen shortages have been occurred in the Covid-19 pandemic worldwide, leading to avoidable deaths. Therefore, the improvement in oxygen delivery may contribute to reducing oxygen consumption. Previously, we developed a comfortable surgical mask for oxygen delivery, which is designed to offer preferential inflow to the patient's mouth. The goal of this study was to evaluate the efficacy of a novel surgical mask in oxygen delivery with low flow oxygen.

Materials and Methods: A novel surgical mask (PAT: PCT/JP2015/073276) equipped with an oxygen tube (10Fr) placed into the inner layer or a cavity composed of three-layered non-woven textile was prepared. The oxygen was supplied into the cavity to serve as an oxygen reservoir and the oxygen flow was directed preferentially toward the patient mouth along with the difference in the layers. Spontaneous ventilation was simulated using a manikin (Laerdal airway management trainer, Norway), the trachea of which was connected to a ventilator of the anesthetic machine (Kato ™, Draeger, Germany).

After the airway and the ventilator were equilibrated with room air, the manikin's face was covered with A) a novel surgical mask or B) a conventional plastic face mask, and was given with O_2 flow (2, 3, and 5 $L \cdot min^{-1}$) and ventilated (VT: 500 mL and RR: 12 min^{-1}). The efficacy of oxygen delivery was evaluated by the time to achieve the FiO_2 from 0.21 to 0.4 at the trachea. Data were analyzed using ANOVA and a $p<0.05$ was considered to be significant.

Results and Discussion: The time to achieve $FiO_2 > 0.4$ in the novel surgical mask was 177 ± 11, 112 ± 4, and 58 ± 9 sec with O_2 flow at 2, 3, and 5 $L \cdot min^{-1}$, respectively (n=3).

However, the conventional plastic facemask failed to achieve FiO_2 >0.4 when O_2 flow was at 2, 3 $L \cdot min^{-1}$. When O2 flow was increased to 5 $L \cdot min^{-1}$ the conventional plastic face mask achieved FiO2 >0.4 but required a significantly longer time than that of the novel mask (102 ± 4 sec, $p<0.05$, n=3).

It was considered that the improvement in oxygen delivery with the novel surgical mask was due to:

1. the closer position of the oxygen outlet to the mouth,
2. the direction of oxygen flow toward the mouth, and;
3. the reservoir by the flexible cavity.

Non-woven texture may also be beneficial to retain moisture of the airway mucosa and to protect healthcare providers from aerosol exposure.

Conclusion(s): A novel surgical mask may improve oxygen delivery and reduce oxygen consumption.

References:
1. Br J Anaesth, 117 (S1): i104–i120, 2016
2. J Anesth, 34, 950-2, 2020

11AP06-01
Cardiopulmonary resuscitation during the COVID-19 pandemic. Do supraglottic airways protect against aerosol generation?

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Background: Cardiopulmonary resuscitation in Covid constitutes a major challenge due to viral aerosolization.
Tracheal intubation,[1,2] if used with filter the risk of aerolization lowers. (Fig. 1)

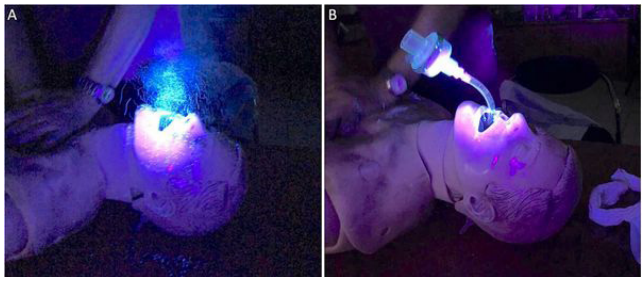

Fig. 1

Methods: The study was conducted in Bnai Zion Hospital Haifa, after the approval of the Ethics Committee. The trachea of a simulator was charged with 2 ml of Glo Powder, which glows brightly when exposed to ultraviolet light. The powder will expulse if the seal of the SAD is lower than the positive pressure during resuscitation compressions. The powder expulsion from the simulator was documented. The devices were: the LMA Supreme and LMA ProSeal, Ambu AuraGain, I-gel, Laryngeal Tube Suction Disposable and Combitube. (Fig. 2)

Fig. 2

A HEPA filter was attached in each device. After each trial, the simulator was recharged with the Glo Germ Powder. (Fig. 2)
Results: The observational study revealed that a cuffed ETT with a HEPA filter is an effective barrier. However, all tested SADs showed a similar considerable aerosol leakage through the mouth and nose of the simulator.

Conclusions: The findings emphasize the importance of using physical barriers around the SADs and adequate personal protective equipment to ensure the safety of care providers.
References:
1. Benoit JL, et al. Endotracheal intubation versus supraglottic airway placement in out-of-hospital cardiac arrest: a meta-analysis. Resuscitation 2015; 93:20—6.
2. Edelson DP, et al. Interim guidance for basic and advanced life support in adults, children, and neonates with suspected or confirmed COVID-19: from the emergency cardiovascular care committee and get with the guidelines-resuscitation adult and pediatric task forces of the American Heart Association. Circulation 2020;141: e933—43.

11AP06-02
Direct and video-laryngoscopy vs combined laryngo-bronchoscopy approach for orotracheal intubation in a simulated normal airway scenario

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Background and goal: Endotracheal intubation (ETI) plays a crucial role during anaesthesia and emergency medicine. The fibreoptic-bronchoscope intubation (CLBI) has been proposed to improve airway management and has shown promising results in simulated airway scenarios. The aim of this study was to evaluate the results of the CLBI approach as compared with direct laryngoscopy (DL) or video-laringoscopy (VL, with McGrath and Glidescope) in a simulated normal airway management scenario.
Methods: We performed a survey and a prospective simulation study involving 89 residents of Anesthesia with variable experience in airway management. Residents performed ETI on a Laerdal™ manikin using DL with Macintosh blade, McGrath, Glidescope and CLBI after a video presentation on the devices. Residents were allowed maximum 3 attempts per device and no more than 60 seconds for each attempt. They were also asked to report their experience with all the devices used. The main outcomes were success rate (SR) and time to intubation (TTI) at first attempt.

	TTI		SR_1	SR_2	SR_3	Failed
	media	DS	%	%	%	%
MAC	18,18	9,88	96,6%	98,9%	100,0%	-
GLIDESCOPE	26,55	11,54	85,4%	95,5%	98,9%	1,1%
MacGRATH	25,31	12,77	67,4%	83,1%	89,9%	10,1%
CLBI	41,44	9,67	51,7%	69,7%	80,9%	19,1%
	Between Group Comparisons (p value)					
	MAC-Glidescope	MAC-MacGrath	MAC-CLBI	Glidescope-MacGrath	Glidescope-CLBI	MacGrath-CLBI
TTI	<0.0001	0.001	<0.0001	0.51	<0.0001	<0.0001
SR_1	0.016	<0.0001	<0.0001	0.008	<0.0001	0.047
Failure	1.0	0.003	<0.0001	0.02	<0.0001	0.14

Table 1. Summary of results on 89 participants.
TTI: Time to intobation; SR: success rate; DS: Standard deviation

Results and discussion: As shown in Table 1, DL had significantly higher SR (96.6%) at first attempt than CLBI (51.7%) and VLs (Glidescope, 85.4%; McGrath 67.4%). Intubation failure after three attempt was significantly higher for CLBI (19.1%) as compared to VLs (10.1% with McGrath and 1.1% with Glidescope) or DL (0%).

In residents succeeding the intubation, CLBI had significantly higher TTI (41.4±9.7 sec) than other devices (Glidescope 26.6±11.5 sec, McGrath 25.3±12.8 sec and DL 18.2±9.9 sec). Among VLs, Glidescope was superior to McGrath in terms of SR at first attempt (p=0.008), while TTI was not different (p=0.51).

Conclusion(s): Under simulated conditions, in residents with variable experience CLBI approach had significantly worse performances as compared to DL with Macintosh blade and to VLSs. Our results suggests that more experience and training is needed before implementing this intubation technique. Analysis of subgroups according to their experience is ongoing.

Reference:

Sanfilippo F, Sgalambro F. Use of a Combined Laryngo-Bronchoscopy Approach in Difficult Airways Management: A Pilot Simulation Study. 2019;47:464-70.

11AP06-03
Evaluation of the relationship of ultrasonographic and anthropometric measurements of the anatomical structures of the neck and the difficult airway

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Background and goal of study: In this prospective observational study, we evaluated the predictive potential (specificity and sensitivity) of difficult airway and difficult laryngoscopy procedure with ultrasonographic measurements.

Materials and methods: With the approval of Duzce University Faculty of Medicine Non-Interventional Health Research Ethics Committee 21.06.2021 / 2021/160. ASA I-III group, 170 patients between the ages of 18-65 years patiens who will undergo endotracheal intubation under general anesthesia were included.

Anthropometric measurements and ultrasonographic measurements of the patients were taken by the first anesthetist in the preoperative evaluation. The patients were intubated using the same induction anesthetic agents by a second anesthetist with at least 3 years of experience who did not know the results of the preoperative evaluation.

Using Macintosh 3 or 4 blades, Cormack-Lehane classification was determined according to the laryngoscopic appearance in the first trial and without any maneuver. It was stated that intubation could be performed in the first attempt. Difficult mask ventilation, difficult intubation, easy and difficult laryngoscopy were evaluated. ROC curve analysis was used to evaluate the success of ultrasound measurements and to determine cut-off values.

Results and discussion: In comparisons in terms of demographic and clinical characteristics, a significant difference was found between easy intubation (n=142) and difficult intubation (n=28) in terms of height, weight and neck circumference (p values 0.017; 0.002; <0.001, respectively).

It was determined that the number of difficult intubations was less in females and more in males (p=0.001). Grade IV was found to be significantly higher, with Mallampati being the highest in grade III (p <0.001). A significant difference was found between easy and difficult intubation, especially in tongue thickness, and in the distances between neck structures and skin. According to the results of ROC curve analysis for ultrasound measurements, it was observed that the measurements with the highest sensitivity and specificity were tongue thickness and distance between skin and epiglottis (Cut-off values ≥59.85; ≥28.40, respectively).

Conclusion(s): It was observed that ultrasonographic measurements had moderate to weak sensitivity and specificity in terms of measurement parameters other than tongue thickness and epiglottis skin thickness in predicting difficult intubation.

11AP06-04
The role of ketamine in refractory severe asthma exacerbations: systematic review of prospective studies

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Background and Goal of Study: Asthma is a heterogeneous disease with wide range of symptoms. Severe asthma exacerbations (SAEs) are characterized by worsening symptoms and bronchospasm requiring emergency department visits.

In addition to conventional strategies for SAEs (inhaled β-agonists, anticholinergics, and systemic corticosteroids), another pharmacological option is represented by ketamine. This study was aimed at exploring the role of ketamine in refractory SAEs.

Materials and Methods: We performed a systematic search on PubMed and EMBASE up to August 12th, 2021. We selected prospective studies only, and outcomes of interest were: oxygenation/respiratory parameters, clinical status, need for invasive ventilation and effects on weaning.

Results and Discussion: We included a total of seven studies, five being randomized controlled trials (RCTs, population range 44-92 patients). The two small prospective studies (n=10 and n=11) did not have a control group. Four studies focused on adults, and three enrolled a pediatric population.

We found large heterogeneity regarding sample size, age and gender distribution, inclusion criteria (different severity scores, if any) and ketamine dosing (bolus and/or continuous infusion). Of the five RCTs, three compared ketamine to placebo, while one used fentanyl and the other aminophylline.

First author, year, Design	N of patients Age (Range)	Inclusion Criteria	Ketamine dose(s) Comparison dose	Outcomes reported by the authors Side effects reported
Esmailian M, 2018; RCT	92 48 years (34 – 62)	-	- K: bolus 0.3 mg/kg (16.3%), 0.4 mg/kg (15.2%), and 0.5 mg/kg (17.4%) - Placebo	PEFR before and 1 h after treatment. No side effects reported.
Allen JY, 2005; RCT	68 6 years (2 – 10)	PIS> 8	- K: bolus 0.2 mg/kg + infusion 0.5 mg/kg/h (2 h) - Placebo	PIS score at 0, 30, 60, 90, and 120 minutes. No side effects reported.
Tiwari A, 2016; RCT	48 48 months (16 – 144)	PRAM ≥5 after 2 h of standard therapy	- K: bolus 0.5 mg/kg (20 min) + infusion 0.6 mg/kg/h (3 h) - Aminophylline: 5 mg/kg bolus (20 min) + infusion 0.9 mg/kg/h (3 h)	ΔPRAM in the first 24 h, Hypertension, Tachycardia. No side effects reported.
Nedel W, 2020; RCT	45 65 (51 – 79)	- Adults intubated for acute bronchospasm. -Rs_{max}≥12 cmH$_2$O/L/s	- K: bolus 2 mg/kg + infusion 2 mg/kg/h - Fentanyl: bolus 1 mcg/kg + infusion of 1 mcg/kg/h	Rmax, Cdyn, PEEPi, Duration of MV at baseline, 3h and 24h. No side effects reported.
Howton JC, 1996; RCT	44 33 (26 – 40)	-	- K: bolus 0.1 mg/kg + infusion at 0.5 mg/kg/h - Placebo	Respiratory rate, hemodynamic parameters, Borg Score, P/F ratio, FEV$_1$ before and after treatment. Side effects reported.
Petrillo TM, 2001; Prospective	10 8 (5 – 16)	CAS > 12	- K: bolus 1 mg/kg + infusion 0.75 mg/kg/h (1 h)	CAS, vital signs, PEFR before K administration, within 10 min after K administration, and 1 h after infusion. Side effects reported.
Heshmati F, 2003; Prospective	11 30 (15 - 40)	-	- K: bolus 1 mg/kg + infusion 1 mg/kg/h (2 h)	Ppeak, $PaCO_2$, PaO_2 before K administration, 15 min after administration and 2 h after infusion. No side effects reported.

Table. Summary of the included studies. RCT: Randomized Controlled Trial; K: Ketamine; MV: Mechanical Ventilation; PEEPi: Positive End Expiratory Pressure Intrinsic; Cdyn: Dynamic Compliance; Rsmax: Airway Resistance; PEFR: Peak Expiratory Flow Rate; Ppeak: Pressure Peak; FEVI: Forced Expiratory Volume in 1 second; PRAM: Pediatric Respiratory Assessment Measure; PIS: Pulmonary Index Score; CAS: Clinical Asthma Score

The outcomes evaluated by the included studies were highly variable. Despite paucity of data and large heterogeneity, an overview of the included studies suggests absence of clear benefit produced by ketamine in patients with refractory SAE, and some signals towards side effects.

Conclusions: Our systematic review does not support the use of ketamine in refractory SAE. A limited number of prospective studies with large heterogeneity was found. Well-designed multicenter RCT are desirable.

11AP06-05
Goldenhar syndrome - a case report of a difficult airway approach

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Background: Goldenhar Syndrome is a rare congenital anomaly of unknown etiology. It is characterized by impaired development of several structures such as eyes, ears, lip, palate, mandible, maxilla and teeth. Abnormalities localized in the internal organs such as heart, kidneys, central nervous system or in the skeleton are also observed[1]. Oral manifestations range from malocclusion to complete absence of the mandibular ramus and temporomandibular joint. Different forms of lip and palate cleft and decreased palatal width are frequently found[2].

Case report: A 19-year-old women diagnosed with Goldenhar Syndrome was submitted to dental surgery under general anesthesia. Preoperative anesthesia evaluation was made with a multidisciplinary approach. As clinical findings she had mandibular hypoplasia with retrognathism and malocclusion, decreased palatal width, epibulbar dermoids and vertebral anomalies resulting in scoliosis and kyphosis. She previously had surgery for palate cleft, preauricular appendages and mandibular hypoplasia. She had sleep apnea treated with cPAP. No renal or cardiac abnormalities were reported. Difficult airway was predicted and a fiberoptic intubation expert was called. Before the induction of anesthesia, midazolam 3mg oral was given. Topical anesthesia of the nostrils and pharynx was achieved using the Mackenzie technique with 6 mL of 1% lidocaine. The patient was sedated using 1 mcg/kg of fentanyl and 0.5mg/Kg of propofol, ensuring effective spontaneous ventilation. Fiberoptic orotracheal intubation was performed using an endotracheal 6.5 cuffed tube. After confirmation of a secure airway, induction of general anesthesia guided by Bispectral index and neuromuscular blockade was performed. The surgery went uneventful. Extubation was successful after reversal of neuromuscular blockade and clinical criteria were verified.

Discussion: Patients with Goldenhar Syndrome have multiple comorbidities requiring general anesthesia. A full diagnosis and comorbidities optimization should occur before an elective procedure. Early recognition of difficult airway allowing for timely planning and management is crucial for patient safety.

References:

1. Bogusiak et al. (2017)World Journal of Pediatrics, 13(5), 405–415
2. Martelli et al. (2010). Journal of Applied Oral Science, 18(6), 646–649

Learning points: Difficult airway management is to be expected in this patients. Planning for all possible scenarios is important to assure a safe aproach.

11AP06-06
Mucopolysaccharidosis, when the first plan doesn't work: a case report

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Background: The mucopolysaccharidosis (MPS) are rare inherited storage diseases, characterized by a defective activity of lysosomal enzymes, that blocks degradation of glycosaminoglycans (GAG) and leads to their abnormal accumulation. Depending on its specific deficit, several clinical outcomes have been identified. MPS type VI consists on an abnormal accumulation of dermatan sulfate, mostly causing macrocephaly, macroglossia, vertebral column abnormalities, and cardiac valve disease. This group of genetic disorders may be challenging during anesthetic care, particularly concerning airway management.

Case report: A 14-year-old female patient, ASA IV, diagnosed with MPS type VI, when she was five months old, was admitted for scoliosis correction surgery under total intravenous anesthesia.

The pre-operative physical examination revealed a short immobile neck, macroglossia, limited mouth opening, and a difficult airway was anticipated. Initially, topical anesthesia of nostrils, nasopharynx and oropharynx was performed using lidocaine 1%.

Secondly, a TCI- based sedation with remifentanil was started and a first airway approach was attempted by nasal fiberscopic intubation, maintaining spontaneous ventilation. This approach was unsuccessful due to posteriorly located glottis, macroglossia and increased secretions. To improve it, a video-laryngoscope was combined with an oral fiberscope was a better guide for the endotracheal intubation, which was successful using a 5.5 mm cuffed tube.

The surgery underwent with no further complications. The patient was admitted into the pediatric intensive care unit for vigilance and extubation was eventful performed 24 hours after surgery.

Discussion: Patients with MPS are at high risk for anesthesia-related complications, namely a high incidence of difficult airway. Preoperative evaluation and knowledge of the MPS pathophysiology are essential to anticipate any obstacles and achieve the best outcome. Although awake intubation using flexible fiberscope is usually the first choice, alternative methods should be anticipated for the best outcome.

References:

Moretto A, *et al,* Anesthesiologycal risks in mucopolysaccharidoses, ItalianJournal of Pediatrics, 2018; 44(2):116

Learning points: Anesthesiologists should anticipate potential problems, plan, and prepare for all scenarios.

11AP06-07
Accidentally swallowed denture: a challenge for airway management

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Background: Dentures are one of the most commonly accidentally swallowed foreign bodies among adults.[1] Such objects can become impacted in different parts of the gastrointestinal tract and lead to various complications, including obstruction, perforation and bleeding.[2]

Case report: A 90-year-old man presented to the emergency department with complaints of odynophagia and a sensation of cervical obstruction after he inadvertently swallowed his partial denture. A front and lateral cervical radiograph revealed the presence of the semicircular object with metallic components at the level of C3-C4.

The plan was to perform a rapid sequence induction and intubation but as the videolaryngoscope was introduced the denture was immediately visualized at the level of the upper esophagus, posterior to the epiglottis. At this point an attempt was made to extract the foreign body with Magill forceps, unsuccessfully. Orotracheal intubation was achieved but it was imediately necessary to replace the endotracheal tube (ETT) using a frova due to a leak compatible with cuff rupture.

Rigid esophagoscopy was then performed with multiple attempts to extract the denture. During the maneuvers, the metallic components of the denture became stuck to the ETT and lead to another rupture of the ETT cuff. It was decided to introduce a frova and remove the ETT. A Rapi-Fit® adapter was placed on the frova to ensure oxygenation during the procedure. After several more attemps, the foreign body was extracted, followed by the immediate introduction of a new ETT through the frova.

Due to the presence of edema of the esophagus mucosa and a laceration of the right tonsil, it was decided to perform oropharyngeal packing with compresses.

The patient was successfully extubated after 36 hours in the post anesthesia care unit and was discharged on the postoperative day six.

Discussion: This case presented a situation of difficulty in maintaining the patient's airway due to a removable partial denture deeply embedded in the wall of the upper aerodigestive tract.

Due to the configuration of the denture and location close to the epiglottis, this procedure was associated with several risks, including laceration, hemorrhage, cuff rupture and aspiration of blood and secretions.

References:

1. Dtsch Arztebl Int. 2012;109(50):869–75.
2. Ann Med Surg (Lond). 2015;4(4):407–13.

Learning points:

Swallowed dentures can impact in the upper aerodigestive tract and become a challenge for airway management

11AP06-08
Submental intubation in facial trauma – the reborn of an old technique

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Background: Airway management in patient with complex facial fractures presents a challenge for the Anesthesiologist. Orotracheal intubation was often unfeasible and basilar skull fracture was a contraindication for nasotracheal intubation[1].

Surgical tracheostomy provides a safe way to access the airway but was associated with an increase in complications rate and hospital stay. Submental intubation provides an alternative to tracheostomy.[2]

We report a submental intubation in a patient with multiple facial fractures.

Case report: An 37-year-old male polytraumatized with many facial fractures. He was proposed for na open reduction and osteosynthesis of the fratures under general anesthesia. We performed orotracheal intubation with a reinforced tube number 8. The surgical team was made a 1.5cm midline submental incision and passed a curved hemostat from submental incision to the oral cavity. The tube passed through the incision and emerged at submental region.

At the end of the surgery, submental intubation was converted to orotracheal intubation. No complications was registered. The postoperative period was uneventful.

Discussion: Facial trauma is the most common indication and it provides a safe airway, while leading to a shorter hospital stay and a better aesthetic result compared to tracheostomy. It allows a better surgical field, without dislodging facial struct and can be used in patients with basilar skull fractures.

On the other hand, when the need for long term ventilation is expected, submental intubation was unsuitable.[3] The most common complications are accidental extubation, local infection, submental scarring, temporary lingual nerve paresthesia and hemorrhage.[2]

Submental intubation is an old technique, which allows a reliable alternative to tracheostomy in patient with complex facial trauma.[3]

References:

1. Das S, Das TP, Ghosh PS. Submental intubation: A journey over the last 25 years. J Anaesthesiol Clin Pharmacol. 2012 Jul;28(3):291-303
2. Oshima, Naoya MD; A Simple and Reliable Submental Intubation Technique for Maxillofacial Fractures, Journal of Craniofacial Surgery: October 2018 - Volume 29-Issue 7- p 1952-1955
3. Anwer HM, Zeitoun IM, Shehata EA. Submandibular approach for tracheal intubation in patients with panfacial fractures. Br J Anaesth. 2007 Jun;98(6):835-40

Learning points: Submental intubation is an old technique, which allows a reliable alternative to tracheostomy in patient with complex facial trauma, with a low rate of complications.

11AP06-09
The challenging airway management in head and neck cancer patients: delayed extubation as a safe alternative to elective tracheostomy

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Background: Airway management in head and neck cancer (HNC) patients undergoing surgical procedures presents unique challenges to anesthesiologists in the perioperative period since most have difficult airway criteria. Recently, delayed extubation (DE) has been described as a safe alternative to standard tracheostomy (TT) to maintain airway patency following surgery thus reducing perioperative morbimortality.

Case report: We report the case of a 68-year-old male patient, ASA III, diagnosed with oropharyngeal epidermoid carcinoma recurrence (after surgery, chemotherapy and radiotherapy) who underwent partial pharyngectomy with CO_2 laser plus radical unilateral neck dissection.

Our approach was a fibroscopy under sedoanalgesia with remifentanil using a microlaryngeal tube size 5, compatible with CO_2 laser surgery. There was distortion of all airway structures and extreme rigidity due to previous radiotherapy and abundant thick secretions were also impairing visualization.

Nonetheless, orotracheal intubation was successfully attained without adverse events, maintaining peripheral O_2 saturation >97%. Maintenance performed with sevoflurane and sufentanil TCI with hemodynamic stability throughout, monitored by initial placement of an arterial line.

After partial pharyngectomy, orotracheal tube was exchanged using a Frova, leaving a simple 6.0 orotracheal tube. At the end of surgery, reversal of neuromuscular block was achieved with sugammadex. DE with sufentanil perfusion was decided and the patient was transferred to the post-anesthesia care unit with oral tube in place, conscious and collaborative.

Extubation was performed the following morning in the intensive care unit with no adverse events.

Discussion: In HNC patients airway may get further compromised postoperatively due to edema, hemorrhage, swelling of flap reconstruction and phlegm accumulation. In selected patients DE may be a safe alternative to TT with less complications, time to speech and oral intake after surgery, and reduced hospital stay.

There are scoring systems on which to perform an elective TT but only small cohort studies attempted to identify factors associated with the safety of DE. The increasing development of airway management equipment and the growing number of centers performing DE in selected patients should burst interest and further studies with larger cohorts to identify patients in which DE should be the standard approach.

References:

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11AP06-10
Sudden airway collapse in a patient under sedation: a case report

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Background: Proper airway management is a must-have skill for all anesthesiologists. Resulting complications can be devastating and life-threatening. We present a clinical case of a woman who suffered a sudden airway collapse under sedation in a prone position.

Case report: 71-year-old woman electively undergoing a vertebroplasty under sedation with remifentanil, in a prone position. During the procedure, the patient suffered a cardiorespiratory arrest, which was initially oriented as secondary to chest rigidity due to remifentanil.

After resuscitation, two unsuccessful extubation attempts were performed. The fibrobronchoscopy showed tracheal collapse due to hypermobility of the posterior tracheal wall. A non-treated thyroid goiter was detected by reviewing an old CT scan and therefore a thyroidectomy was performed while she remained intubated. The patient was extubated without complications after the surgery.

Discussion: Hyperdynamic airway collapse involves airway compromise caused by an intrusion of the posterior tracheal membrane(1).

Its pathogenesis is comparable to tracheobronchomalacia, which leads to loss of structural integrity of the airway secondary to hypermobile cartilaginous structures. Both can be congenital or acquired. Mechanical causes include airway manipulation or chronic external tracheal compression(2).

Clinical presentation is nonspecific and treatment will be addressed to symptoms and causes. Both can lead to significant functional impairment and increased anesthetic risk.

References:

1. Choo et al. Tracheomalacia/Tracheobronchomalacia and Hyperdynamic Airway Collapse. Immunol Allergy Clin N Am 33 (2013) 23–34.

2. Kazunari et al. A 71-year-old female with giant goiter associated with tracheomalacia. Acute Medicine & Surgery 2014; 1: 242–244.

Learning points: Hyperdynamic airway collapse and tracheobronchomalacia are not common but important diagnoses to consider. A rigorous preoperative evaluation is mandatory prior to any anesthetic procedure. Anaesthesiologists must be attentive and prepared to face unexpected airway complications.

11AP06-11
Case report: patient with Crouzon syndrome airway management

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Background: Crouzon syndrome is a rare congenital disorder, inherited or as a sporadical mutation in the fibroblast growth factor receptor gene, more common in men. Its incidence is of approximately 1 in 25000 births and it is characterized by premature closure (craniosynostosis) of the cranial sutures, resulting in a dysmorphic appearance with a high forehead, flattened occiput, and brachycephaly[1].

These patients may also have mental retardation, mandibular prognathism, high arched palate with overcrowding teeth, restrictive lung functions, and upper airway obstruction. They pose a challenge mainly due to craniofacial abnormalities and difficult airway. There are cases where laryngeal mask airway has been successfully used, for this being necessary an adequate mouth opening[2].

Case report: A 17-year-old boy with Crouzon syndrome, hyperactivity disorder, learning deficit and dysmorphic facies (presented with craniofacial dysostosis type 1), was scheduled for surgical placement of tarsal bars.

We decided on a Combined Anaesthesia Technique, combining the blockage of the sciatic (popliteal pathway) and saphenous (adductor canal) nerves with general anesthesia.

When the patient presented to the operating room, standard ASA monitoring was placed. Peripheral nerve blocks were performed uneventfully. Bispectral index and neuromuscular block monitoring were placed. Then we proceeded to induction of general anesthesia. Airway management was successful using a laryngeal mask (iGel® n.4). Surgery occurred uneventfully.

Discussion: Airway and ventilation management is one of the most important skills of an anesthesiologist even more when managing a patient with Crouzon Syndrome. An adequate pre-anesthetic evaluation, avoiding sedative premedication, minimal use of opioids and awake extubation are key points in successful management of such cases. Use of locoregional techniques is very useful in these patients, providing analgesia and lowering opioid requirements.

References:

1. Ahmed, I., & Afzal, A. (2009). Diagnosis and evaluation of Crouzon syndrome.*J Coll Physicians Surg Pak*,*19*(5), 318-20.

2. Kumar, A., Goel, N., Sinha, C., & Singh, A. (2017). Anesthetic implications in a child with Crouzon syndrome.*Anesthesia, Essays and Researches*,*11*(1), 246.

Learning points: We presented a case of a patient with a rare congenital disorder (Crouzon Syndrome), scheduled for orthopedic surgery and airway approach for these patients who frequently present a difficult airway.

11AP06-12
Effect of oxygen flow rate on respiratory and cardiovascular physiology during prolonged apneic oxygenation - an experimental study

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Background and goal of study: Apneic oxygenation using high flow nasal oxygen prolongs the safe apneic period during general anesthesia. Still, the effects on central hemodynamics and respiration have not been explored.

The aim of this experimental study was to describe central hemodynamic effects and arterial and mixed venous blood gases during apneic oxygenation using nasal oxygen flow of 70 and 10 L/min.

Materials and methods: Swedish landrace pigs, mean weight 41.4 (1.6) kg, were anesthetized and endotracheally intubated. The pulmonary and femoral arteries were catheterized. The animals were preoxygenated and paralyzed before apnea.

After extubation, suspension laryngoscopy kept airway patency. Apneic periods were performed, applying 70 and 10 L/min, FIO21.0, via a nasal cannula on the snout. Between apneic periods animals were intubated and recovered baseline physiological parameters. Additionally, seven animals performed an apneic period without supplementary oxygen. Parameters and blood gases were measured repeatedly.

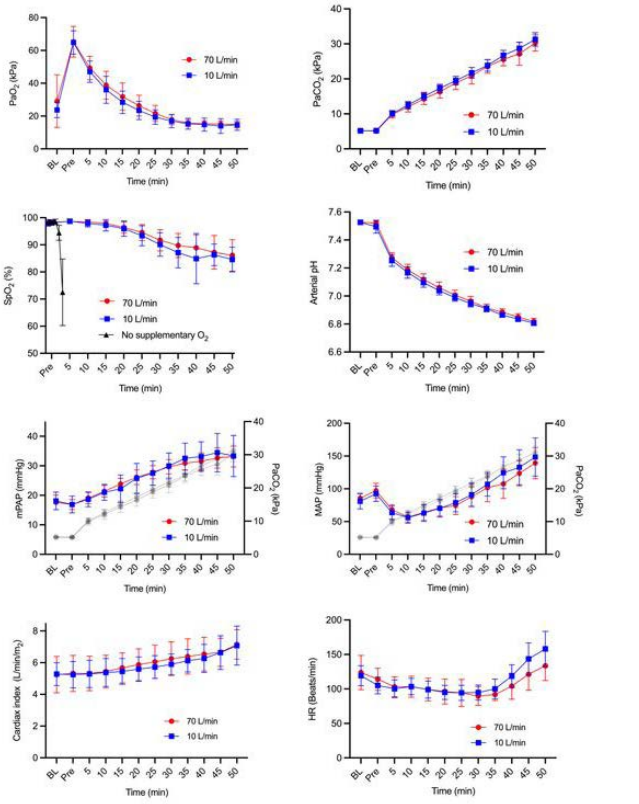

Figure legend: Graphs display mean (SD) $PaCO_2$, PaO_2, SpO_2, arterial pH, mPAP, MAP, Cardiac index and HR during apneic oxygenation using 70 L/min and 10 L/min oxygen, FiO2 1.0. n = 9 at 45 min in both flowrates, at 50 min n = 9 (70 L/min) and n = 8 (10 L/min).

Figure.

Results and discussion: Nine pigs performed two apneic periods, 70 and 10 L/min of oxygen, with at least 45 min of adequate oxygenation. During apnea mean pulmonary arterial pressure (mPAP) increased in both groups ($P < 0.001$) with no difference between flow rates ($P = 0.60$). The $PaCO_2$-rise was 0.49 kPa/min and 0.52 kPa/min with 70 L/min and 10 L/min, respectively ($P = 0.22$). During apnea without supplementary oxygen, SpO_2 declined to < 85% after 155 (11) sec.

Conclusion: Prolonged apneic oxygenation using 70 and 10 L/min of oxygen adequately oxygenated the animals with a continuously increasing mPAP and carbon dioxide with no difference between the groups. Without oxygen supply, animals desaturated quickly during apnea.

Transfusion, Haemostasis and Thrombosis

12AP01-01
Prediction of unfractioned heparin effect using deep learning approach

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Background and goal of study: Unfractioned heparin (UFH) is the anticoagulant of choice during carotid endarterectomy surgery (CEA). Activated partial thromboplastin time (aPTT) has been the primary laboratory test used to monitor effect of UFH. Range of 1.5-2.5 times baseline value has gained wide acceptance as therapeutic range in daily clinical practice. Despite being cornerstone of anticoagulation, UHF is limited by its unpredictable pharmacokinetic profile and is difficult to dose accurately.
We hypothesized that deep learning, a type of machine learning based on a set of algorithms to model high level abstractions in data using multiple linear and nonlinear transformations, could better interpret the dose-response relationship of UFH.
Materials and methods: We studied 63 consecutive patients undergoing elective carotid endarterectomy in superficial cervical block. Heparin sodium 50 U/kg of total body weight was administered 3 minutes before application of carotid artery cross-clamp and aPTT was measured 30 minutes after heparin administration.
We built a model for prediction of aPTT of 1.5 to 2.5 times the baseline value using artificial neural network (ANN). ANN was composed of three layers: input layer, the middle layer and output layer. Input variables included the pharmacokinetic-pharmacodynamic covariates (age, sex, weight, height, previous antiplatelet therapy, complete blood count, biochemistry panel, baseline coagulogram, total heparin dose). Twenty percent of the dataset was used as a testing dataset, and the remaining were used for model training.
Results and discussion: The activation function used for both ANN layers was sigmoid. aPTT of 1.5 to 2.5 times the baseline value at 30 minutes occurred in 12 patients (19.0%). The area under the receiving operator curve (AUROC) was 0.752 with deep learning algorithm prediction accuracy of 90.4%. None of the patients were bellow therapeutic range of aPTT.
Conclusion(s): Deep learning approach can be used for calculating better dosage of used drugs to deliver safer, more efficient and more cost-effective doses. Adding more clinical data into this model and testing various models might further improve prediction of heparin effect.

12AP01-02
Use of low-frequency piezoelectric thromboelastography (LPTEG) for personalized correction of hemostasis disorders in patients with COVID-19

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Background and goal of study: Coronavirus infection with COVID-19 caused by SARS-CoV-2 virus has a significant effect on the haemostasis system and can lead to severe thrombotic complications. The question of selecting doses of antithrombotic drugs and monitoring their effectiveness remains open, as laboratory methods for assessing the hemostasis system, proposed by current guidelines do not allow to obtain complete information about the functional state of hemostasis. LPTEG allows to obtain integrated information about the functional state of the hemostasis system, its vascular-platelet, coagulation, fibrinolytic and anticoagulant units and to control the effectiveness of therapy of hemostasis disorders.
Materials and methods: 18 patients with COVID-19 were studied and treated. 9 patients with acute respiratory distress syndrome (AIDS) received treatment in the Department of Anesthesiology and Intensive Care (VIT) before the acute condition was eliminated.
After relief of ORDS and correction of hemostasis disorders, they were transferred to the therapeutic department (TD) for rehabilitation. Another 9 patients who underwent COVID-19 and received standard therapy were examined and treated in TD from the rehabilitation phase.
Upon admission to the ICU, PCR showed SARS-CoV-2 antigen and IgM immunoglobulins 6.1 ± 4.2 U / ml and IgG = 10.2 ± 5.1 U / ml. In the acute phase of the disease, interstitial changes in lung tissue characteristic of SARS-CoV-2 were detected in CT scans of the chest. The hemostasis system was evaluated using LPTEG.
Results and discussion: Upon admission to ICU according to LPTEG, it was found that 8 patients have chronometric and structural hypercoagulation at all stages of fibrinogenesis, and one who took a few days before hospitalization NSAIDs - chronometric and structural hypocoagulation with hyperfibrinolysis.
In a group of 9 patients with detected structural and chronometric hypercoagulation, antiplatelet agents were used to reduce the detected high aggregation activity of blood cells: aspirin + magnesium hydroxide at a dose of 150 mg / day and Dipyridamole 75 mg / day. Sulodexide was used to correct virus-induced endothelial damage, which largely determines the detected changes in GP.
Conclusion(s): Covid causes severe hypercoagulation, which emphasizes the need for adequate personalized therapy under the control of LPTEG.

12AP01-03
Perioperative colloids: From theory to practice

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Background and Goal of Study: Intravenous fluid administration is the cornerstone in hypovolemic patient's hydric reanimation. Clinical guidelines restrict colloid administration favouring crystalloids. Currently, we don't know exactly which is the daily clinical practice during the perioperative period. The objective of this study is to describe perioperative use of colloids analysing possible reasons aiming to use them.

Materials and Methods: Prospective, cross-section, national, multicentre observational study. Fluid day sub-study. After informed consent, We enrolled all patient's older than 18 years old who underwent surgery during the 24 hours of the two-days study (February, 2019, 18 Th and 20Th).

Exclusion criteria were: Procedures performed under local anaesthesia and/or outside the surgical area, ophthalmic surgery and any other without anaesthesiologist requirement. We registered demographic data, comorbidities, anaesthetic data, surgical procedure, global risk stratification (combination of patient and surgical risk), fluids administered, perioperative bleeding, transfusion practice and monitoring.

Results and Discussion: 5928 cases were analysed. 542 patient's (9,1%) received any type of Colloids, being Hydroxiethyl-Starch the most frequently used (5,1%). Patient's receiving colloids, suffered more longing surgery (150 [90;255] vs. 75 [45;120]), were urgently operated (13,7% vs. 7,5%) and their recovery was mostly in critical care units (45,1% vs.15,8%).

Patients at high risk (High or very high surgical procedure risk in patients at high medical risk) were whom received colloids more frequently (22%). Patient's with bleeding less than 500 mL received Colloids 5,9%.

Above this figure, Colloids were administered 45,9%. Patients who received colloids were anaemic more frequently: 29,4% vs. 16,3%. Colloids administration had and Odds ratio for transfusion of 15,7. Advanced monitoring increased the risk for receiving colloids (OR 9,43).

Conclusion(s): In our environment with routine clinical practice, colloids administration is limited and close linked to Perioperative bleeding.

References:

1. Colomina MJ, Ripollés-Melchor J, Guilabert P, Jover JL, Basora M, Casinello C, Ferrandis R, Llau JV, Peñafiel J. Observational study on fluid therapy management in surgical adult patients. BMC Anesthesiology 2021; Dec 13;21(1):316. doi: 10.1186/s12871-021-01518-z.

12AP01-04
Bad Blood: type 3 Von Willebrand disease

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Background: Type 3 Von Willebrand disease (VWD) is rare but is the most severe form of VWD, characterized by absent or undetectable levels of von Willebrand factor (vWF), leading to a massive deficiency in plasmatic factor VIII (FVIII).

Case Report: A 27-year-old patient, ASA-PS IV, with type 3 VWD was admitted at the emergency department for lipothymia and abdominal pain. The patient was hemodynamically unstable with BP 84/52mmHg, HR 137bpm, and 5.5g/dL hemoglobin.

Abdominopelvic CT revealed hemoperitoneum with active hemorrhage. She was administered 2000UI FVIII, 4800UI FvW, and 2 RBCs, and underwent exploratory laparotomy. Balanced general anesthesia was performed with videolaryngoscope, arterial line and central venous catheter were placed.

The local massive hemorrhage protocol was activated: 4 concentrated RBC, 4 units of FFP, 1 platelet concentrated, 3g fibrinogen and 1.5g tranexamic acid. During surgery she remained hemodynamically stable. A fallopian tube rupture was diagnosed and left salpingoophorectomy was performed.

The patient was transferred to the ICU where she became hemodynamically unstable requiring norepinephrine and 2 concentrated RBC, 1200UI FvW and 500UI FVIII were administered. She was extubated after 36h in ICU.

Discussion: In type 3 VWD the bleeding anomalies are mainly characterized by mucocutaneous hemorrhage. In addition hematomas and hemarthrosis may occur like in hemophilia A. The treatment depends on the type of VWD. In these patients purified human VWF associated with FVIII is the principal preventive or curative treatment, because they do not respond to desmopressin. An antifibrinolytic and platelet pool may be useful. In this case, the young age and quick diagnosis allowed a good outcome.

References:

1. Adjambri, A. E., et al. (2020). Discovery of Type 3 von Willebrand Disease in a Cohort of Patients with Suspected Hemophilia A in Côte d'Ivoire. Mediterr. J. Hematol. Infect. Dis. 12(1).

2. Bonhomme V, et al JM: Von Willebrand disease. Anästh Intensivmed 2019

Learning points: The manifestations of type 3 VWD can be life-threatening in the absence of appropriate management. The anesthesiologist has to take a few things into consideration. General anesthesia is preferred. If regional anesthesia is done it must be performed with caution. In order to avoid traumatic intubation, we should consider the use of a videolaryngoscope to reduce the risk of bleeding and mucosal lesions.

12AP01-05
Patient blood management in a child with ethical constraints to blood transfusion – a case report

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Background: Jehovah's Witnesses (JW) may refuse blood products for their child, based on their religious beliefs. Patient blood management (PBM) may represent an ethical and medical challenge, as described in the following case report.

Case report: 13-year-old boy, ASA I, diagnosed with a mandibular carcinoma. He was scheduled for a segmental mandibulectomy and reconstruction with iliac crest flap - a high bleeding risk surgery. PBM strategies were discussed with his parents. They were JW and refused to give consent for blood transfusion, blood salvage and acute normovolemic hemodilution.

Being a minor, a court order was obtained, authorising its usage in the setting of a permanent harm or life-threatening situation. Preoperative hemoglobin (Hb) was 12.9 g/dL. Despite the normal hematocrit, erythropoietin and iron supplementation were given for 6 weeks preoperatively, increasing Hb to 14.2 g/dL.

Intraoperatively, tranexamic acid was administered by bolus and infusion and a hypotensive anaesthesia was conducted using a fentanyl infusion. Normothermia was maintained, as well as fluid management targeting normovolemia. The procedure lasted 11 hours with an estimated blood loss of 800 mL. The final Hb was 10.1 g/dL with no need for transfusion.

The patient was transferred to an intensive care unit (ICU), with no active bleeding. After a 7-day stay at the ICU, he had signs of infection and failure of bone graft, so he underwent a new mandibular reconstruction with a free fibular flap. Initial Hb was 9.4 g/dL, and the aforementioned intraoperative strategies were applied.

Before microvascular anastomosis, we couldn't maintain normal blood pressure with fluid replacement, compromising an adequate perfusion through the flap tissue. Hb was 7.6 g/dL.

After discussion with the surgical team, we decided to transfuse 1 unit of red blood cells (RBC). Hb increased to 9.4 g/dL and adequate blood pressure was obtained. He went to the ICU, another RBC unit was transfused, and he had an improved clinical and functional outcome, and was discharged after 14 days.

Discussion: Techniques to prevent blood transfusion were applied successfully in an elective surgery. On the reintervention, regarding patient's well-being and surgical outcome and according to ethical principles, RBC transfusion was necessary.

Reference:

BJA. 2015; 115(5):676-687

Learning points: With a careful pre-operative optimization, there are effective ways to avoid transfusion, acceptable to most JW.

12AP01-06
Autoimmune thrombocytopenia and type 1 von Willebrand disease in a patient with a femoral fracture - a case report

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Background: von Willebrand Disease (vWD) is the most common inherited bleeding disorder, resulting from a quantitative or qualitative defect of von Willebrand Factor. This disease carries significant hemorrhagic risk for surgery, thus requiring careful perioperative management.

Case report: A 77 year old woman, ASA IV, with multiple comorbidities, including vWD, Non Hodgkin Lymphoma and Autoimmune Thrombocytopenia, was admitted to the hospital after being diagnosed with a Subcapital Femur fracture, being proposed for a non-cemented hip hemiarthroplasty.

At admission, she presented with severe Thrombocytopenia, so a course of corticotherapy was started, and surgery was postponed util a safe platelet count was achieved. Her vWF and FVIII levels were at hemostatic values, so no factors' correction was warranted. Prior to the surgery 1 Platelet Pool and Tranexamic Acid 1g were administered.

General Anesthesia was chosen based on the hemorrhagic risk. Standard ASA monitoring plus BIS and TOF was used, and 2 peripheral venous accesses plus an arterial line were established. During the intraoperative period, hemodynamic stability was maintained, coagulation values stayed normal and platelet count remained stable. Blood loss was estimated as 300mL and Hb dropped to 7,2 g/dl, hence 1 unit of RBC was transfused. Standard multimodal IV analgesia was administered, except for NSAIDs; in addition, a ultrasound guided Femoral Nerve Block was performed.

After the surgery, the patient had an uneventful emergence, was transferred to the ICU for close monitoring, and Tranexamic Acid 500mg was administered every 8 hours for the first 24h. Day 2 PO she was transferred to the infirmary, and in the days that followed she remained hemodynamically stable without any apparent bleeding, but hemoglobin dropped to 6,5 g/dL, requiring the transfusion of a total of 3 units of RBCs. No vWF and VFIII levels were obtained postoperatively. At day 8 PO she was safely discharged from hospital care.

Discussion: This case illustrates the specificities of the anesthetic management of a complex patient with both vWD and Severe Thrombocytopenia, it also highlights the importance of a multidisciplinary approach to minimize the peri-surgical bleeding risk.

As demonstrated, trauma avoidance, factors' levels control and clinical monitoring throughout the entire perioperative period, and not only before and during surgery, become fundamental for hemorrhage prevention and achievement of a good outcome.

12AP01-07
Procoagulant pattern of COVID-19 patients at ICU admission assessed by new viscoelastic test device Quantra®

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Background and goal of study: A procoagulant state in patients with severe COVID-19 disease has been described with standard haemostasis test, being scarce the viscoelastic test characterization. The aim of the study was to assess the results found using sonorheometry technology (Quantra® device) [1].
Materials and methods: After EC approval, retrospective data of consecutive patients admitted to our ICU with severe ARDS due to COVID-19 were collected. A viscoelastic test from Quantra® analyzer (HemoSonics LLC, Charlottesville, VA) was performed on admission, measuring [2]:
- Clot coagulation time: CT (NR 113-164 sec)
- Clot stiffness: CS (NR 13.0-33.2 hPa)
- Platelet contribution to CS: PCS (NR 11.9-29.8 hPa)
- Fibrinogen contribution to CS: FCS (NR 1-3.7 hPa)

Results and discussion: We collected data from 20 patients (5 Jan-15 Feb 2021). The main results were (baseline characteristics in table 1):

Demographics	**Age (y)** 61 (40-76)	**Gender: male/female** 14/6	**Weight (kg)** 85 (58-170)
Clinical situation at ICU admission	**NIV device at ward** HFNO:16 CPAP: 4 BIPAP: 0	**NIV device 1 h after ICU admission** HFNO:0 CPAP: 8 BIPAP: 12	**PaFiO2 at ICU admission** >200: 3 100-200: 12 <100: 5
Main data at ICU admission	**APACHE II** 10 (3-22)	**Days up to ICU admission** 9.5 (3-18)	**LMWH dose at ICU admission (n)** Prophylaxis: 17 Therapeutic: 3

Table 1. Main baseline characteristics of patients.

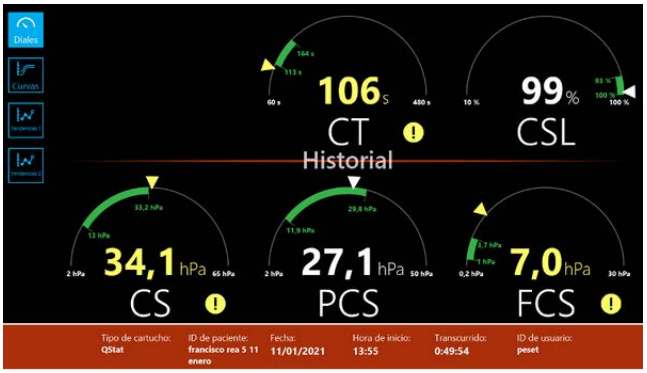

Figure 1. Typical Quantra® screen of one patient (see text)

- CT: 14/20 pts had a normal or short (5/20) result, and one patient a prolonged one (170 sec)
- CS: 7/20 pts had a normal CS and 13/20 a high firmness of coagulated blood (up to 55.6 hPa)
- PCS: 10/20 pts had a normal result, 8/20 a high one (up to 45.1 hPa) and 2 pts a low PCS
- FCS: 19/20 pts showed a high FCS (up to 11.0) and 1/20 a normal result

The pattern shows a normal or short CT with high clotting blood firmness (CS), depending on both PCS and FCS. Although most patients had a normal platelet count, platelet contribution to clot firmness was high, as fibrinogen also.
Conclusion(s): Our data support that critically ill COVID-19 patients have a hypercoagulability pattern at admission, also characterized with Quantra®, a viscoelastic test device using ultrasound-based technology. The significance of our results in the outcome needs to be confirmed by further studies.
References:
1. Ferrante EA et al. Anesth Analg 123:1372-9, 2016.
2. Corey FS et al. Ann Biomed Eng 44:1405–24, 2016

12AP01-08
A randomized, double-blind, phase 3 study of 4-factor prothrombin complex concentrate in patients with acute major bleeding on direct oral anticoagulant therapy with factor Xa inhibitors: the LEX-210 study

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Background and Goal: Major bleeding associated with direct oral anticoagulant therapy with Factor Xa Inhibitors (FXaI) may be controlled using hemostatic agents such as prothrombin complex concentrates (PCCs). The efficacy/safety of PCCs in managing FXaI-related bleeding requires further study. LEX-210 aims to demonstrate hemostatic efficacy/safety of four-factor PCC (4F-PCC; *Octaplex®*, Octapharma) in adults with FXaI-related major bleeding.
Materials and Methods: LEX-210 (NCT04867837) is a Phase 3, multicenter, prospective, randomized, double-blinded, group-sequential, parallel-group, adaptive design study (sponsor: Octapharma). Patients (≥18 years) with acute major bleeding and FXaI activity equivalent to ≥100 ng/mL are eligible. Exclusion criteria include bleeding that is immediately life-threatening and acute trauma for which FXaI reversal alone would not be expected to control bleeding. Approval from independent ethics committees will be sought prior to study start. Prior written informed consent will be obtained from each patient or their legally authorized representative. Approximately 200 patients will be enrolled and randomized 1:1 to 50 IU/kg or 15 IU/kg 4F-PCC, to demonstrate superior hemostatic efficacy of the higher dose for emergency reversal of FXaI-related major bleeding. The primary endpoint is the proportion of patients with effective (excellent/good) or non-effective (poor/none) hemostasis within 24 h of 4F-PCC, as determined by an independent adjudication committee according to predefined criteria based on Sarode *et al*. (**Table 1**)[1].
Secondary endpoints include change in endogenous thrombin potential (baseline to 1h after PCC), 30-day rates of thromboembolic events and all-cause mortality, adverse events, vital signs, and laboratory parameters.

Results and Discussion: LEX-210 launched in Q4 2021 and will be performed across ~60 sites in North America and Europe. Completion is anticipated Q1 2024.

Hemostatic Effectiveness Outcome	Hemostatic Effectiveness Assessment Criteria [1]	
	Visible Bleeding	Non-visible Bleeding
Excellent (Effective)	Cessation of bleeding ≤1 h after the end of infusion and no additional coagulation intervention (plasma, whole blood products not including pRBCs, and/or coagulation factors) required	**1.** Musculoskeletal bleeding: pain and swelling are stable or reduced or unequivocal improvement in objective signs of bleeding ≤1 h after the end of infusion; and the condition has not deteriorated during the 24-h period **2.** ICH: ≤20% increase in hematoma volume[1] compared to baseline on repeat CT scan performed at the 12-h time point **3.** Non-visible bleeding that is not described above (e.g., GI bleeding): ≤10% decrease in both Hgb/Hct[2] at 24 h[3] compared to baseline (initial correction of decrease in Hgb with pRBC, with a transfusion trigger of a Hgb ≤8 ± 1 g/dL [i.e., transfuse pRBC if the Hgb ≤8 ± 1 g/dL])
Good (Effective)	Cessation of bleeding >1 and ≤4 h after end of infusion and no additional coagulation intervention (plasma, whole blood products not including pRBC, and/or coagulation factors) required	**1.** Musculoskeletal bleeding: pain and swelling are stable or reduced or unequivocal improvement in objective signs of bleeding >1 h and ≤4 h after the end of infusion; and the condition has not deteriorated during the 24-h period **2.** ICH: >20%, but ≤35% increase in hematoma volume[1] compared to baseline on a repeat CT scan performed at the 12-h time point **3.** Non-visible bleeding that is not described above: >10 to ≤20% decrease in both Hgb/Hct[2] at 24 h[3] compared with baseline (initial correction of decrease in Hgb with pRBC, with a transfusion trigger of a Hgb ≤8 ± 1 g/dL [i.e., transfuse pRBC if the Hgb ≤8 ± 1 g/dL])
Poor/None (Non-effective)	Cessation of bleeding >4 h after end of the infusion, and/or additional coagulation intervention (plasma, whole blood products not including pRBC, and/or coagulation factors) required	**1.** Musculoskeletal bleeding: pain is not controlled or swelling is increased by 4 h after the end of infusion or the condition has deteriorated during the 24-h period **2.** ICH: >35% increase in hematoma volume[1] compared to baseline on repeat CT scan performed at the 12-h time point **3.** Non-visible bleeding that is not listed above: >20% decrease in both Hgb/Hct[2] at 24 h[3] compared to baseline (initial correction of decrease in Hgb with pRBC, with a transfusion trigger of a Hgb ≤8 ± 1 g/dL [i.e., transfuse pRBC if the Hgb ≤8 ± 1 g/dL])

[1] Use maximum thickness in case volume cannot be measured for subarachnoid bleed and subdural hematoma

[2] The smallest percentage decrease in Hgb or Hct should be used to determine the hemostatic efficacy rating of excellent, good or poor/none

[3] Assumption for the 24-h adjusted Hgb/Hct calculation: for each unit of pRBC transfusion there is generally an increase of 1 g/dL in Hgb or 3% increase in Hct

Criteria modified from Sarode R *et al*., 2013 [1]

CT, computerized tomography; GI, gastrointestinal; Hgb, hemoglobin; Hct, hematocrit; ICH, intracranial hemorrhage; pRBC, packed red blood cell concentrate

Table 1. Hemostatic effectiveness assessment criteria by bleeding type.

Conclusion: Results could confirm the hemostatic efficacy/safety of 4F-PCC for managing FXaI-related major bleeding, potentially offering an alternative treatment for these patients.

References:

1. Sarode R*et al*. Circulation 2013;128:1234-43

12AP01-09
Using heparin-calibrated assays to estimate anti-factor Xa activity of factor Xa inhibitors (FXaI): correlation analysis of published data

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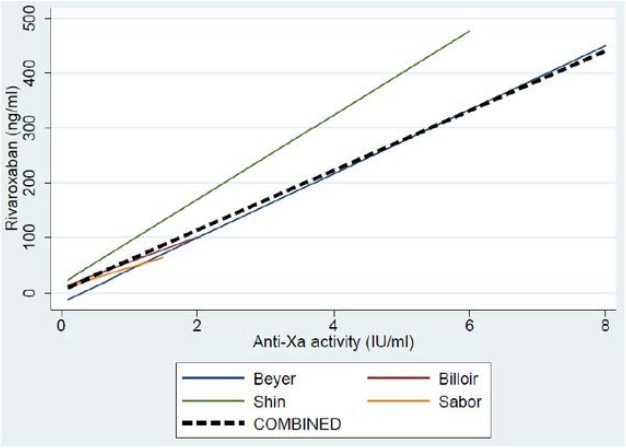
Background and Goal: LEX-210 (NCT04867837, Octapharma) will evaluate 4-factor prothrombin complex concentrate (*Octaplex®*) in patients with acute major bleeding on FXaI and aims to include patients with baseline anti-Xa activity equivalent to ≥100 ng/mL according to the locally available test. As specific calibrated FXaI assays are not readily available, we performed correlation analysis of published data to enable LEX-210 investigators to convert heparin-calibrated anti-factor Xa assay results to equivalent FXaI concentrations, to recruit patients.

Materials and Methods: PubMed was searched (June 2021) for data correlating heparin-calibrated and FXaI-specific assays. Data from animals or spiked (not patient-derived) samples, or from liquid-chromatography-tandem mass spectrometry, were excluded. Fitted regression equations were extracted/calculated from papers. If >1 report was available for a device/reagent/FXaI combination, data were meta-analysed.

Results and Discussion: 8/57 screened articles had relevant data. Correlation curves vs. FXaI-calibrated anti-Xa assays were obtained for heparin-calibrated assays, for different combinations of device/reagent/calibrator. The correlation curves and corresponding conversion table for a commonly used device (STA-R coagulation analyzer) and FXaI (rivaroxaban) are shown.



*Beyer J, et al. Clin Appl Thromb Hemost. 2016;22(5):423-8, n=14 patient samples
Billoir P, et al. Ann Pharmacother. 2019;53(4):341-7; n=135 patient samples
Shin H, et al. J Vasc Surg Venous Lymphat Disord. 2020;8(5):741-7; n=38 patient samples
Sabor L, et al. Thromb Res. 2017;156:36-8; n=7 patient samples
These studies used heparin and rivaroxaban calibrators from Diagnostica Stago
The relationships between anti-Xa and rivaroxaban activity are shown for each set of data and the combined data

IU, international units

*Figure 1. Association between heparin-calibrated anti-Xa activity (IU/mL) and rivaroxaban activity (ng/mL) obtained using the STA-R coagulation analyser and STA-liquid anti-Xa reagent (Diagnostica Stago), based on data from four studies**

Fewer data were available for edoxaban. Investigators can use conversion tables when only heparin-calibrated assays are available for enrolling patients in LEX-210.

Anti-Xa (IU/mL)	Riv (ng/mL)	Anti-Xa (IU/mL)	Riv (ng/mL)	Anti-Xa (IU/mL)	Riv (ng/mL)	Anti-Xa (IU/mL)	Riv (ng/mL)
0.1	10	2.1	119	4.1	228	6.1	337
0.2	15	2.2	124	4.2	233	6.2	342
0.3	21	2.3	130	4.3	239	6.3	348
0.4	26	2.4	135	4.4	244	6.4	353
0.5	32	2.5	141	4.5	250	6.5	359
0.6	37	2.6	146	4.6	255	6.6	364
0.7	42	2.7	152	4.7	261	6.7	370
0.8	48	2.8	157	4.8	266	6.8	375
0.9	53	2.9	162	4.9	271	6.9	381
1.0	59	3.0	168	5.0	277	7.0	386
1.1	64	3.1	173	5.1	282	7.1	391
1.2	70	3.2	179	5.2	288	7.2	397
1.3	75	3.3	184	5.3	293	7.3	402
1.4	81	3.4	190	5.4	299	7.4	408
1.5	86	3.5	195	5.5	304	7.5	413
1.6	92	3.6	201	5.6	310	7.6	419
1.7	97	3.7	206	5.7	315	7.7	424
1.8	102†	3.8	211	5.8	321	7.8	430
1.9	108	3.9	217	5.9	326	7.9	435
2.0	113	4.0	222	6.0	331	8.0	441

*Beyer J, et al. Clin Appl Thromb Hemost. 2016;22(5):423-8, n=14 patient samples
Billoir P, et al. Ann Pharmacother. 2019;53(4):341-7; n=135 patient samples
Shin H, et al. J Vasc Surg Venous Lymphat Disord. 2020;8(5):741-7; n=38 patient samples
Sabor L, et al. Thromb Res. 2017;156:36-8; n=7 patient samples
These studies used heparin and rivaroxaban calibrators from Diagnostica Stago
Different models of analyser device from the same manufacturer were considered to be equivalent

†The LEX-210 study will only include patients with baseline anti-factor Xa activity equivalent to at least 100 ng/mL according to the available test (e.g., chromogenic assay)

IU, international units; Riv, rivaroxaban

*Table 1. Conversion table for estimating rivaroxaban activity (ng/mL) from heparin-calibrated anti-Xa activity (IU/mL) obtained using the STA-R coagulation analyser and STA-liquid anti-Xa reagent, based on data from four studies**

Conclusion(s): Conversion tables based on correlation data enable clinicians to estimate FXaI plasma activity using assays calibrated for heparin, if FXaI-calibrated assays are unavailable, for clinical decision making including use of reversal/hemostatic agents. Until FXaI calibrations become more widespread, this approach may be valuable in managing patients with FXaI-related major bleeding.

12AP01-10
Oxygen balance-based transfusion triggers

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Background and Goal of Study: Over one hundred million units of red blood cells (RBC) are transfused worldwide annually. In clinical practice hemoglobin level threshold of oxygen delivery adequacy may be rather different[1]. Our aim was to compare effectiveness and safety of oxygen balance-based transfusion triggers: O_2 extraction ratio (O_2ER), central venous blood oxygen tension ($PcvO_2$) and arterio-venous O_2content difference(A-V O_2diff).

Methods: Prospective observational study included 90 adult, non-bleeding, hemodynamically stable patients with anemia. The study protocol was approved by the Ethics Committee of the Kazakh Institute of Oncology and Radiology (approval No. 12/18).

Patients with SpO_2<94% and/or mechanical ventilatory support were excluded. Transfusion decision was based on hemoglobin level only (median 7,3 [6,33–7,7] g×dl^{-1}) while Hb, $PcvO_2$, O_2ER and A-V O_2diff ($CaO_2 - CcvO_2$) were measured in all patients before and one hour after RBC transfusion.

Effectiveness of each potential trigger was assessed by its positive response to transfusion, sensitivity and specificity were analyzed by ROC. We calculated cut-off points for each trigger responsiveness, divided the whole study group into two subgroups (with low versus high trigger level before RBC transfusion) and then compared each trigger effectiveness by c^2test.

Main results: ROC-analysis showed the best profile of oxygen extraction ratio with 89% sensitivity, 74% specificity and AUC of 0,848. Responsiveness cut-off points for potential triggers were 35,7 mm Hg for $PcvO_2$, 31,8% for O_2ER and 29,75 ml×l^{-1}for A-VO_2diff. RBC transfusion response evaluation showed $PcvO_2$rise in 64,44% of cases, decrease of O_2ER in 80% and of A-VO_2diff in 53,33% (p=0,001). In low O_2ER group (n=21) Hb was 7,3 [6,8-7,8] g×dl^{-1} before and 8,5 [8,0-9,0] g×dl^{-1}after RBC transfusion, in high O_2ER group (n=69) Hb was 7,2 [6,2-7,7] g×dl^{-1} before and 8,3 [7,4-9,4] g×dl^{-1} after transfusion.

Difference between Hb levels in groups with high and low O_2ER was evaluated by Mann-Whitney U-test. No difference in initial hemoglobin levels between groups was observed, while the difference in oxygen extraction ratio proved to be significant.

Conclusion: While being "pure" oxygen delivery determinant, hemoglobin level does not reflect O_2demand/delivery balance and does not seem to be reliable trigger for RBC transfusion. In contrast, O_2ER may be evaluated as alternative and physiologically reasonable RBC transfusion trigger.

12AP01-11
Preliminaryresearchresults: evaluation of viscoelastic methodsinblood clotting throughout the evolution of COVID-19 affected patients

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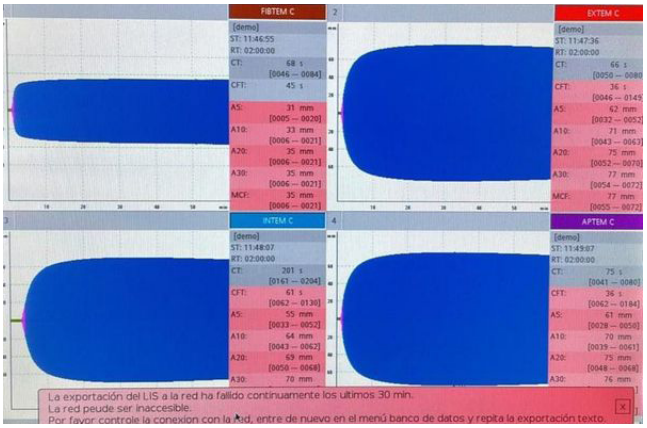
Background: The infection caused by COVID-19 presents a clear pattern of hypercoagulability described in its pathophysiology. This reasearch tries to evaluate the possibility to predict respiratory worsening in patients with COVID-19 pneumonia according to the results of viscoelastic methods.

Materials and Methods: Single-center, observational, non-interventional and prospective study. A total of 24 patients with signed informed consent were included. Inclusion criteria: diagnosis of COVID-19 pneumonia requiring oxygen therapy and hospitalization. Exclusion criteria: anticoagulation home treatment, known coagulation disorder, and glomerular filtration rate <30ml/min.

Blood samples were analyzed every 48 hours. VEM evaluated variables were: CT, CFT, A10, MCF, LI30, LI45, LI60, ML. Also epidemiological and clinical data were collected. Chi-squared test or Fischer's test were used to perform the statistical analysis comparing qualita-

tive variables (absolute and relative frequencies). Mean, standard deviation and percentiles were calculated to study the quantitative variables. Those continuous variables with normal distribution were analyzed with T-student or ANOVA; continuous variables of non-normal distribution were studied with non-parametric tests (Mann-Whitney or Kruskal-Wallis tests).

Results: A 30% of the recruited patients had no pathological history. 15% of the sample required admission to critical care units. Pending on definitive results from the statistical analyses, but similar to other articles, it was observed that higher levels of D-dimer, CRP, interleukin-6, PT and fibrinogen, as well as lymphopenia, were found in those patients with worse evolution. The VEM results for those patients showed bigger amplitudes (MCF EXTEM mean of 72.7mm), highlighting the FIBTEM with a MCF mean of 37.2mm. Firinolysis was lower (lysis of 0%-1% at 45 min).



Conclusion: Preliminary results show that patients affected by COVID-19 have a greater tendency to hypercoagulability according to VEM, specially those severe cases who already showed hypercoagulability at the moment of admission. These findings agree with the use of an earlier antithrombotic treatment and higher doses.

12AP01-12
Periprocedural management of antithrombotic therapy: compliance with a national consensus

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Background and goal of study: The number of patients on antithrombotic drugs is increasing. Despite the extensive literature on the perioperative management of these therapies, there is not always consensus in their implementation.

A Spanish study (REQXAA) is aimed to analyze the management of antithrombotic drugs and the effect on the incidence of thrombotic or hemorrhagic events in the perioperative period. As a preliminary study, we propose to evaluate the adherence to the multidisciplinary Spanish consensus.

Materials and methods: It is an observational prospective study with a month clinical follow-up, with the local ethic committee approval. The main endpoint was the adherence to the Spanish consensus document of periprocedural antithrombotic drugs management.

The inclusion criteria were: age over 18 years, current treatment with at least one antithrombotic and scheduled for an intervention. The exclusion criteria were: impossibility of 30-day follow-up and absence of informed consent.

Results and discussion: The sample was made up of 83 patients. 61 were on antiplatelet treatment (51 on Aspirin, 3 on Clopidogrel, and 7 on dual antiplatelet therapy), 20 on anticoagulant treatment (10 on Acenocoumarol, 5 on Apixaban, 3 on Edoxaban, and 2 on Rivaroxaban) and 2 on both.

The risk of thrombotic events was high in 7%, moderated in 14% and low in 78%; whereas the risk of hemorrhagic events was high in 10%, moderated in 57% and low in 34%. Of the total antiagregated patients, 54% fulfilled the withdrawal protocol, 51% the restart protocol, and only 41% accomplished both. Of the total number of anticoagulated patients, 70% met the withdrawal protocol, 60% the restart protocol, and 50% both. The most frequent reason of unfulfillment a wrong withdrawal time.

There were thrombotic events in only 4% (66% of them fulfilled the protocol) and hemorrhagic events in 7% of patients (50% of them fulfilled the protocol).

The study presents the limitations inherent to its observational design. However, this is essential to analyze the effect that the periprocedural management of antithrombotic drugs has on the incidence of adverse events.

Conclusion: Antithrombotic drugs periprocedural management still presents high variability despite there are many consensus documents on this topic.

The results obtained show that there is still a long way to go and many points to work on to improve the safety of patients undergoing antithrombotics in the perioperative period.

12AP01-13
PPH haemostatic management with rotational thromboelastometry: a case series

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Background and goal of study: We present a case series of 24 parturients who suffered severe postpartum haemorrhage (PPH) after elective or urgent ceasarean section due to abnormal placentation and were managed according to point-of-care haemostatic monitoring.

Materials and methods: 24 parturients were included. Preoperative conventional lab tests, age, BMI, week of gestation, commorbidities, previous c-sections, placentation, anticoagulant therapy, type of anaesthesia, fluid administration, blood loss, vasoconstrictors use, urination, need for ICU admission were noted. Thromboelastometry (ROTEM) was performed preoperatively and whenever it was deemed necessary during the course of the procedure. Anaemic threshold for transfusion was set at 8g/dL. Hypocalcaemia, hypothermia were also treated. Max and min values of $A5_{EXTEM}$ and $A5_{FIBTEM}$ and max CT_{EXTEM} were collected and fibrinogen concentrate (FC), tranexamic acid (TXA), RBCs, FFP, PCC, or PLTs were administered according to published ROTEM algorithm for PPH haemostatic management.

Results and discussion: Median values: age 34y, 34w of gestation, 1 previous c-section. Mean BMI 24.84, 79.2% with no commorbidities, 12.5% under anticoagulants, 91.7% under general anaesthesia.

Preoperative Hgb 10.6, intraoperative lowest value 7.9 and 9.82g/dL at the end of the operation. Preoperative: PLTs 195 x10^9/L, PT 10.8, aPTT 26.1, INR 0.95, FIB 3.73 g/L. Intraoperatively several abnormal placentations were confirmed: placenta anterior (70.8%), low-lying (4,2%), previa complete (25%), marginal (4,2%), lateral (8,3%), abnormally invasive placenta (8,3%).

Mean blood loss was 2,616L, while 3,318L crystalloids and 2,79 units RBCs were administrated (mean values). Transfusions (median values): TXA 1g, FC 2,5g and no FFP, PLT or PCC. ROTEM mean values: $A5_{EXTEM}$ (mm) min:34.25 & max:44.25, $A5_{FIBTEM}$ (mm) min:12.71 & max:20.83, CT_{EXTEM} (sec) max:86.13. Lactate value at end was 2.75mmol/L. In 29.2% no vasoconstrictors were needed, hysterectomy was performed in 25% of parturients and only 16.7% were admitted to ICU.

Conclusion: The advantage of rapid haemostatic assessment with point-of-care haemostatic monitoring is reflected to the targeted fluid, factors and blood products transfusion, with the presumed benefit of decreased TACO, hysterectomies and ICU admission incidence.

References:

Goerlinger K. et al. The role of evidence-based algorithms for rotational thromboelastometry guided bleeding management. Korean J Anesthesiol 2019

12AP02-01
Associations of the combined effects of perioperative anemia and blood transfusion on the long-term outcomes after colorectal cancer surgery: a retrospective propensity-score-matched analysis

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Background and goal of study: To investigate the combined effect of preoperative anemia and postoperative anemia, preoperative anemia and blood transfusion, which imposes a greater risk to overall survival (OS) and disease-free survival (DFS) in patients undergoing colorectal surgery, and how to act on them and modify them.

Materials and methods: This was a retrospective propensity-score-matched analysis. Patients with colorectal cancer (CRC) undergoing elective surgery between January 1, 2008 to December 31, 2014 were enrolled in this study. Patients were divided into preoperative anemia and not preoperative anemia groups according to their hemoglobin status before the surgery.

After propensity-score matching, Kaplan-Meier survival analysis, and univariable and multivariable Cox proportional hazards models were used to study the prognostic factors for OS and DFS.

Results and discussion: Of the 8,121 patients with CRC, 1,975 (24.3%) and 6,146 (75.7%) patients presented with preoperative and not preoperative anemia, respectively. After matching, 1,690 patients remained in each group. In the propensity-matched cohort, preoperative anemia was associated with more blood transfusion, more postoperative anemia, and a higher overall mortality rate in colorectal cancer patients. In the preoperative anemia and postoperative anemia model, the preoperative anemia and postoperative anemia was an independent risk factors for decreased OS (HR, 1.202; 95% CI, 1.043-1.385; P=0.011) and DFS (HR, 1.210; 95% CI, 1.050-1.395; P=0.008). In preoperative anemia and transfusion model, preoperative anemia and transfusion >0 was a more dangerous independent prognostic factor for OS (HR, 1.791; 95% CI, 1.339-2.397; P<0.001) and DFS (HR, 1.857; 95% CI, 1.389-2.483; P<0.001). In patients with preoperative anemia, the OS and DFS of patients with transfusion were worse than those without transfusion (P=0.026 in OS; P=0.037 in DFS).

Conclusion(s): The combined prognostic value of preoperative and postoperative anemia, preoperative anemia and transfusion improved risk stratification and outcome prediction, showing preoperative anemia and blood transfusion imposed a greater risk to OS and DFS in patients undergoing CRC surgery, encouraging clinicians to tolerate anemia, to restrict blood transfusion appropriately and to be vigilant for timely and appropriate prevention and intervention of anemia.

12AP02-03
Intraoperative blood transfusionis associated with increased morbidityin elderly patients undergoing gastrointestinal cancer surgery: a retrospective cohort study

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Background and goal of study: The relationship betweenintraoperative transfusion and outcomes is still under debate. It is difficult to unify the results due to the difference of surgical type, target population and complications. This study was designed to investigate the risk factors and outcomes of intraoperative transfusion in elderly patients undergoing surgery for gastrointestinal cancer.

Materials and methods: A retrospective study was performed to explore the risk factors of intraoperative blood transfusion and primary complications in elderly patients (≥65 yr) who underwent elective surgery for gastrointestinal cancerwith general anesthesia. The primary complicationswereacute kidney injury (AKI),myocardial injury after noncardiac surgery(MINS)and pulmonary complications during hospitalization.Multivariable logistic regression analyses were performed to evaluate the relationship between intraoperative-transfusion and the three outcomes.

Results and discussion: This study included 1021 patients and finally 145 (15.0%) needed intraoperativetransfusion. Transfused patientswere more likely to develop AKI, MINS andpulmonary complications (P=0.001). Multivariate logistic regression analysessuggested that intraoperative transfusion was independent risk factor predicting these adverse outcomes(all P<0.05). Preoperative hematocrit <30%, operative time >300 min and larger amount of estimated intraoperativeblood loss wereindependently associated with intraoperative transfusion (all P<0.001). The mechanisms by which intraoperative transfusion has adverse effects on outcomes are mainly the following: transfusion-induced immunomodulation (TRIM) and the effect of banked blood on circulatory system[1,2].

Conclusion(s): Accepted individualized blood transfusion guidelines should be adopted to standardize the indications of blood transfusion and improve elderly patients'outcomes. Unnecessaryintraoperative blood transfusion should be avoidedby actively correcting preoperative anemiaand better operative handling to shorten operative time and reduce intraoperative bleeding.

References:
1. Raghavan M, Marik PE. Anemia, allogenic blood transfusion, and immunomodulation in the critically ill. *Chest.*2005;127(1):295-307.
2. Barshtein G, Manny N, Yedgar S. Circulatory risk in the transfusion of red blood cells with impaired flow properties induced by storage. *Transfusion medicine reviews.*2011;25(1):24-35.

12AP02-04
Comparing the efficacy and safety of weight-adjusted *vs.* empiric dosing of fibrinogen concentrate and cryoprecipitate in bleeding adult cardiac surgical patients with hypofibrinogenemia

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Background and Goal: Acquired hypofibrinogenemia with significant coagulopathy is common in cardiac surgery, for which fibrinogen replacement with fibrinogen concentrate (FC) or cryoprecipitate is recommended. While empiric dosing is widely used and well-tolerated, sub-optimal dosing may lead to inadequate bleeding control, and additional transfusions, impacting clinical outcomes.
Our goal was to compare the efficacy and safety of weight-adjustedvs. empiric dosing of fibrinogen replacement for bleeding cardiac surgery patients.
Material and Methods: *Post-hoc* analysis of the FIBRES trial examined bleeding adult cardiac surgery patients with hypofibrinogenemia across 11 Canadian centres. Empiric dosing of FC (*Fibryga*®, Octapharma; 4 g) or cryoprecipitate (10 IU) was used, and patients were grouped into quartiles based on weight-adjusted dosing.
Generalised estimating equation models accounting for clustering adjusted for age, sex, surgical complexity, urgency, and critical pre-operative status.
The primary outcome was the number of red blood cell (RBC) units given within 24h of cardiopulmonary bypass (CPB).
Secondary outcomes included total number of allogeneic blood components transfused within 24h of CPB, re-exploration, and incidence of thromboembolic and/or ischemic complications within 28 days of CPB.
Results and Discussion: Median weight-adjusted FC dose was 52 mg/kg (IQR 45–61; n=372) and 1.30U/10kg (IQR 1.11–1.54; n=363) for cryoprecipitate. Increase in plasma fibrinogen after a single dose was significantly higher with FC (FC: 0.96 g/L [IQR 0.74–1.28], n=252; cryoprecipitate: 0.78 g/L, IQR 0.52–1.00, n=225; p<0.0001).
The lower and higher quartiles were comparable for the number of RBC units transfused within 24h of CPB (Table 1), and the number of allogenic transfusions received within 24h, re-exploration, or thromboembolic/ischemic complications within 28 days of CPB.
Conclusions: Transfusion and safety outcomes for lower and higher weight-adjusted doses of FC or cryoprecipitate were comparable. Weight-adjusted dosing was non-inferior to fixed dosing in hypofibrinogenemic bleeding cardiac surgery patients.

Quartile	Fibrinogen concentrate		Cryoprecipitate	
	Mean (SD) dosing (mg/kg)	Relative risk (95% CI); p-value	Mean (SD) dosing (IU/10kg)	Relative risk (95% CI); p-value
1	40 (5)	Reference	1.01 (0.09)	Reference
2	49 (2)	1.04 (0.77, 1.40); p=0.81	1.21 (0.06)	0.82 (0.52, 1.27); p=0.37
3	57 (2)	0.89 (0.70, 1,15); p=0.38	1.39 (0.06)	1.17 (0.85, 1.60); p=0.33
4	71 (10)	0.90 (0.71, 1,13); p=0.36	1.78 (0.22)	1.04 (0.76, 1.43); p=0.80

Table 1. Adjusted hierarchical generalised estimating equation models for number of RBCs transfused within 24 h of CPB.
Poisson models accounting for clustering by study site, adjusted for sex, age, surgical complexity, urgency, and critical pre-operative status.
CI, confidence interval; CPB, cardiopulmonary bypass; IU, international units; RBC, red blood cells; SD, standard deviation.

12AP02-05
Perioperative decision making for recombinant factor VII administration in a patient with congenital deficiency undergoing urgent operation

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Background: Factor VII deficiency is a rare autosomal recessive hemorrhagic disorder that its prevalence is estimated in about 1:500.000. In emergency surgical cases it is not clear whether anesthesiologists' decision for rFVII administration should exclusively rely on standard coagulation tests.
Case report: A 18-year-old man presumed as with FVII deficiency underwent urgent appendectomy. According to hematologist's consultation the diagnosis was made based on known familiar history of FVII deficiency. Patient's preoperative work-up revealed elevated INR 2,07 & PT 21,8.The levels of FVII were not available.
Prior to incision, viscoelastic monitoring (ROTEM®) indicated normal coagulation profile (CT EXTEM 171, CFTEXTEM88, A10 EXTEM 61, CTINTEM178, CFTINTEM64, CTFIBTEM135, A10 FIBTEM 19).
Nevertheless, although without any sign of hemorrhage, a single iv prophylactic dose of 2mg rFVII (26 mcg/kg) at surgical incision was given, as recommended by the hematologist.
Induction of general anesthesia was uneventful. Propofol-remifentanyl TCI technique was used for maintenance.
Intraoperative series of ROTEM analysis, INR & PT showed: (30 min after rFVII) CT_{EXTEM}51, CFT_{EXTEM}60, $A10_{EXTEM}$64, CT_{INTEM}164, CFT_{INTEM}51, CT_{FIBTEM}48, $A10_{FIBTEM}$27, INR 0,8, PT 10,3. (2 hr after rFVII) CT_{EXTEM} 64, CFT_{EXTEM}72, $A10_{EXTEM}$61, CT_{INTEM}144, CFT_{INTEM}68, INR 1,26, PT 14,3.
Surgery was completed without any hemorrhagic events in 2 hours. Despite elevated INR from 1st to 4th post-op days (values 2,10-2,50), there were no clinical signs of bleeding.
Therefore, no transfusion or rFVII was given and the patient was discharged on 4th post-op day.
Discussion: In our case, without FVII levels measurement available, ROTEM analysis suggested a normal haemostatic profile, in spite of initial abnormal lab tests. Viscoelastic monitoring offered a more objective assessment and accurate guidance in clinical decision making, indicating that rFVII admistration was maybe unnecessary.

References:
Yeom R.S, Wang X. et.al.(2021). Severe Congenital Factor VII Deficiency with Normal Perioperative Coagulation Profile Based on ROTEM Analysis in a Hepatectomy. Am J Case Rep,2021;22:e930245.
Learning points: Following the hippocratic recommendation 'first do no harm', indication for rFVII administration in congenital factor deficiency intraoperatively demands further justification in face of probable thromboembolic events, as mentioned in the literature. Viscoelastic monitoring is a useful tool in this direction.

12AP02-06
Systemic thrombolysis in perioperative high risk pulmonary embolism

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Background: High-risk pulmonary embolism (PE) management remains a controversial and challenging topic in perioperative medicine. International guidelines recommend primary reperfusion as the treatment of choice in high-risk PE. In most cases that would be systemic thrombolysis, for which recent surgery remains an absolute contraindication.
Case Report: We report the case of a 92-year old, ASA III, moderately frail, female proposed for partial hemiarthroplasty due to hip fracture. The procedure was uneventful under regional anesthesia. At the Post Anesthesia Care Unit (PACU), the patient developed hypotension and bradycardia. Bedside echocardiography was highly suggestive of PE. The situation rapidly deteriorated, culminating in cardiac arrest.
After return to spontaneous circulation, and following interdisciplinary consultation, systemic thrombolysis was initiated with alteplase, and anticoagulation with unfractionated heparin. Due to surgical site hemorrhage, anticoagulation was reverted and restarted at 24h post-surgery. She maintained obstructive shock requiring vasopressor support for 48 hours.
No other hemorrhagic complications were reported during hospital stay. She was discharged from the Intensive Care Unit on day 5 and from hospital care on day 19, returning to previous functional status. Echocardiography previous to discharge described normal right ventricular dimensions and function, and mild pulmonary hypertension.
Discussion: Systemic thrombolysis is associated with increased bleeding risk, particularly in perioperative patients. When no other means of reperfusion or support are available, systemic thrombolysis in high-risk life-threatening PE could be considered. In this case, provisions should be made for the reduction of risk and immediate management of hemorrhagic complications.
References:
Konstantinides SV, Meyer G, Becattini C, et al. 2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS). Eur Heart J. 2020;41(4):543-603.
Learning points: Systemic thrombolysis for life-threatening high-risk PE in perioperative patient should be considered on a case to case basis.

12AP02-07
Effect of tranexamic acid on intraoperative blood loss and transfusion requirements in intracaranial tumor excision: a systematic review and meta-analysis

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Background and Goal of Study: Craniotomy and intracranial tumor excision are associated with significant risk of blood loss and subsequent need of blood products transfusion. Tranexamic acid (TXA) is a potent antifibrinolytic agent routinely used to reduce perioperative blood loss and the need for volume replacement. Despite being used in other neurosurgical procedures, namely in craniosynostosis and spine surgeries, there is no clear data on its effectiveness in intracranial tumor surgery.
We conducted a systematic review and meta-analysis to evaluate the effect of TXA on intraoperative blood loss and transfusion requirements.
Materials and Methods: We searched MEDLINE and CENTRAL databases for randomized controlled trials reporting on the effect of TXA on intracranial tumor excision bleeding and need of transfusion.
Primary outcomes were total intraoperative blood loss and need of blood products transfusion.
Secondary outcomes included any side effects reported. Statistical analysis was done with Cochrane RevMan 5.4. Continuous data were summarized using mean difference (MD) and dichotomous data using risk ratio (RR), both with a 95% confidence interval (CI). Heterogeneity was quantified using I2 statistic.
Results and Discussion: Out of 296 search results, 4 studies comparing 281 patients were included. When given as a bolus before surgical incision and maintained as a perfusion until completion of the procedure, TXA reduced the total volume of intraoperative blood loss (MD [95% CI] = -294.97 [-324.50, -265.43], $p < 0.001$, I2=0%) and reduced the risk for overall need of blood products transfusion (RR [95% CI] = 0.65 [0.48, 0.89], p=0.007, I2=0%).
Of the 4 studies, only 3 discriminated complications, with no observed difference in risk of postsurgical seizures (RR [95% CI] = 0.76 [0.18, 3.28], p=0.071, I2=0%). There were no recorded occurrences of thromboembolic events in any of the studies.
Conclusions: In patients undergoing intracranial tumor excision, tranexamic acid reduces the total volume of intraoperative blood loss and reduces the risk of blood products transfusion, at no cost of increased negative outcomes, specifically postsurgical seizures or thromboembolic events. Further clinical trials are needed to evaluate the optimal dose of tranexamic acid, and longer term outcomes.
References:
de Faria, José Luiz et al. Tranexamic acid in Neurosurgery: a controversy indication-review. Neurosurgical review 44,3 (2021): 1287-1298.

12AP02-08
LEX-211 (FARES-II): a phase 3, prospective, active-control randomised study of four-factor prothrombin complex concentrate versus frozen plasma in bleeding adult cardiac surgery patients

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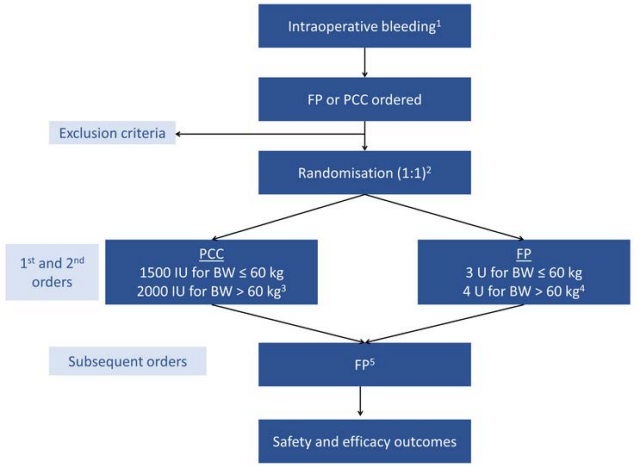
Background and Goal: Cardiac surgery is often complicated by coagulopathic bleeding, leading to transfusion and poor outcomes. Prothrombin complex concentrate (PCC) and frozen plasma (FP) are used for coagulation factor replacement during surgery. The objective of LEX-211 is to demonstrate that PCC (*Octaplex*®, Octapharma) is clinically non-inferior to FP in terms of haemostatic effectiveness, as measured by the need for post-therapy haemostatic interventions.
Materials and Methods: LEX-211 (sponsor: Octapharma) will include patients (≥18 years) undergoing cardiac surgery with cardiopulmonary bypass (CPB) who require coagulation factor replacement due to post-CPB bleeding and known/suspected coagulation factor deficiency.
Exclusion criteria include heart transplant, insertion/removal of ventricular assist devices, high probability of death within 24h, severe right heart failure, heparin contraindications, thromboembolic event (TEE) within 3 months and IgA deficiency. Approximately 500 patients will be randomised to PCC (20–25 IU/kg) or FP (10–15 mL/kg) (Figure 1).



[1] Due to the emergency nature of the condition being studied, the trial will include patients who are incapable of providing informed consent at the time the therapy is needed and in whom delays in obtaining consent from a legally authorised representative can be severely detrimental to their well-being. In Canada, the study meets the criteria of the Tri-council policy statement for the ethical conduct for research involving humans for alteration to consent requirement, and patient or surrogate consent from all patients will be obtained at the earliest possible opportunity after surgery. The study protocol and any subsequent amendment(s) will be submitted to relevant regulatory authorities.
[2] Randomisation (1:1) will continue until at least 410 evaluable patients are obtained (205 patients per group). Approximately 500 patients will need to be randomised to obtain a minimum of 205 evaluable (randomised, treated and consented) patients per group. Operating room personnel will remain blinded to treatment until the decision to administer treatment is made. Patients will be blinded to treatment allocation
[3] PCC dose corresponds to a weight-based dosing range of 20—25 IU/kg
[4] FP dose corresponds to a weight-based dosing range of 10—15 mL/kg
[5] FP in 1U increments as per the ordering physician
Abbreviations: BW, body weight; FP, frozen plasma; IU, international units; PCC, four-factor prothrombin complex concentrate; RBC, red blood cell concentrate

Figure 1. Study flow

The primary endpoint is haemostatic response to PCC vs. FP, rated 'effective' if no further haemostatic intervention (systemic haemostatic agents, including second dose of study drug, or surgical re-opening for bleeding) is required 60 min–24 h after initiation of first dose. Secondary endpoints include global haemostatic response (60 min–24 h), bleeding (24 h), blood product/coagulation factor usage (24 h, 7 d), surgical re-exploration (24 h) and coagulation parameters (~1 h post-treatment). Safety endpoints include serious treatment-emergent adverse events (e.g., TEE, major adverse cardiac event), mechanical ventilation, ICU stay, hospitalisation and mortality (30 d).
Results and Discussion: LEX-211 is planned to start in Q2 2022. An unblinded interim analysis (100 evaluable patients/group) will test sample size assumptions and re-estimate if necessary. Completion is expected Q1 2024.
Conclusion(s): The results of this study will inform clinical practice for bleeding cardiac surgery patients requiring coagulation factor replacement, potentially reducing blood product usage, and improving outcomes.

12AP02-09
Prospective, randomised study of clotting factor concentrates versus standard massive haemorrhage protocol in severely bleeding trauma patients: The FiiRST-2 Study

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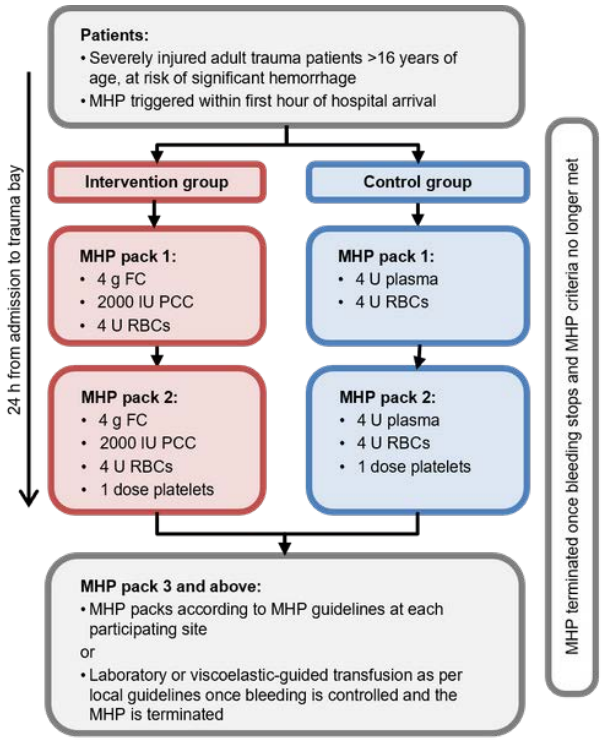
Background and Goal: Bleeding coupled with acute trauma coagulopathy (ATC) is a leading cause of in-hospital mortality in trauma patients. Acquired fibrinogen deficiency and impaired thrombin generation are major drivers of ATC. Targeted coagulation factor replacement with fibrinogen concentrate (FC) and prothrombin complex concentrate (PCC) may be superior to the current standard of care, a ratio-based plasma resuscitation via a massive haemorrhage protocol (MHP). The FiiRST-2 study will investigate whether FC+PCC given ≤1 h after hospital arrival is superior to the standard of care in this setting.
Materials and Methods: FiiRST-2 is a randomised, parallel-control, superiority trial with an adaptive two-stage design, performed in 11 Canadian level one trauma centres. Due to the emergency setting, a deferred consent approach will be employed, in accordance with the Tri-council policy statement for the ethical conduct[P1]. Bleeding trauma patients >16 years old (N=350) will receive FC+PCC or a minimum 2:1 red blood cells (RBCs):plasma transfusion plus platelets. The intervention period is considered until the second MHP pack has been given, MHP is terminated, or 24 h has elapsed from admission (Figure 1).
Exclusion criteria include receipt of RBCs before randomisation, >3 h elapsed from injury, catastrophic brain injury, or known bleeding disorder.
The primary endpoint is superiority in the number of composite allogeneic blood product units transfused ≤24 h after admission.

Secondary endpoints include RBC units transfused ≤24 h after admission, ventilator-free days and 28-day mortality. Adverse events, including thromboembolic complications will be assessed through 28 days.

Results and Discussion: To date, FiiRST-2 has enrolled 80 patients at 4 sites. An interim analysis will be performed after 120 patients have completed the study. Completion is expected in Q1 2024.



FC = fibrinogen concentrate; IU = international units;
MHP = massive hemorrhage protocol; PCC = prothrombin complex concentrate;
RBC = red blood cells

Conclusion(s): The FiiRST-2 study will determine if early use of factor concentrates is superior to the standard of care in bleeding trauma patients. Results from this study could have a major impact on clinical practice, improving management and outcomes for this high-risk patient population.

12AP02-10
PBM program implementation in aortic valvular cardiac procedures: benchmarking at Spanish Hospitals

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Background and goal of study: During the last years, hospitals have started to implement programs to assess and spare blood transfusions. PBM (Patient Blood Management) programs have offered the possibility to optimize transfusions, by improving blood volume, reducing blood loss and minimizing transfusions. This has proved to improve the outcomes. The aim of this study was to evaluate the application of this program in valvular cardiac procedures during the last five years in 22 Spanish Hospitals and to analyze the improvement in the transfusion management.

Materials and methods: Multi-center, observational, non-interventional and prospective study. 41.120 patients were admitted from 43 Spanish hospitals, and we analyzed only the patients submitted to aortic valvular replacement in 22 hospitals during the period 2016-2019 like a benchmarking. We analyze the impact and evolution of the implementation PBM program including KPIs related to I, II and III pillars of PBM strategy and the transfusion requirements.

Results and discussion: In Table 1, since the start of the PBM program, the antifibrinolytic treatment has increased because of the implementation of different protocols. Furthermore, the hemoglobin test prior transfusion decreases as the objective changes. This shows that globally the transfusion rate decreases.

HUB	Transfusion rate	Hb test 21-90 days preop	Antifibrinolytic treatment	Hb prior transfusion
2016 (n=199)	46.7%	36.9%	35.6%	8.1
2017 (n=328)	57%	51.6%	32.4%	8.3
2018 (n=242)	40.9%	50.8%	56.7%	8.4
2019 (n=228)	45.6%	44.3%	69.1%	7.8

Table 1. Results from Bellvitge University Hospital.

Average (n=41.120)	Transfusion rate	Hb test 21-90 days preop	Antifibrinolytic treatment	Hb prior transfusion
2016	60.2%	33.7%	78.8%	9.3
2017	50.7%	43.6%	81.9%	9.2
2018	53.5%	50.2%	76.5%	9.4
2019	53.7%	46.2%	72.8%	8.5

Table 2. Average of all Spanish Hospitals.

Conclusions: Since the implementation of the PBM program, results show an improvement in the different pillars in all the Spanish hospitals including ours. In general, the three pillars of the PBM programs showed improvement in different KPI's. At last, the transfusion rate decreased between 7-10% in almost all the hospitals analyzed.

12AP02-11
The role of the Thromboelastography test to monitor fibrinogen activity after rTPA treatment in a patient that requires urgent surgery

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Background: The thromboelastography (TEG) test was initially used for monitoring coagulation disorders in liver transplantation. Advances of the TEG have resulted in significant improvements in many different situations as pregnancy or drug monitoring. No other cases were reported about the use of TEG to guide the reversal of fibrinolysis treatment before an urgent surgery.

Case report: A 33-year-old woman who was 28 weeks pregnant was attended to the emergency department of our hospital after a cardiorespiratory arrest reversion. The cardiopulmonary resuscitation maneuvers were started at home after her husband detected tachypnea and subsequent cardiorespiratory arrest. Then, following the suspicion of pulmonary thromboembolism, plasminogen acti-

vator recombinant tissue was administered before hospital arrival. The fetal ultrasound objectivated a fetal death so we reconsidered the need for emergency cesarean taking into account the risk of the bleeding vs the thromboembolic risk associated with antenatal fetal death. We agreed to defer the surgery because the initial TEG results demonstrated no fibrinogen activity.

After 6 hours and the administration of 9gr of Fibrinogen and 4.500mg of Tranexamic Acid, the coagulation function began to normalize and the cesarean was indicated. No surgery complications occurred, the bleeding was lower than 1000mL and she was successfully extubated after 24h.

Discussion: The TEG test reflects the activity and the interaction of platelets, clotting factors, and fibrinogen that it seems more sensitive than traditional coagulation exams. The data on TEG on pregnant women is still limited because the knowledge of normal reference values is lacking. In this case, the main use of the TEG was the monitorization of a single value of the coagulation that was altered pharmacologically. The TEG allowed us to carry out surgery in a moment that, in our opinion, was the safest to avoid severe bleeding for the patient.

References:

Kuiper GJ, Kleinegris MC. Validation of a modified thromboelastometry approach to detect changes in fibrinolytic activity. Thromb J. 2016 Jan 14;14:1. DOI: 10.1186/s12959-016-0076-2. PMID: 26770073; PMCID: PMC4712545.

Learning points: We concluded that TEG may be beneficial to elaborate a therapeutic plan in coagulation disorders due to its qualitative study of the coagulation state. Moreover, the real-time correlation of its results makes the TEG test more useful for critical cases and urgent or emergent surgeries.

Perioperative Medicine

13AP01-01
Long-term effect of cardiac surgery on cognitive functions: a prospective observational study

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Background and goal of study: Although, postoperative cognitive decline is a common complication following cardiac surgery, the prolonged effect of surgery on cognition is still poorly investigated. Therefore, we sought to assess the impact of cardiac surgery on different cognitive domains four years postoperatively.
Materials and methods: This prospective observational study enrolled 84 patients scheduled for elective cardiac surgery, and 62 patients were included in the analyses. We used a validated battery of five neuropsychological tests which included eight main variables to assess global cognitive status, short-term and intermediate-term memory, attention, concentration and psychomotor skills. Tests were administered to the patients two days before the surgical procedure, and then alternative forms of the tests were repeated four years postoperatively. The independent-samples t test was applied for comparisons of preoperative and postoperative neuropsychological test results.
Results and discussion: Analysis of the neuropsychological test battery results showed postoperative deterioration in all tested cognitive domains, apart from the visual memory. The patient scores on the different tests are presented in Table 1.

Test	Baseline	4-year follow-up	*P*
Mini-Mental State Examination	28.3 ± 1.1	27.2 ± 2.3	< 0.001
RAVLT - Immediate recall	42.2 ± 8.8	33.8 ± 10.1	< 0.001
RAVLT - Delayed recall	7.6 ± 3.1	5.9 ± 3.0	0.002
Visual memory span	9.7 ± 3.2	10.3 ± 3.1	0.291
Digit span forward	7.0 ± 1.2	6.7 ± 1.4	0.203
Digit span backward	5.1 ± 1.2	4.4 ± 1.6	0.007
Symbol Digit Modalities Test	33.2 ± 10.2	32.2 ± 12.1	0.620
Simple reaction time	1278.8 ± 460.5	1840.8 ± 832.8	< 0.001

Our results support recent reports about consistently impaired cognitive functions over the years following cardiac surgery. This finding is particularly important, given that cognitive decline diminished quality of life and leads to premature retirement. The possible limitations of our study are represented by the effects of natural aging, the progression of cerebrovascular disease, or the development of dementia which may have interfered with neuropsychological test results at the 4-year follow-up.
Conclusion: The current study revealed that cognitive decline four years after cardiac surgery is still significant.

13AP01-02
Trans-thoracic echocardiography assessment of inferior vena cava compliance to detect fluid responsiveness: comparison of the transhepatic window to the standard subcostal window

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Background and goal of study: Inferior vena cava (IVC) compliance measured by trans-thoracic echography (TTE) through a subcostal window is a valid method to assess fluid responsiveness.[1] Transhepatic window may represent an alternative although it has not been validated yet.
This study aimed to determine, in surgical patients, whether the transhepatic window was as reliable as the subcostal window to assess fluid responsiveness through the measurement of IVC compliance.
Materials and methods: After IEC approval (CE2021/78) and NCT registration (NCT04866095), adult elective surgical patients respecting the international rules of preoperative fasting, who gave written informed consent, were assessed for inclusion in this prospective observational study.
Exclusion criteria were: suboptimal imaging, patients with six or more extra systoles per minute, or presenting cardiac valve pathologies. Recruited patients underwent measurement of IVC compliance through the subcostal and the transhepatic window and estimation of CO by TTE at four time points: in supine position with upper body at 45°, during passive leg raising (PLR), again in the initial position and 10 minutes later in the same position.
The primary outcome was to compare the sensitivity and specificity of IVC compliance to predict a CO response to PLR obtained with the two windows. Patients were considered fluid responders if CO increased by at least 11% after PLR.[2] Cut-off value for IVC compliance to predict fluid responsiveness was 44%.[3]
Secondary outcome was the estimation of right atrial pressure (RAP) from IVC measurement through both examination windows. We used the DTComPair R package to compare sensitivities and specificities using McNemar's (1947) approach, and T-test to compare RAP estimations.
Results and discussion: Over the 56 eligible patients, 49 were included. The sensitivities of the subcostal and transhepatic windows were 0.92 and 0.86 respectively (P = 0.157); the specificity was 0.68 for both windows. There was no difference in RAP estimation between the 2 echographic approaches.
Conclusion(s): These preliminary results show that IVC compliance determined through a transhepatic window can be a reliable method for the evaluation of fluid responsiveness in surgical patients.
References:
1. Airapetian N, et al. Crit Care Lond Engl. 2015;19:400.
2. El Hadouti Y, et al. Eur J Anaesthesiol. 2017 Nov;34(11):748-754.
3. Caplan M, et al. Ann Intensive Care. 2020 Dec 11;10(1):168.

13AP01-03
Subclavian artery occlusion: a case diagnosed after invasive blood pressure monitoring for orthopaedic surgery

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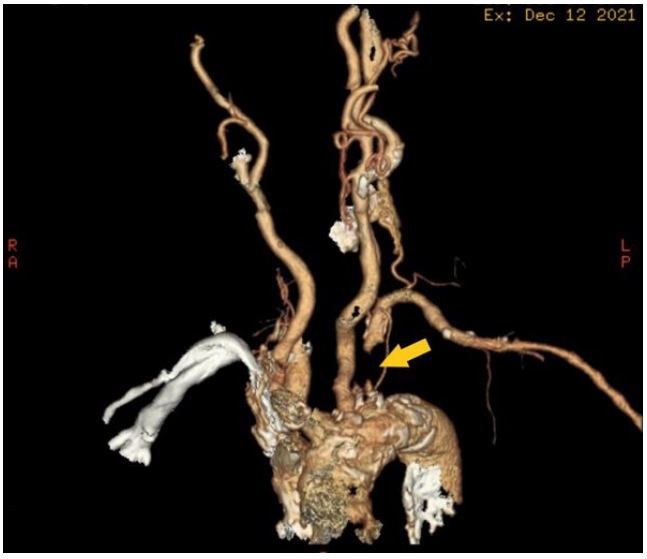
Background: Subclavian artery (SA) disease has an estimated prevalence of 2%. SA occlusion is usually asymptomatic and underdiagnosed. We present a case of left SA occlusion diagnosed after invasive blood pressure (IBP) monitoring for orthopaedic surgery.
Case report: A 78-year-old woman, ASA IV, was scheduled for total knee replacement surgery. Her comorbidities included heart failure NYHA II, hypertension with severe left ventricular hypertrophy, type 2 diabetes mellitus, chronic kidney disease and cerebrovascular disease. Preoperative evaluation by Cardiology revealed no contra-indications to surgery.
The procedure was planned to be performed under combined spinal epidural anaesthesia and IBP monitoring was preferred due to the cardiovascular background. The first non-invasive blood pressure (NIBP) obtained on the right arm was 216/103 mmHg.
After unsuccessful catheterization of the left radial artery, NIBP was switched to the left arm while an arterial catheter was placed on the right forearm. NIBP measured on the left arm was 135/94 mmHg, revealing a significant differential between both arms. Surgery was postponed and the patient was referred to Cardiology for further investigation.
The cervical CT angiography obtained (Image) revealed occlusive stenosis on the proximal third of the left SA due to the presence of endoluminal thrombus. The patient was referred to Vascular Surgery for evaluation and adequate treatment.



Discussion: SA occlusion usually progresses slowly, allowing the development of collateral vessels, so patients may be asymptomatic. This condition is associated with increased mortality, thus increasing perioperative risk, and can be easily detected through a significant differential in BP in both arms (>10 mmHg). In this case, NIBP was measured in both arms, which led to SA occlusion diagnosis and avoided possible perioperative complications.

References:
1. *Am J Med*.2017;130(4):409-16
2. *J Am Coll Cardiol*.2017;49(14):1540-5
Learning points: This case highlights the relevance of routine pre-operative BP measurement in both extremities in patients with high cardiovascular risk to exclude conditions potentially associated with perioperative mortality.

13AP01-04
Anesthesia for an ASA IV patient with myocardial infarction for non-cardiac surgery

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Background: The incidence of ischemic heart disease has been increasing in recent years, which leads to an increase of patients with this pathology who are proposed for non-cardiac surgical procedures. These patients are more likely to experience cardiovascular (CV) events with superior morbi-mortality during the perioperative period.[1,2]The pre-operative optimization is indispensable to reduce this risk and decrease the occurrence of adverse postoperative events.
Case report: Male, 73-years-old, with history of hypertension, dyslipidemia, type 2 diabetes, myocardial infarction (MI) with angioplasty and stent placement in 2006. Presented in the emergency room with macroscopic hematuria and anemia which conducted to a type two MI, decided to conservative treatment.
After ten days of hospitalization, he underwent diagnostic cystoscopy with biopsy of an unresectable lesion. One day after surgery, a new episode of MI occurred. Mono antiplatelet therapy with aspirin was started and coronary angiography was decided, revealing multivessel disease.
The performance of coronary stenting was denied due to the lesions' anatomy and the hemorrhagic risk and coronary artery bypass graft was postponed until further urological diagnosis. After 3 weeks of the cardiac event, he was proposed to radical cystectomy. His physical status was ASA IV and pre-operative optimization included regular transfusions of red blood cell concentrates. Standard ASA monitoring using five leads electrocardiogram plus invasive arterial pressure and measurement of cardiac output was instituted and induction with etomidate was performed.
The five hour surgery ellapsed with no cardiovascular complications. The post-operative period in an intensive care unit was uneventful and he was discharged to the nursery 3 days after surgery.
Discussion: Guidelines consider that major non-cardiac procedures should wait at least 4-6 weeks (ideally 6 months) after a CV event.[1]In the case presented, the proposed surgery was an integral part of the treatment of the ischemic condition, highlighting the importance of a multidisciplinary pre-operative management.
References:
1. Indian journal of anaesthesia,2017,*61*(9), 705-11; 2.BJA: British Journal of Anaesthesia,1981, 53(7), 757-765.
Learning points: In this clinical case, it was imperative to perform the surgery in advance to prevent new events, counterbalancing the risks associated with the hemorrhagic and thrombotic scenario.

13AP01-05
Coadministration of amiodarone and digoxin inducing an atrioventricular block

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Background: Amiodarone and digoxin are antiarrhythmic drugs commonly used. Both drugs can produce a range of cardiac arrhythmias including bradycardia and atrioventricular (AV) block. If not diagnosed and adequately treated, this conduction abnormalities may be life-threatening[1].

We describe an unusual case of a patient who developed serious abnormalities of the conduction system during intravenous infusion of amiodarone and digoxin in the post anaesthetic care unit (PACU), treated with an isoprenaline infusion.

Case Report: A 68 years old women with known paroxysmic atrial fibrillation presented with a femur fracture requiring surgery. At the time of hospitalization, the electrocardiogram showed a sinus rhythm and the surgery went without complications.

While in the PACU, the patient developed an AF with rapid ventricular response. A total of 750mg of amiodarone and 0,5mg of digoxin had been administered in 12 hours, without conversion to sinus rhythm, when the patient developed bradycardia, sinus pauses and multiple unconducted P waves. Amiodarone infusion was immediately stopped. Administration of atropine produced no effect and an isoprenaline infusion was initiated with return to a normal sinus rhythm. The patient remained hemodynamically stable and responsive throughout the event. The isoprenaline infusion was discontinued after two days and the patient was discharged after 7 days without recurring events.

Discussion: Although most episodes of drug induced AV block resolve spontaneously after drug discontinuation, some may require transcutaneous pacing (TP) or pharmacological treatment. In the few published case reports of amiodarone/digoxin induced AV block, TP was the primary treatment choice and remains as the gold standard treatment for symptomatic/hemodynamically unstable patients[1].

We showed that isoprenaline infusion may be a safe and effective option to TP in hemodynamically stable patients. This may be particularly important when TP is not available or in awake patients to whom the TP may be extremely uncomfortable.

References:

1. Osmonov D et al. Management of Patients with Drug-Induced Atrioventricular Block. Pacing Clin Electrophysiol.2012;35(7):804-810.

Learning points: Isoprenaline infusion may be an alternative to TP in drug-induced AV blocks in hemodynamically stable patients. Adequate monitoring of pharmacological treatment is essential to prevent and detect possible side effects.

13AP01-06
Assessment of stroke volume variation estimated with pulse wave transit time after off-pump coronary artery bypass grafting

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Background and goal of study: Fluid responsiveness can be assessed using different dynamic indices, including stroke volume variation (SVV). Among different techniques for continuous measurement of SVV, the assessment of pulse wave transit time has recently become available. This method is based on the relationship between R-wave on ECG, SpO_2, and blood pressure.

The goal of our study was to assess the accuracy of estimated stroke volume variation (esSVV) compared with SVV determined by conventional pulse contour analysis (SVV_{PCA}) in patients after off-pump coronary artery bypass (OPCAB) grafting.

Materials and methods: Twelve patients after OPCAB were enrolled into a prospective ongoing study. All patients received catheterization of femoral artery for the measurement of esSVV (KC-910P, Nihon Kohden, Japan) and SVV_{PCA} ($PiCCO_2$, Pulsion/Getinge, Germany). The measurements were performed during mechanical ventilation (MV) with continuous sedation of propofol (2–6 mg/kg/hr), during MV with spontaneous breathing and after tracheal extubation. The accuracy of esSVV measurements was assessed with Bland–Altman analysis using SVV_{PCA} values as a reference technique.

Results and discussion: According to Bland-Altman analysis, the mean bias between esSVV and SVV_{PCA}during sedation and MV was -4.06 % with limits of agreement ± 10.1% (number of paired measurements n = 823). The mean bias during ventilation with spontaneous breathing was -3.5 ± 10.9% (M±1.96 SD) (n = 1920). The mean bias between esSVV and SVV_{PCA}in spontaneously breathing patients was -8.4 ± 8.3% (n = 151).

Conclusion(s): Our preliminary results show that esSVV and SVV_{PCA} cannot be used as interchangeable variables after OPCAB. The difference between the methods increases after tracheal extubation. Further studies for assessment of value of esSVV for prediction of fluid responsiveness are warranted.

13AP01-07
Does APOEε4 genotype influence the occurrence of postoperative delirium (POD) in cardiac surgical patients developing higher postoperative systemic inflammation? A secondary analysis of a prospective observational study

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Background-goal of study: Current literature shows a lack of direct association between APOEε4 genotype, a strong risk factor for Alzheimer disease, and a greater risk of developing POD. However, APOEε4 carriers might be at higher risk of POD under spe-

cific circumstances, such as an important postoperative systemic inflammation. The aim of this study is to evaluate whether there is an indirect influence of APOEε4 on the relationship between the occurrence of POD and higher levels of C-reactive protein (CRP) after cardiac surgery.

Materials-methods: This is a secondary analysis of a research project (NCT03706989). APOEε4 genotyping was performed in 220 adult patients undergoing elective cardiac surgery. Patients were classified according to the presence (or not) of at least 1 allele ε4. CAM-ICU, CAM and a chart review were used for POD screening until hospital discharge. The peak serum level of postoperative CRP was recorded for each patient. Patients with high CRP levels are those > P_{75}.Data are presented as numbers (%) and medians (P_{25}-P_{75}). Comparisons between groups were performed using Chi-square test for dichotomous variables and Mann-Whitney U test for continuous variables.

Results-discussion: The overall incidence of POD was 29.1%. Patients' characteristics are shown in Table 1. In total, 53 patients were APOEε4(+) (24%). Among them, 14 developed POD. No direct association between APOEε4 and POD was found (p=0.56). Classification of APOEε4(+) patients according to POD and maximum CRP levels is shown in Table 2. Ten of the APOEε4 delirious patients (71.4%) had the highest CRP levels (p=0.104).

Conclusion: Results of this underpowered observational study suggest that APOEε4 might have an indirect influence on the occurrence of POD after cardiac surgery in patients developing higher postoperative systemic inflammation. Further studies are needed to investigate this "gene-protein interaction" concept.

Reference:

Vasunilashorn SM et al. Alzheimers Dement (2020);16:572-80

	POD (-) (n=156)	POD (+) (n=64)	p
Age (y)	67 (60-74)	74 (65-79)	< 0.001
Males	129 (82.7%)	51 (79.7%)	0.6
Euroscore II (%)	1.5 (0.89-2.56)	2.39 (1.32-3.93)	< 0.001
MMSE	29 (27-29)	28 (26-29)	0.075
Surgical time (min)	222 (185-261)	240 (191-284)	0.119
CPB time (min)	96 (75-118)	109 (79-133)	0.027

Table 2

	APOEε4 (+) POD (-) (n=39)	APOEε4 (+) POD (+) (n=14)
Patients with CRP < P_{75}	21 (53.8%)	4 (28.6%)
Patients with CRP > P_{75}	18 (46.2%)	**10 (71.4%)**

Table 1

13AP01-08
Heart rate variability and systemic inflammation in response to surgery – an explorative study of trauma-induced changes in innate immunity and cardiac vagal nerve activity

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Background and goal of study: The inflammatory response evoked by surgery associates with long-term cognitive impairment and adequate immune regulation is essential to restore homeostasis. Since a growing body of evidence point towards the brain as a regulator of peripheral inflammation, we explored the temporal immune response in a surgical cohort and its associations with neuroimmune regulatory pathways and cognition.

The cholinergic anti-inflammatory pathway (CAP) relays bidirectional information between the peripheral immune system and the brain. The vagal nerve plays a central role in this pathway that ultimately affects peripheral immune cell activity with systemic consequences. However, its relevance following a surgical trauma is not known.

Materials and methods: Twenty-fivemale patients undergoing elective laparoscopic abdominal surgery were included in this observational prospective study. Serial blood samples with extensive immune characterization, recordings of heart rate variability (HRV) and cognitive tests were performed before surgery and continuing up to 6 months post-surgery.

Results and discussion: Temporal immune responses revealed biphasic reaction patterns with most pronounced changes at 5 hours after skin incision and 14 days following surgery. Estimations of cardiac vagal nerve activity through HRV recordings exposed great individual variations depending on the pre-operative HRV baseline. A principal component analysis of multiple systemic inflammatory markers displayed distinct differences in inflammatory trajectories based on pre-operative HRV with possible consequences for long-term surgical outcomes.

Conclusion(s): Individual pre-operative HRV generates differential response patterns that associate with distinct inflammatory trajectories following surgery. Long-term surgical outcomes need to be examined further in larger studies with mixed gender cohorts.

13AP01-10
The misdiagnosis of prolonged anesthetic emergence: a perioperative stroke case report

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Background: A perioperative stroke is defined as any embolic, thrombotic, or hemorrhagic cerebrovascular event with motor, sensory or cognitive dysfunction lasting at least 24 hours, occurring intraoperatively or within 30 days after surgery. Half of these events

occur in the first 24 h after surgery. We report a case of postoperative stroke following urgent vascular surgery under regional anesthesia with axillary brachial plexus block and sedation with dexmedetomidine.

Case Report: A 84-year-old patient, with a history of aortic valve surgery, coronary artery bypass, right side endarterectomy and chronic renal failure presented to the emergency department with an acute left upper limb ischemia. Surgical thromboembolectomy and brachial artery stenting were performed with successful limb reperfusion under regional anesthesia with axillary brachial plexus block and sedation with dexmedetomidine.

At admission to the post anesthetic care unit the patient presented with no eye opening to pain, no verbal response, best motor response was withdrawal from pain and pupils were equal in diameter and responsive to light. We first thought this was a case of prolonged anesthetic emergence but two hours after arriving the patient presented with bradypnea and bradycardia.

At this point the acute stroke fast track protocol was activated. A CT scan revealed no flow of both vertebral arteries with absent filling of the basilar artery.

More than 4 and half hours have passed since the last time the patient was seen in her normal status, therefore the patient didn't meet criteria for either pharmacological or mechanical thrombolysis.

Discussion: Prolonged anesthetic emergence can sometimes be a consequence from the administered drugs and this is a confounding factor for the diagnosis of an acute neurological event.

References:

Update in the Evaluation and Management of Perioperative Stroke - Dilip Kumar Jayaraman MD, Sandhya Mehla MD, Saurabh Joshi MD, Divya Rajasekaran MBBS & Richard P. Goddeau Jr. Perioperative Stroke and Associated Mortality after Noncardiac, Nonneurologic Surgery - George A. Mashour, M.D., Ph.D.; Amy M. Shanks, M.S.; Sachin Kheterpal, M.D., M.B.A.

Learning points: it is important to raise awareness to the need of a high level of suspicion for neurological events following surgery specially in patients with increased risk for ischemic events since it can have permanent and fatal outcomes for the patient, limiting therapeutic options.

13AP01-11
Reliably automating ASA classification: a case for artificial intelligence in preoperative assessment

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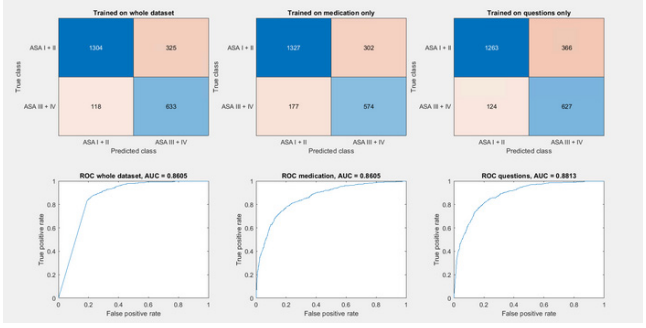
Background and Goal of Study: With the advancement of artificial intelligence (AI) comes the possibility of automating tasks. These tasks should follow a set of predictable rules, have a limited number of clear outcomes, and training data should be readily available. Preoperative screening, using the American Society of Anesthesiologists Physical Status (ASA PS) classification, meets these criteria and is a potential candidate for partial automation. If reliable enough, automated ASA PS scoring could advance digital preoperative screening. A barrier to the automation of preoperative screening has been the large number of variables (features) involved, which negatively affects accuracy and requires much computational power. Least Squares Support Vector Machines (LS SVM) are a form of AI well suited to classification problems with a high number of features. The objective in this study was to assess the feasibility of using LS SVM as a screening tool for ASA PS scores, to safely automate the scoring of low risk (ASA PS I & II) patients and detect high risk patients (suspected ASA PS III or over).

Materials and Methods: From a database containing medication records and a standardized preoperative health questionnaire containing 361 data points, filled out by 23,800 patients, models were trained to detect patients of ASA PS III and over, and to differentiate between ASA PS I and ASA PS II, using a LS SVM toolkit in MATLAB. These models were then analyzed for performance.

Results and Discussion: For detecting patients of ASA PS III and over, the model trained on the entire dataset had an accuracy of C 0.84 +/- 0.03. When tuned for a probability of 0.99 to detect patients of ASA PS III or higher, it had a false positive rate of 67%. For differentiating between ASA PS I and ASA PS II, the model had a specificity of 83%.



Conclusion(s): With 99% of ASA PS III and IV patients correctly being detected by the LS SVM algorithm, the automation of screening for high-risk patients appears feasible, albeit with a false positive rate of 67%. Accuracy could likely be improved by fine-tuning the questionnaire and adding other clinical features (e.g. blood pressure or ECG).

13AP01-12
Anaesthetic propofol induces innate immune memory resulting in enhanced inflammation and pathogen clearance via augmented fatty acid metabolism

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Background: Intravenous propofol (2,6-diisopropylphenol) is a common anaesthetic used for the induction and maintenance of general anaesthesia in surgery, critical care patients, and routine outpatient procedures. Though widely used, evidence is mounting that brief exposure to propofol may have acute immunomodulatory effects.

Objectives: Recent studies have shown that monocytes can adopt a long-term pro-inflammatory phenotype in response to a primary stimulus, a process termed innate immune memory or trained immunity. Fatty acids, such as the ones found in clinical formulations of propofol, can act as inflammatory stimuli, but it remains unknown whether they can act as a primary stimulus in the context of trained immunity.
Here, we sought to determine the long-term immunomodulatory effects of propofol on monocyte effector functions, and to investigate the role of fatty acid oxidation (FAO).
Methods: Blood from healthy donors was obtained after written informed consent. Peripheral blood mononuclear cells (PBMCs) and monocytes were isolated and exposed to various concentrations of propofol, after which cells were given a secondary inflammatory stimulus. Inflammation-related gene expression was measured by qPCR after secondary LPS stimulation, and secreted protein concentrations of IL-1β, TNF-α, and IL-6 were assessed via ELISA. Reactive oxygen species (ROS) production was measured by means of a luminol-based ROS assay upon stimulation with PMA.
Pathogen clearance was investigated by co-incubation of monocytes with several species of bacteria. Real-time metabolic rates were assessed by Seahorse analysis. Mann-Whitney*t*-tests were performed with GraphPad Prism software (v5.03).
Results: Propofol induced a trained immunity phenotype in primary human monocytes*in vitro*, accompanied by an increased production of IL-1β, TNF-α, and IL-6. Monocytes trained with propofol had heightened microbicidal activity despite impaired generation of ROS. Propofol-trained monocytes exhibited elevated oxygen consumption, relying in part on FAO. Pharmacological inhibition of FAO by etomoxir precluded propofol-induced trained immunity.
Conclusions: This study demonstrates that monocytes pre-treated with propofol show enhanced antimicrobial functions that conform to the trained immunity phenotype, and highlights FAO as a novel important mechanism for trained immunity. Taken together, our data contribute to the understanding of the effects of propofol on the innate immune system.

13AP02-01
Cascade filtration in ABO-incompatible kidney transplantation on living donor transplantation: case report

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Background: Elimination from plasma of anti-A and anti-B antibodies (isoagglutinins α and β) allows organ transplantation from ABO-incompatible donors. In this clinical case, we show our experience of cascade filtration in ABO-incompatible kidney transplantation from a living donor.
Case report: Patient X. aged 38 years was on program hemodialysis for 6 months. The titer of anti-A / B antibodies was determined by salt agglutination reaction and and was determined at 1:32, the result of the cross-match in the lymphocytotoxic test was negative. The initial level of B-lymphocytes (CD20) was 8.3%. Recipient – A (II)RhD-positive, donor – father with B(III)RhD-positive blood group.
During the week before the planned kidney transplantation, 6 cascade filtration sessions were performed. There was a decrease in B lymphocytes (CD3-, CD20 +, HLA-DR+) to 0.1%, and the titer of anti-A / B antibodies to 1: 4.Intra- and postoperative immunosuppressive therapy was performed similarly to ABO-compatible transplantation.
The initial function of the transplanted kidney was satisfactory and was accompanied by a sufficiently high diuresis and a decrease in creatinine to 133.6 μmol / l by the end of the first postoperative week.
During the first two weeks after surgery, an additional 2 sessions of cascade filtration were performed. The titer of anti-B antibodies in this period did not exceed 1:8.
Currently, renal transplant function is satisfactory, and supportive immunosuppressive therapy consists of Prograf at a dose of 12 mg per day, Myforticat a dose of 1080 mg per day and methylprednisolone at a dose of 4 mg per day.
Discussion: The introduction into clinical practice of preoperative conditioning regimens of the recipient, based on the use of modern immunosuppressive drugs before transplantation, prevents only *de novo*formation of antibodies in the posttransplantation period. At the same time, the use of cascade filtration in the pre- and postoperative period allows to remove anti-A or anti-B antibodies from the plasma and overcome the barrier of ABO-group incompatibility.
Learning points: Based on our results, the removal of anti-A and anti-B antibodies (isoagglutinins α and β) from plasma before surgery, organ transplantation from an AB0-incompatible donor is a prespective direction in the development of transplantology.

13AP02-02
Intraoperative shock following reaming of the femur - a case report

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Case description: 37-year-old male (ASA physical status 2) proposed for intramedullary nail fixation following left femur fracture after a 3-month-long external fixation. Combined spinal epidural and deep sedation were the chosen anesthetic techniques. During femur reaming, immediate and severe circulatory shock was observed (systolic blood pressure below 40mmHg, tachycardia above 140 bpm, unmeasurable peripheral oxygen saturation). We assumed a fat embolism syndrome (FES) and withheld the surgical procedure. Tracheal intubation, mechanical ventilation, intravenous fluid infusion and vasopressors were necessary.
Post procedure thorax CT angiography findings were compatible with venous pulmonary embolism (PE), without compatible findings of pulmonary FES.
The patient was admitted in the ICU. During the first 48 hours, there were multiple episodes of acute obstructive shock, suggesting repeated pulmonary venous embolisms. He was discharged after 4 days, under anticoagulation, breathing on room air, without evidence of pulmonary artery hypertension or right ventricle failure.
Discussion: During a surgical procedure, hypoxemia and hypotension may be nonspecific and deserve a structured approach by the anesthesiologist. In the situation we describe, FES was our first diag-

nostic hypothesis. Differential diagnosis excluded massive hemorrhage (total blood loss of 500ml), tension pneumothorax, myocardial infarction and anaphylactic shock. FES is a common cause of PE during orthopedic surgery, especially during the manipulation of a long bone. [1]

However, the thorax CT angiography showed a venous PE. Apart from the cause of the PE, the treatment is supportive in both situations.

Intraoperative anticoagulation should be used in life-threating situations as the one we describe, however, we have to bear in mind the risks, such as hemorrhage and epidural hematoma after neuraxial techniques.

Supportive therapy, thorax CT angiography as the way to confirm the diagnosis and ICU admission were core attitudes that improved the patient's outcome.

Learning points: Intraoperative identification of PE requires a high level of clinical suspicion. Prompt initiation of supportive treatment is crucial to warrant the patient's survival.

Critical scenarios are of major importance for the anesthesiology and surgical teams, constituting a moment of learning and debriefing, so as to improve future strategies in similar scenarios.

References:

1. S. Barwood et al "The incidence of acute cardiorespiratory and vascular dysfunction following intramedullary nail fixation of femoral metastasis,"*Acta Orthopaedica Scandinavica,*pp. 147-152, 2009.

13AP02-03
Bone cement implantation syndrome: case report

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Background: Bone cement implantation syndrome (BCIS) is defined as hypoxia, hypotension and/or unexpected loss of consciousness occurring during cementation, in a patient undergoing cemented bone surgery[1].

The etiology and pathophysiology are not fully established being right ventricular failure secondary to increased pulmonary artery pressure one possible cause with recent evidence proposing an embolus-mediated model[1].

Case report: Male, 34-years-old, submitted to percutaneous vertebroplasty of T12-L3 due to traumatic vertebral fracture. The surgical procedure was performed under general anesthesia. After cement implantation with high pressure, there was transient desaturation with peripheral saturation of 93% and a drop in systolic blood pressure from 125mmHg to 98mmHg with no other lintraoperative complications to report. On the third postoperative day, the patient developed an acute right pleuritic chest pain that worsened with deep inspiration associated with peripheral saturation of 97%.

At observation, the patient was eupneic at rest without oxygen support with crackles in the right lung base at pulmonary auscultation and no changes in blood gas analysis. Lower limbs were without edema or signs of thromboembolism. Analyzes were collected, highlighting a rise in d-dimers value. From the imaging exams performed, the chest X-ray showed wedge opacity in the right lower lobe (Hampton hump sign) and bilateral linear opacities more evident on the right lobe.

Chest CT scan showed an embolus in the right lower lobe, causing peripheral ischemia confirmed by angiography. Given the clinical picture, non-thrombotic pulmonary embolism due to cement was assumed. Considering the clinical stability, the patient was discharged from the service treated with subcutaneous enoxaparin with improvement in the clinical scenario.

Discussion: BCIS is a potentially fatal perioperative complication ranging from transient desaturation or mild hypotension to cardiac dysrhythmias and death[2]. Patients at high risk for severe BCIS should be identified and preventive measures such as avoidance of excessive pressurization of implants should be taken to reduce it's consequences.

References:

1. *AANA journal*, 2018,*86*(6); 2. BJA, 2009,102(1), 12-22.

Learning points: BCIS can be a life threatening event depending not only on a meticulous anesthetic plan but also on the surgeon's role in reducing it's risk and being crucial for an uneventful procedure.

13AP02-04
Risk factors for postoperative complications after pheochromocytoma and paraganglioma surgery

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Background and goal of study: The aim of this study was to identify the risk factors for severe postoperative complications in patients undergoing pheochromocytoma and paraganglioma surgery.

Materials and methods: Patients who underwent surgery for pheochromocytoma or paraganglioma, of which the diagnoses were confirmed by postoperative pathologic examination, in Fujian provincial hospital from January 1, 2015, to January 31, 2021, were enrolled in this study.

Demographic characteristics, comorbidities, preoperative examinations, preoperative preparation, intraoperative data, and postoperative complications were collected. Patients were divided into the Severe postoperative complication group (SPC Group) and non-Severe postoperative complication group (non-SPC Group) according to the Clavien-Dindo classification system.

Demographic and clinical data of the two groups were compared to identify the risk factors for severe postoperative complications after surgery.

Results and discussion: A total of 126 patients were finally included in the study. Of these, 38 patients developed severe complications (Clavien-Dindo grade ≥ II).

Compared with patients without severe morbidity, patients in SPC group were significantly older, had a higher level of preoperative D-dimer, higher fibrinogen degeneration products (FDP), larger tumor size, higher urine vanillylmandelic acid (VMA), lower hemoglobin concentration and lower albumin level.

Duration of operation was significantly longer in patients with SPC than non-SPC patients. Besides, patients in the SPC group had a larger difference between the maximum and minimum systolic blood pressure (ΔSBP), larger standard deviation of systolic blood pressure (SBPSD) and longer duration of hypotension.

On multivariate analysis, preoperative D-dimer level (OR 2.29 , 95%CI 1.264~4.163, P=0.006), intraoperative SBPSD (OR 1.12, 95%CI 1.052~1.197, P<0.001) and duration of hypotension (OR 1.04, 95%CI 1.012~1.069, P=0.004) were independent risk factors for severe postoperative complications.

In contrast, preoperative hemoglobin level was a protective factor (OR 0.97, 95%CI 0.937~0.997, P=0.030).

Conclusion(s): Higher preoperative D-dimer level, larger SBPSD, longer duration of hypotension, and lower hemoglobin concentration were closely associated with severe postoperative complications in patients after pheochromocytoma or paraganglioma surgery.

13AP02-05
Olfactory dysfunction (OD) is associated with postoperative neurocognitive disorder (PND) in a population of older patients scheduled for elective non-cardiac surgery

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Background and Goal of Study: OD has a well-known link with cognitive decline and may also represent a biomarker of frailty. Yet, the two latter are thought to be preoperative risk factors for developing PND. The aim of this study was to evaluate whether preoperative OD is associated with PND.
Materials and Methods: We conducted a prospective observational study including 79 patients aged from 65 years old and scheduled for elective non-cardiac surgery under general anesthesia. Olfactory function was examined using the Sniffin' sticks extended test (assessing threshold, discrimination and identification modalities) resulting in a composite TDI-score with a maximum of 48 points. OD was defined as TDI-score below the 25th percentile for age and gender. Baseline preoperative cognitive function was examined using the Montreal Cognitive Assessment 22-item (MoCA-22) test. At 3 months postoperatively, patients received a telephone interview in which they performed the MoCA-22 and were asked about any change in subjective cognitive concerns and in instrumental activities of daily living (IADLs). PND was defined as either subjective cognitive change and/or a decline of at least 1 standard deviation in the postoperative MoCA-22. Statistical analysis was carried out using Kruskal-Wallis and chi-square tests.
Results and Discussion: Incidence of PND at 3 months was 25.3%. Subjective cognitive complaints were found in 22.8% (18/79) of patients whereas an objective impairment in cognitive function was detected in 5.1% of patients (4/79). Characteristics of the patients according to the presence of PND are presented in Table 1.

Characteristic	Overall patients (n=79)	PND (n=20)	No PND (n=59)	p-value
Age (y)	73 (69-78)	75 (69-81)	72 (68-76)	0.119
Level of education Lower (≤ 9 years) (%) Upper (> 9 years) (%)	 15 (19.0%) 64 (81.0%)	 5 (25.0%) 15 (75.0%)	 10 (16.9%) 49 (83.1%)	0.512
TDI-score (points)	29.50 (24.75-31.75)	25.75 (22.75-29.50)	30.50 (26.50-32.50)	**0.011**
Olfactory function status No OD (%) Presence of OD (%)	 59 (74.7%) 20 (25.3%)	 11 (55.0%) 9 (45.0%)	 48 (81.4%) 11 (18.6%)	**0.019**
Postoperative decline in IADLs (%)	8 (10.1%)	6 (30.0%)	2 (3.4%)	**0.003**

Table 1.

We clearly noticed that PND occurred more frequently in patients with OD. Postoperative decline in IADLs was also observed in exactly 30% of the olfactory-impaired patients versus only in 3.4% of the patients without OD (p=0.003).
Conclusion: This study demonstrates a significant association between preoperative OD and the incidence of PND in older patients undergoing elective surgery.
Further studies with larger sample sizes and extended perioperative neuropsychological test batteries are needed to validate OD as a reliable risk factor for PND.

13AP02-06
Immediate post-operative care after urgent major surgery: level I, II or III?

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Background and Goal of Study: Patients admitted to Intensive Care Unit (ICU) after developing a postoperative complication tend to have worse outcomes than those who are admitted pre-emptively. Most complication prediction scores have at best, moderate accuracy in predicting postoperative complications.This quality improvement programme aims to identify risk factors for unplanned ICU admission.
Materials and Methods: A retrospective observational analysis was made of all clinical data from patients without planned admission to ICU (instead, went to Post Anaesthesia Care Unit) after urgent abdominal, urologic and vascular surgery from January to June 2019.
The primary outcome was to determine risk factors for unplanned ICU admission. Statistical analysis was performed in IBM SPSS Statistics® v. 23, using Pearson correlation coefficient, Fisher's exact test and Cohen's kappa coefficient.
Results and Discussion: Data was collected from 97 patients (74% submitted to abdominal, 22% to urologic and 4% to vascular surgery). In theabdominal surgery group, namely gastrointestinal surgery due to occlusion/perforation, we found an association between:

- Unplanned ICU admission and:
  1. **Pre-operative creatinine** >2mg/dL OR **creatinine clearance**<60mL/min (*p=0,047*); *Odds Ratio (OR)*=**6,0** (95%CI:1,1-33,1); Fair agreement (Kappa=0,24; *p=0,025*);
  2. **Pre-operative haemoglobin** <12g/dL (*p=0,026*); *OR*=**6,3** (95%CI:1,3-31,1); Fair agreement (Kappa=0,30; *p=0,014*);
  3. Higher **ASA Classification** (*p<0,001*);
  4. Higher **Lee Score** (*p=0,036*);
  5. Intra-operative need for **vasopressors** (*p=0,006*); *OR*=**14,0** (95%CI:1,6-123,8); Weak agreement (Kappa=0,07; *p=0,004*);
- Post-operative complications (cardiovascular, respiratory, renal, infectious or surgical) and:
  1. **Pre-operative creatinine** >2mg/dL OR **creatinine clearance**<60mL/min (*p=0,007*); *OR*=**5,8** (95%CI:1,6-20,5); Fair agreement (Kappa=0,37; *p=0,004*);
  2. **Pre-operative hemoglobulin** <12g/dL (*p<0,001*); *OR*=**11,7** (95%CI:2,9-46,3); Moderate agreement (Kappa=0,51; *p<0,001*);
  3. Higher **ASA Classification**(*p=0,005*);

Unplanned ICU admission was 9% (all belonged to the abdominal surgery group), mainly due to hypovolemic and septic shock. 30-day mortality was 7%, almost all belonged to the abdominal surgery group.

Conclusion(s): In abdominal surgery, anemia, acute renal failure, higher ASA status, higher Lee Score and intra-operative need for vasopressors were associated with unplanned ICU admission. Despite the reduced size of the sample, we now suggest studying patients proposed for the same type of surgery with planned ICU admission to compare risk factors and outcomes.

13AP02-07
Management and outcome of tubless patients undergoing esophagectomy

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Background and goal of study: Within the measures adopted for early recovery for patients undergoing esophaguectomyis the non-placement of pleural drains intraoperatively (tubless). This inevitably means a closer postoperative care.

The aim of this study is to evaluate the protocol adopted in the ICU for "tubless" esophagus, and these patients outcome.

Materials and methods: Single-center, observational, prospective cohort study of consecutive cases between November 2020 and December 2021. All adult patients who underwent elective esophagectomy for neoplasic causes were included. Patients who underwent urgent or non-oncologic surgery, or those whose follow-up could not be completed were excluded

Patients were assigned into two groups depending on intraoperative drainage use (yes/no), decision made by the surgical team.

Our ICU protocol establishes the need for daily pulmonary ultrasound, applying the "lung score" technique, and evaluation of the presence and amount of pleural effusion. Demographic data, complications, re-interventions, realization of chest physiotherapy and need for readmission to the ICU were also registered.

SPSS software (version 14, SPSS Science, Inc.) was used for statistical analysis.

Results and discussion: Throughout the study period, 30 patients were enrolled. In 75% of the patients (n=22) no intraoperative drain was used. During follow-up, 8/22 (36%) of these patients required placement of pleural drainage in the first 7 postoperative days and no patient required pleural drainage during their stay onhospital ward.

As observed in other studies the mean surgical time for patients who required to postoperative place of drainage, waslonger (576 ±35 minutes) than time in patients who did not require drainage (532 ± 16).

Patients without drainage presented a respiratory failure rate of 45.5%, similar to the 43% found in patients with pleural drainage. However we found differences in the mean length of stay, which was 6 days (±2)for patients with intraoperative pleural drainage and 9 days (±2) for patients without pleural drainage.

Conclusion(s): The medical trend towards enhanced recovery aims at a future with less invasiveness intraoperatively and postoperatively. In this line of work we find the tubless esophagectomy, which is a safe procedure but requires a continuous pulmonary evaluation for early detection of pleural effusion.

13AP02-09
Prospective study of perioperative optic nerve sheath diameter (onsd) variation in patient undergoing robotic assisted kidney transplant (RAKT)

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Background and goal of study: USG measurement of optic nerve sheath diameter (ONSD) closely corresponds to ICP assessed by invasive methods. We did prospective observational study, evaluating the changes in ONSD, respiratory, haemodynamic & perioperative parameters in patients undergoing RAKT with Steep Trendelenburg (ST)& CO2 pneumoperitoneum. We also evaluated the possible association between these parameters.

Materials and methods: 20 patients included. Before surgery patients underwent dialysis & received immunosuppressants as per protocols. Anaesthesia provided as per our institutional protocols. A 7.5MHz linear probe was used.

ONSD was measured 3mm behind the optic disc. Mean of ONSD of both the eyes, ETCO2, HR, systolic, diastolic & MAP, CVP, BIS, peak airway pressure, plateau pressures, PAO2, PACO2 were measured at T1(10min after intubation), T2(ST position after docking), T3(1hr post docking), T4(reperfusion), T5(on supination), T6(3hr post extubation).

Results and discussion: A repeated measures ANOVA determined that mean ONSD differed statistically significantly between time points ($p<0.001$). Post hoc tests using the Boferroni correction revealed that ONSD increased from T1(36.0 ± 4.4) to T3(40.6 ± 4.5) & T4(39.9 ±6.2) which was statistically significant ($p=0.002$, $p=0.046$, respectively).

However, ONSD decreased from T3 to T5 & T6 similarly from T4 to T5 & T6. Pearsons Correlation analysis revealed a significant positive correlation only between changes in ONSD & DBP, MAP, ETCO2, PACO2, Plateau pressure ($p < 0.05$). There was no significant correlation between ONSD, SBP, HR, CVP, BIS, Peak airway pressures ($p > 0.05$), time for tracheal extubation, recovery & emergence.

Ours is probably the first study which has investigated the changes in ONSD in RAKT. Our findings were similar to the studies previously conducted on Robotic Assisted Laparoscopic Prostate surgeries. ONSD peaked at reperfusion thereafter gradually decreased. Post extubation was below baseline. This may be due to release of pneumoperitoneum and CO2 wash out.

Factors like CO2 pneumoperitoneum , trendelenburg position, hypercarbia, sympathomimetic response, IV fluids & primary renal disease itself along with associated comorbidities can contribute to elevate ICP. ONSD helps in monitoring the ICP & guide anaesthetic management accordingly.

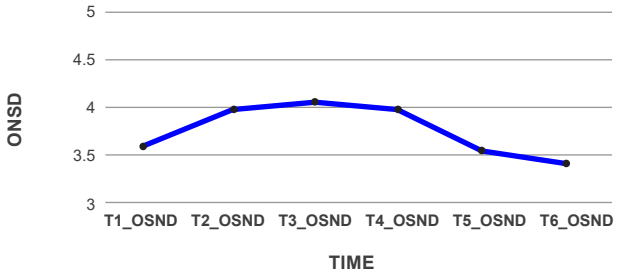

Figure. Optic Nerve Sheath Diameter variation.

Conclusion: RAKT can be done safely as far as raise in ICP is concerned provided proper patient selection, judicious fluid management, washout of CO2, hemodynamics maintenance, diuretics, use of anaesthetic agents with minimal effect on ICP and adequate ventilation. Monitoring of ONSD might be a simple way to detect early rise of ICP.

13AP02-10
Total intravenous anaesthesia vs inhalation anaesthesia and 30-day postoperative complications in patients undergoing colorectal surgery within an ERAS protocol

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Background and Goal of Study: Enhanced recovery after surgery (ERAS) protocols have been shown to reduce complications in colorectal surgery. The aim of this study was to determine whether total intravenous anaesthesia (TIVA) with propofol would further improve postoperative complication rates and hospital stay compared to inhalational anaesthesia.
Materials and Methods: Retrospective cohort study including patients undergoing colorectal cancer surgery at Infanta Leonor University Hospital(Madrid) between 2016 and 2020. Patients were grouped according to whether they received TIVA or sevoflurante based inhalational anaesthesia. Predefined 30-day postoperative complications and length of hospital stay were analysed. A weighted logistic regression and a multivariate Cox proportional hazards regression to evaluate the adjusted odds ratios (OR) and hazard ratios (HR) for the effect of the type of anesthesia on the outcome variables were performed.
Results and Discussion: We included 787 patients (294 received TIVA (37.3%) and 493 (62.6% inhalational anesthesia). There were no differences between the two groups except for patients with ASA 2 physical score (61% TIVA and 54.6% in the inhalational anesthesia group). In the multivariate analysis TIVA was associated with a lower incidence of arrythmia (OR 0.34; CI 95% 0.11-0.99, P = 0.047). There were no differences for overall complications and length of stay between the two groups.
Conclusion(s): Administration of TIVA compared with inhalational anesthesia was not associated with less 30 day postoperative complications nor length of stay in patients undergoing colorectal surgery within an ERAS program.
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13AP02-11
AKI biomarkers for early prediction of acute kidney injury after liver transplantation

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Background & goal of study: Acute kidney injury (AKI) affects up to 50% of patients within 72h of orthotopic liver transplant (OLT) and is associated with poorer outcomes. AKI is diagnosed by serum creatinine and urine output values, which can delay diagnosis after OLT. TIMP-2 & IGFBP7 are urinary cell cycle arrest biomarkers, and [TIMP-2]x[IGFBP7]>0.3((ng/ml)^2/1000) can predict AKI early after cardiac surgery.
We aimed to assess whether urinary concentrations were higher in patients developing AKI after OLT, and to assess their predictive ability for subsequent KDIGO-defined AKI.
Materials & methods: Prospective observational study of adult patients undergoing routine OLT, without preoperative organ support or AKI/chronic kidney disease. Urinary biomarker values were measured preoperatively, at 6h, 12h, 24h and 48h after graft reperfusion. The primary outcome measure was all-stage AKI by KDIGO criteria at 72h post-OLT.
Median biomarker concentrations were compared between patients developing and not developing AKI using the Mann-Whitney U Test, and incidence of AKI between patients with (>0.3)/without elevated biomarker concentrations using Chi-square test. The association of biomarker concentrations at different timepoints with AKI were investigated using univariate logistic models and empirical receiver operating characteristic (ROC) curves.
Results & discussion: 20 patients underwent OLT, and 80% (n=16) developed AKI; KDIGO Stage 1 20% (n=4), Stage 2 36% (n=9) and Stage 3 12% (n=3). Of those developing AKI, 68.8% (n=11) developed their most severe grade within 24h postoperatively, and 31.2% (n=5) within 24-48h.
For patients developing AKI, median [IQR] biomarker values were significantly higher at 6h (1.0 [0.50-2.15] v 0.10 [0.08-0.13], p<0.01) and 24h post-reperfusion (0.86 [0.39-1.31] v 0.12 [0.10-0.16], p=0.02). Incidence of AKI amongst patients with elevated biomarker values was significantly greater at 6h (p=0.01) and 24h (p=0.01). Greatest area under the ROC curve for prediction of AKI was at 6h (0.96 [95% CI: 0.88-1.0]).
Most patients developed their most severe grade AKI within 24h. Combined with the greatest AUROC for prediction of AKI occurring at 6h, this would be the appropriate timepoint for risk stratification for developing subsequent KDIGO-defined AKI.
Conclusion: Urinary biomarker values are significantly elevated at 6h post-reperfusion in patients developing AKI after OLT, with a predictive ability which warrants further study.

13AP02-12
Detecting hyperlactatemia with the respiratory exchange ratio during intermediate-to-high risk abdominal surgery

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Background and Goal of Study: A mismatch between oxygen delivery (DO_2) and consumption (VO_2) is associated with increased perioperative morbidity and mortality. Hyperlactatemia is often used as an early screening tool, but this non-continuous measurement requires intermittent arterial line sampling. Having a tool to rapidly detect inadequate DO_2 is of great clinical relevance.
The respiratory exchange ratio (RER) can be easily measured in all intubated patients and has been shown to predict postoperative complications. We therefore aimed to determine if the RER calculated at the end of the surgery could detect an inadequate DO_2 as reflected by hyperlactatemia.
Materials and Methods: This historical cohort study included all consecutive patients who underwent intermediate-to-high risk surgery from January 1st, 2014, to April 30th, 2019. Blood lactate levels were measured routinely at the end of surgery. Patients were split between low and high blood lactate levels (i.e., ≤1.5 or > 1.5mEq/l). A receiver operating characteristic (ROC) curve was constructed to evaluate if RER calculated at the end of the surgery could detect a high lactate level.
Results and Discussion: In 941 included patients, the RER was significantly higher in the high lactate group at end of surgery (median [25th-75th percentile]): (0.83 [0.80-1.00] vs. 0.80 [0.67-0.80]; p<0.001).
A RER value above 0.75 at the end of surgery detected a high lactate value with a sensitivity of 87.5% and a specificity of 49.5% (Youden index J).
Conclusion: The RER measured in intubated patients at the end of intermediate to high-risk surgery can detect hyperlactatemia with high sensitivity but poor specificity. This approach for assessing DO_2/VO_2 mismatch can potentially be used to rule out hyperlactatemia and help guide postoperative management.

13AP03-01
Impact of perioperative analgesia in prostatectomy patients on early quality of recovery: a 3-arms randomized active-controlled phase IV trial

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Background and goal of study: Open prostatectomy is associated with relevant acute postoperative pain. Optimal analgesic techniques to optimise postoperative analgesia and enhance recovery after surgery are still under investigation, aiming for optimised patient comfort and fast functional recovery encouraging the DREAMS concept (DRinking, EAting, Mobilising and Sleeping).
Materials and methods: This randomised, parallel groups, single centre, interventional, active controlled trial compares the effect of either spinal anaesthesia (SSS, bupivacaine 0.5% + fentanyl 20mcg), bilateral transversus abdominis plane block (TAP, ropivacaine 0.375% + clonidine 150mcg) or systemic analgesia (SA, intravenous lidocaine 1%, 1.5mg/kgIBW/h over 24 hours) in addition to general anaesthesia. All groups received ketorolac (iv, 90mg/day) for 48 hours, metamizol (iv/po, 4g/day) and fentanyl (iv) or oxycodone (po) on request.
Primary outcome: Change in Quality of Recovery 15 (QoR-15) score on day 1 compared to baseline.
Secondary outcomes: QoR-15 at hospital discharge, PONV, pain scores, return of gastrointestinal function, morphine equivalents.
Results and discussion: From 06/2018 to 12/2020, we included 133 patients (SSS, 40; TAP, 45; SA, 48). QoR-15 did not differ between groups on day 1 (figure 1B, left plot, p=0.027) or at hospital discharge (figure 1C, left plot, p=0.029) when compared to baseline. Pattern of QoR-15 changes where similar in all three groups (figure 1A, left plot). Compared to additional spinal anaesthesia, patient in the SA group undergoing open prostatectomy had significantly lower QoR-scores at hospital discharge (figure 1C, middle plot, p=0.008). At discharge, median QoR-15 was considered as good (>122) in all groups: SSS 134 [128; 138]; TAP 129 [122; 136] and SA 128 [123; 136]. There were no significant differences in the other secondary outcomes.
Conclusion(s): Differences in QoR-Scores on postoperative day 1 compared to preoperative did not differ between the groups. Only in the subgroup undergoing open prostatectomy, QoR-scores at hospital discharge where lower in the group receiving systemic analgesia compared to additional spinal anaesthesia.

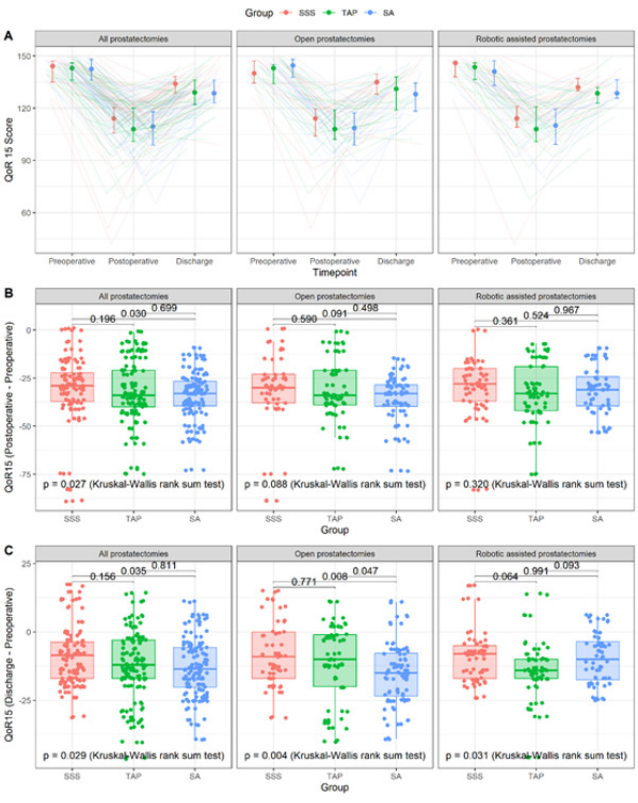

Figure 1.

13AP03-02
A mRNAsi-related metabolic signature for predicting prognosis and immunotherapy and chemosensitivity in patients with colorectal cancer

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Background and goal of study: Colorectal cancer is one of the most common and fatal cancers of the digestive system, and its prognosis is highly heterogeneous. The mRNA expression-based stemness index (mRNAsi) is used to evaluate the stem cell index of cancer and is closely related to the prognosis of patients with colorectal cancer. Metabolic reprogramming is an important feature of tumor cells.

Therefore, we proposed a new risk score model based on mRNAsi-related metabolic genes and evaluated the relationship between the model and overall survival rate (OS), immune infiltration and chemosensitivity in patients with colorectal cancer.

Materials and methods: In this study, 1323 colorectal cancer patients from TCGA and GEO databases were used as external cohorts for retrospective analysis, and 20 fresh tissue samples from Zhongshan Hospital were used as internal cohorts for verification. Weighted gene coexpression network analysis (WGCNA) was used to screen mRNAsi related module genes. Then mRNAsi -related module genes and metabolic genes were intersected to obtain mRNA-related metabolic genes. The risk score model of mRNAsi-related metabolic genes was constructed by LASSO Cox analysis, and then the patients were divided into high-risk group and low-risk group.

Results and discussion: Eighty-three mRNAsi related metabolic genes were identified by differential enrichment analysis and WGCNA analysis. We developed a mRNAsi-related metabolic signature using 21 genes for prognosis prediction of colorectal cancer. Compared with the low-risk group, the high-risk group had better OS and higher immune infiltration score. There are more macrophages, B cell, T cells and helper T cells in high-risk patients.

In addition, patients in the high-risk group were less sensitive to a variety of chemotherapeutic drugs and small molecular anticancer drugs, especially Metformin, PF4708671, Sorafenib. In addition, patients in the low-risk group had higher copy number variation, especially the deletion of gene copy number.

Finally, univariate, and multivariate Cox analysis showed that mRNAsi related metabolic risk score was an independent risk factor for predicting the prognosis of patients with colorectal cancer.

Conclusion(s): We proposed a new risk scoring model based on mRNAsi-related metabolic genes to predict the clinical prognosis and sensitivity to anticancer drugs in patients with colorectal cancer, and to optimize immunotherapy for patients with colorectal cancer.

13AP03-03
Low expression of NOCA4 is a poor prognostic biomarker and correlates with immune cells infiltration in colorectal cancer

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Background and goal of study: Colorectal cancer (CRC) is one of the most common type of digestive malignancy, severely threatening human health. Nuclear receptor coactivator 4(NCOA4) is a selective cargo receptor for autophagic turnover of ferritin (ferritinophagy).

The present study is aimed to identify and validate theprognostic value of NCOA4 expressionand contrast clinic characteristics among patients under different level of NCOA4 expression. We further analyze the correlation between NCOA4 and immune cellsinfiltration and evaluate possible pathways connected with NCOA4.

Materials and methods: NCOA4 expression and clinical characteristicsdata were downloaded from TCGA. The Human Protein Atlas database was used to analyze the expression of NCOA4 protein. Overall survival (OS), disease special (DSS) and progress free interval (PFI) wereanalyzed through the Kaplan-Meier curves.

Univariate COX regressionwas used to calculate the correlation between NCOA4 expression level and in OSevent. The diagnostic value of RRM2 gene expression was evaluated using the received operating characteristic (ROC) curve.

We used CIBERSORT database to analyze the condition of immune cell infiltration. Onlinesearch tool STRING is used to retrieve the NCOA4 protein network. GSEA was used to identify Immune-related pathway associated with NCOA4 gene expression found in recent studies.

Results and discussion: The expression level of NCOA4 in CRC tissuesis significantly lower compared to that in normal tissues.Low-expression NCOA4, verified of diagnostic value, was demonstrated as a negativeindependentfactor for OS in univariate COX regressionanalysis and correlated to poor prognosis in CRC patients.

NOCA4 is associated with immune infiltration of CRC. AR,RET, FTL, FTH1 were important proteins connected with NCOA4 in protein network.Under co-expression analysis, TSSC4 was the top down-regulated gene, while ABI1 was the top up-regulated gene.

Conclusions: CRC patients express lower level of NCOA4, which correlated with poor prognosis.NOCA4 is correlated with immune infiltrates in CRC.

13AP03-04
High preoperative wbc is involved with increased MPO predicts a poor prognosis in colorectal cancer: a propensity score-matched analysis combined with TCGA analysis

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Background and goal of study: The impact of white blood cell (WBC) count and myeloperoxidase (MPO) on colorectal cancer (CRC) outcome was unclear. This study was designed to investigate the prognostic value of preoperative WBC count on overall survival (OS) and disease-free survival (DFS) after colorectal cancer surgery, the potential correlation between neutrophils and the expression of MPO in CRC, as well as the function of MPO on CRC.
Materials and methods: From January 2008 to December 2014, 8,121 patients at Zhongshan hospital undergoing elective surgery for colorectal cancer were enrolled in this retrospective cohort study. Patients were divided into low preoperative WBC (pre-WBC) group and high pre-WBC group according to their WBC before the surgery.
Propensity score matching was used to deal with the differences in baseline characteristics. Kaplan-Meier method and Cox regression analysis was used to identify the independent prognostic factors of colorectal cancer patients.
And Spearman correlation and Wilcoxon signed-rank test were used to analyze the correlation between MPO expression and neutrophils. The function of MPO in CRC was studied through TCGA.
Results and discussion: Of 8,121 patients who had colorectal cancer surgery were available for analysis (Low pre-WBC group, n = 6,236; High pre-WBC group, n = 1,885). After propensity score matching, 1,553 patients remained in each group. Kaplan–Meier survival curves showed that high pre-WBC was associated with decreased overall survival (OS) (P=0.004) and disease-free survival (DFS) (P=0.01). Pre-WBC was an independent risk factor for OS (hazard ratio [HR], 1.234; 95% CI, 1.068-1.416; P = 0.004) and DFS (HR, 1.210; 95% CI, 1.047-1.397, P = 0.01).
Spearman correlation and Wilcoxon signed-rank test proofed that higher MPO expression was linked with higher infiltration levels of neutrophils. MPO plays promoting cancer effect in CRC patients using data from The Cancer Genome Atlas (TCGA).
Conclusion(s): Our research indicated that high preoperative WBC count is correlated with increased MPO level and both plays as a poor prognostic indicator in colorectal cancer patients.

13AP03-05
Comprehensive analysis of the expression and prognosis for *HOXC* family genes in colorectal cancer

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Background and goal of study: Evidence suggests that the*HOXC* gene family exerts extensive effects on tumor progression in various cancers, including colorectal cancer (CRC). To the best of our knowledge, the role of a few HOXC family genes in CRC has been determined but not systemically and comprehensively. Additionally, the role of the HOXC family in CRC is yet to be analyzed.
Materials and methods: In this study, we investigated the transcriptional and clinicopathological parameters, survival data, genetic mutations, and predicted pathways of the*HOXC* genes in patients with CRC using multiple bioinformatics approaches, including The Cancer Genome Atlas, ONCOMINE, the Human Protein Atlas, cBioportal, and STRING databases.
Results and discussion: Our results show that the transcriptional and protein expression of *HOXC* genes was largely upregulated in patients with CRC. Analysis of each *HOXC* family gene showed that higher expression of the HOXC family members presented more advanced stages of clinicopathological parameters (cancer stage, TNM stage, perineural invasion, and peritumoral lymphocytic infiltration) for patients with CRC.
Furthermore, upregulation of HOXC4/6/8/9/10/11 was significantly correlated with poor prognosis for patients with CRC, and they may be exploited as promising biomarkers for predicting the survival of patients with CRC and as potential therapeutic targets. Moreover, HOXC4/6/8/9/10 were largely regarded as independent risk factors for CRC prognosis. Furthermore, the*HOXC* gene family has significant diagnostic value for differentiating between patients with CRC and healthy individuals.
Conclusion(s): Collectively, the results of this study may provide new ideas for the screening of prognostic biomarkers of the HOXC family in CRC.

13AP03-06
Perioperative management of a patient with type II hereditary angioedema: be prepared and be vigilant

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Background: Hereditary angioedema (HAE) is rare autosomal dominant disease characterized by quantitative (type I) or qualitative (type II) changes in the C1 esterase inhibitor, leading to its reduced activity and uncontrolled activation of the classical complement cascade. Clinically, HAE can manifest as recurrent episodes of angioedema of the skin, GI and respiratory tract. Upper airway edema is documented by 50%–79% of patients and has an estimated 15%–33% mortality rate when untreated.
Case report: We report a case of a 52-year-old woman, ASA III, planned for hysteroscopy. Preanesthetic evaluation revealed history of HAE type II, with recurrent episodes of periorbital edema but without recent severe crises involving the upper airways. Additional medical history of atrial fibrillation. The procedure was programmed in an inpatient regime and in accordance with her immunoallergology consultation.
On the day of the procedure, the urgent administration of a bradykinin B2 receptor antagonist (Icatibant®) in case of acute crisis was planned and the patient received prophylactic therapy with 1000IU of plasma-derived C1 esterase inhibitor (Berinert®). Spinal anesthesia with 12,5mg levobupivacaine and 2,5mcg sufentanil was performed. The procedure lasted close to an hour and postoperative analgesia was accomplished with 1g acetaminophen. The patient remained under close observation for 12 hours, with no complications reported.

Discussion: Risk factors leading to HAE attacks include physical trauma such as surgery, possibly triggering respiratory distress and hemodynamic instability. Hence, prophylactic therapy should be accomplished and urgent therapy planned. Acute exacerbations may not respond well to antihistamines, glucocorticoids and epinephrine and urgent therapy with recombinant C1-inhibitor drugs or bradykinin receptor antagonists may be necessary.
Alternatives include high doses of androgens, tranexamic acid, adequate fluid therapy and intensive support. The supervising clinician must be prepared to recognize and manage angioedema and intubation should be attempted immediately if stridor and/or signs of respiratory arrest are present.
References:
1. Allergy & Rhinology. 2015; 6:1.
2. Brazilian Journal of Anesthesiology, 2017; 67:5, 541-543.
Learning points: Assessment and protection of the upper airway is the most important issue in the patient with acute angioedema. In order to minimize airway manipulation, regional anesthesia should be preferred.

13AP03-07
Opioid receptor expression in colorectal cancer: a nested matched case-control study

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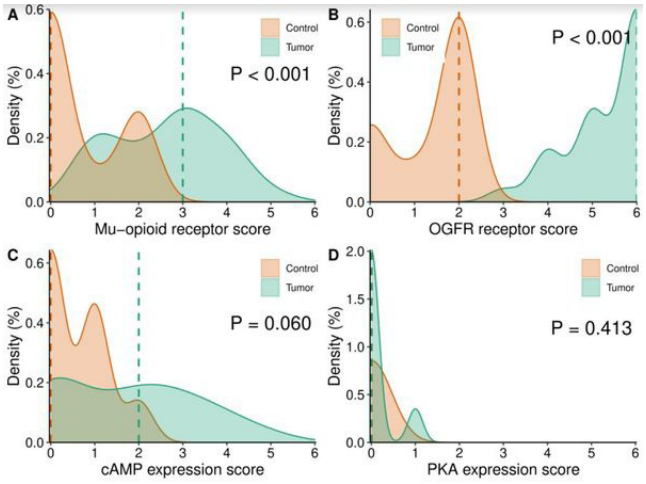
Background and Goal: There is growing interest in the effect of perioperative anesthetic management on the growth and spread of cancer. The impact of perioperative use of opioids on cancer recurrence remains controversial and an assessment cannot yet be established based on current publications.
This study aimed to assessthe differential expression of opioid receptors between healthy and tumor tissues in patients with stage II and III colorectal cancer (CCR) undergoing elective surgeryby immunohistochemistry (IHC).
Materials and Methods: Propensity–score matched case–control study nested in a retrospective cohort of patients with stage II or III CCR.
The primary endpoint was the difference in μ–opioid receptor (MOR) expression measured by IHCbetween tumor and healthy tissue in subject with or without recurrence.
Secondary endpoints were to evaluate the differences in Opioid Growth Factor Receptor (OGFR),cyclic adenosine monophosphate (cAMP) production and protein kinase A (PKA)in the matched sample and from afrom samples of CCR stored in the Cancer Genome Atlas (TCGA) and Genotype Tissue Expression Project (GTEx).
Results and Discussion: There was a significant difference in MOR receptor (median 3 [intequartile range IQR: 1–3] and 0 [IQR: 0–2], P<0.001) and OGFR receptor (median 6 [IQR: 5–6] and 2 [IQR: 1–2], P<0.001) in tumor and control tissue respectively. However, there were no significant differences in cAMP nor PKA expression between both types of tissuesand in expression in any of the analyzed variables by recurrence status.
The MOR and OGFR expression data from TCGA database were similar to our sample size data with lower expression of MOR and higher expression of OGFR in tumoural samples with a skewed distribution for MOR expression in tumor tissue both in patients with and without recurrence.



Conclusion: In patients with stage II and III CCR,overall expression of MOR and OGFR was significantly increased but was not different between previously matched patients with or without recurrence. No differences were found in the analyzed metabolic pathway of cAMP–PKA:These results were confirmed by an*in silico*analysis of samples from the TCGA–GTEx database.

13AP03-08
Study of a simplified algorithm for prevention of postoperative nausea and vomiting in an oncological hospital: a *quasi experimental* study

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Background and Goal of Study: There is some evidence that chemotherapy induced nausea and vomiting (CINV) may be related to postoperative nausea and vomiting (PONV). In this study, we tested if a simplified algorithm for PONV, using CINV as a risk factor, can reduce the incidence of PONV.
Materials and Methods: We used the TREND statement in this single center, nonrandomized quasi experimental trial in patients with malignancy undergoing surgery longer than 2 hours. It was approved by the Ethics and Research Committee of University of São Paulo and registered at Clinical Trials. We established a simplified algorithm for PONV prophylaxis: patients who had history of CINV receiving triple antiemetics (dexamethasone, ondansetron and droperidol) and patients who had no history of CINV receiving double treatment (dexamethasone and ondansetron).
We assessed the PONV incidence after 6 and 24 hours. Association between qualitative variables was analyzed using Pearson's chi-square test or Fisher's exact test. The Mann-Whitney test was used to compare the distributions of non-parametric quantitative variables in relation to the two independent groups. Poisson regression was used to analyzed the other risk factors associated with PONV (SPSS v 25 & Stata/MP 14.0 for Windows).
Results and Discussion: Over a one year period we enrolled 484 patients, of which 122 patients had CINV. Despite the training organized before the start of the study, adherence to the algorithm was

45,08%. The presence of nausea and vomiting in the first 6 hours in the CINV group when the algorithm was applied was reduced by 59% (RR = 0.41; 95%CI 0.20-0.83)(p = 0,014) and by 70% (RR = 0.30; 95% CI 0.10-0.91)(p = 0,033), respectively.
The implementation of the algorithm did not change the overall incidence of PONV. However, in patients who had history of CINV in addition to an Apfel risk score 3 or 4, incidence of vomiting was reduced by 80,6% (p=0,001)(RR = 0.194; 95% CI 0.071-0.529) and 50.9% (p=0,004) (RR 0.491; 95% CI - 0.300-0.804) at 6 and 24 h, respectively.
The adherence rate to the algorithm for less than half of patients was disappointing and reflects the established routine of administering a "universal" prophylaxis for PONV, regardless the risk factors.
Conclusion: A simplified algorithm using CINV as a risk factor for PONV did not reduce the incidence of PONV in this study population, but did reduce it considerably in patients who had both a history of CINV and an Apfel score 3 or 4.

13AP03-09
Postoperative ACE inhibitor-induced angioedema

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Background: Angioedema is a potentially fatal complication that can arise in the perioperative period associated with drug hypersensitivity reactions (1). It can be caused by ACE inhibitors but there are other differential diagnosis.
Case report: Male, 57 years old, ASA II, with a past history of hypertension, diabetes, dyslipidemia and moderate alcohol consumption. He had undergone hemorrhoidectomy under general anesthesia, without intraoperative or immediate postoperative complications.
6 hours after discharge from the PACU, he presented with exuberant upper lip swelling and cheek, with paresthesia. There was no swelling of the lower lip, tongue or mucous membranes, no dysphonia and no rash or itching.
The patient was eupneic, hemodynamically stable and pulmonary sounds were normal. Hydrocortisone and clemastine were administered, without improvement.
The patient mentioned a reaction to NSAIDs 20 years ago when questioned. Ketorolac had been administered during surgery.
Due to the risk of an allergic reaction compromising the airway, adrenaline was given, with slight improvement. Ibuprofen and lisinopril were discontinued. After evaluation by an Immuno-allergist, angioedema due to ACEI was diagnosed and treatment with corticosteroids and anti-histamines was started.
Discussion: There are 3 main causes for perioperative angioedema(1): allergic reaction, non-allergic hypersensitivity to NSAIDs and non-allergic hypersensitivity to ACEI.
In this case, the isolated lip swelling, lack of response to adrenaline, absence of more common allergic manifestations such as rash and pruritus, and late presentation of symptoms in relation to drug administration does not favor an allergic reaction.
On the contrary, NSAID angioedema may be delayed. The patient's history could suggest reaction to NSAIDs but this angioedema is usually periorbitary. ACEI induced angioedema affects only the upper airway(1).
It occurs at any time during treatment or up to weeks after discontinuation. It may be triggered by anesthesia/surgery, typically occurring within 1-8 hours. It is the most likely diagnosis.
In anaesthesia/surgery, there are several possible triggers for ACEI induced angioedema, such as trauma, airway irritation and surgical stress.
References:
1. Br J Anaesth. 2019 Jul;123(1):e38-e4

13AP03-10
Bioimpedance vs CT analysis - could it be an accurate and non-invasive method to estimate sarcopenia in gastrointestinal cancer patients awaiting major surgery?

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Background and Goal of Study: Sarcopenia is characterised by a loss of muscle mass and function, and associated with increased risk of postoperative complications and reduced survival (1).
Sarcopenia can be defined by CT as gold standard, and bioimpedance analysis (BIA). Muscle mass can be estimated by psoas muscle area at L3 vertebrae level. BIA is comparable and could be used to evaluate sarcopenia and pre-habilitation results without radiation. Our device is not validated in our patient population.
The study aimed to identify the relationship between CT derived psoas muscle area and BIA derived skeletal muscle mass in patients with gastrointestinal cancer.
Materials and Methods: CT scans were analysed by a radiologist using OsiriX software (Pixie SARL, Switzerland). Cross-sectional area of left and right psoas muscles, at L3 level, were calculated with the freehand tool.
Total psoas area (PA) was height corrected to give psoas index (PI). PI = PA (cm^2) / height $(m)^2$. BIA, performed with Seca mBCA 525 medical device, measured skeletal muscle mass (SMM) and was height adjusted to give skeletal muscle index (SMI). SMI = SMM (kg) / height $(m)^2$. Data collected from 20 consecutive patients, 16 with colorectal cancer, 4 oesophageal cancer.
Results and Discussion:

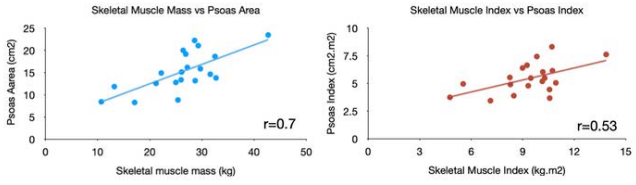

Figure 1: (a) Scatter graph of BIA derived skeletal muscle mass vs CT derived psoas area. (b) Scatter graph of BIA derived skeletal muscle mass vs CT derived psoas index

There was significant moderate association between PA and BIA derived SMM, r=0.7 ($p<0.05$), and when indexed to height with PI and SMI, r=0.53 ($p<0.05$).
Significance suggests a true association in our population. Linear regression analysis between SMM and PA, had r^2 of 0.49, whilst SMI and PI had r^2 of 0.29.
Published linear regression is higher, where Seca mBCA 525 BIA SMM and MRI SMM had r^2 of 0.97. This could be due to the small sample size or increased population variance. CT derived SMM analysis was not possible as all CT scans had contrast.

Conclusion: BIA has positive correlation with sarcopenia measured on CT however accuracy is poor in the population we studied and therefore its utility for pre-op assessment of sarcopenia in GI cancer patients is likely limited.

References

1. Malietzis et al.(2016),Influence of body composition profile on outcomes following colorectal cancer surgery, *BJS*, 103:572-582

13AP03-11
Enhanced recovery after surgery pathway in gastric cancer: a single center pre- and post-implementation analysis

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Background and Goal of Study: Enhanced Recovery After Surgery (ERAS) programs refer to a perioperative bundle of multimodal strategies aimed at optimising patient care in order to reduce surgical stress response and improve clinical outcomes and patient's recovery. Regarding ERAS for gastric surgery, there are still controversies which make difficult its implementation, and evidence is scarce for the impact of these programs in outcomes.

This study aims to determine whether the implementation of an ERAS program improves outcomes in patients undergoing surgery for gastric cancer.

Materials and Methods: Retrospective study including patients undergoing surgery for gastric cancer in a single center from January 2016 to January 2021. Patients were divided in two groups depending on whether surgery took place before or after implementation of an ERAS program at our institution (June 2018). Both groups were treated by the same surgical and anaesthetic team, and had the same oncologic standardised care.

The primary outcome was 30-day postoperative complications.

Secondary outcomes included hospital length of stay (LOS), reinterventions, readmissions and mortality. Hodges-Lehmann analysis was used to estimate median differences of non-parametric outcomes between both periods

Results and Discussion: We included 88 patients (47 in the pre-ERAS and 41in the post-ERAS group). Median age was 69 [IQR 58-78]. Comorbidities were similar in the two groups.

There were no differences between postoperative complications, reinterventions, readmissions and mortality. LOS was shorter in the post-ERAS group (9 [IQR 7-13] vs 6 [IQR 5-9] days; $P<0.01$). Oral feeding started earlier (-3 days; 95% CI -3 to -4), and urinary catheters were removed earlier (-1 days, 95% CI 0 to -2) in the ERAS group.

Conclusion(s): The implementation of an ERAS pathway for gastric surgery in our institution showed to be safe. Patients treated within the ERAS program had a shorter LOS with no differences in 30-day complications, reinterventions, readmissions and mortality.

13AP03-12
Umbilical hernia plastic repair under subarachnoid anaesthesia in a patient with Kartagener's syndrome: a case report

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Background: Kartagener's syndrome is a rare autosomal recessive disorder characterized by cilia dyskinesia and situs inversus (1). The dysfunction of pulmonary cilia causes severe mucus retention and possible severe respiratory infections, such as sinusitis and bronchiectasis (2,3). We describe the successful perioperative management of a patient with Kartagener's syndrome.

Case report: 57-year-old patient male, ASA II with known mild restrictive lung disease due to Kartagener's was presented for elective umbilical hernia repair. The preoperative evaluation with chest x-ray, pulmonary function tests and heart echocardiography did not reveal any significant abnormalities apart from the situs inversus.

After informed consent the patient was operated under subarachnoid anaesthesia. The basic monitoring (ECG, blood pressure and SpO_2), with the ECG in reverse was applied perioperatively. Spinal anaesthesia was performed in a sitting position, with a 25G non-traumatic needle through the L2-L3 vertebral space with ropivacaine 18mg, fentanyl 20mcg and morphine 100mcg. The intra- and postoperatively course was uneventful. The patient was discharged the next day.

Discussion: This case highlights the importance of a thorough preoperative evaluation and informed consent in patients with Kartagener's syndrome and the benefits of regional anaesthesia to counteract for possible cardiovascular and respiratory comorbidity.

The main anesthetic consideration should be the evaluation of the pulmonary function due to the increased susceptibility for respiratory complications. Respiratory physiotherapy, prophylactic antibiotics and preoperative bronchodilators may be necessary to optimize the patient's pulmonary function, while regional anaesthesia should be preferable.

Of note, patients with Kartagener's syndrome are more likely to suffer from congenital heart disorders and perioperative cardiovascular complications. ECG electrodes and defibrillator paddles/patches should be positioned in reverse to counteract for situs inversus (2,3).

References:

1. doi: 10.5152/TJAR.2015.94546
2. doi: 10.1093/bja/85.6.919
3. doi: 10.1111/j.0001-5172.2004.00357.x.

Learning points: Careful preoperative evaluation with an emphasis in respiratory and cardiovascular function and informed consent are imperative for the successful management of patients with Kartagener's syndrome. Regional anaesthesia should be the preferred method of choice whenever possible in suitable candidates.

13AP04-01
Target controlled infusion of propofol during endoscopic retrograde cholangiopancreatography for hepatic cirrhotic patients compared to non-hepatic patients. A quasi experimental study

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Background and goal of study: Target propofol plasma concentrations are derived from healthy individuals. Primary aim was to compare hepatic vs. non-hepatic patients during endoscopic retrograde cholangiopancreatography (ERCP) for propofol consumption (mg), target plasma concentrations for sedation and effect on recovery times.Secondary effect on hemodynamics.
Materials and methods: 40 non-cirrhotic vs. 40 cirrhotic patients (Child A or B) undergoing ERCP included. Sedation induced for both with propofol via a TCI syringe pump (Marsh pharmacokinetic model). Age, weight and target plasma concentration (4 μg/ml) were adjusted prior to induction. Sedation guided with Bispectral Index (BIS) and maintained during ERCP at 60 – 75. Induction time is time to reach BIS 60. Recovery time defined from propofol cessation till BIS > 90 or consciousness regain. Heart rate, blood pressure, oxygen saturation, BIS and target plasma concentration were reported at: T0 (Basline), T1 (5 min after induction), T2 (5 min ERCP), T3 (15 min), T4 (30 min) and T5 (Recovery).
Results and discussion: Comparable age (47.9±11.6 vs. 47.4±10.6 year, p=0.842) and body mass index. Hepatic patients (Child A 50% and B 50%) consumed less propofol (27.4±6.9 mg vs.39.8±13.4 mg, p=0.001) and were sedated at lower target plasma concentrations (T4: . 2.7±0.5 vs. 3.3±0.4 μg/ml), p=0.001). Induction time shorter among hepatic patients (p<0.001)
Despite similar ERCP durations (31.1±11.1 vs. 34±12.5 min,*p*=0.28), recovery time was longer among hepatic patients (8.5±2 vs. 6.2±0.9 min, p=0.001). A gradual decrease in target plasma concentrations with time among hepatic patients, this indicates a cumulative effect (T1: 3.3±0.3, T2: 3.1±0.3, T3: 2.9±0.4, T4: 2.7±0.5 μg/ml, repeated ANOVA p=0.001), Figure 1. Hemodynamics minimally affected in both groups.

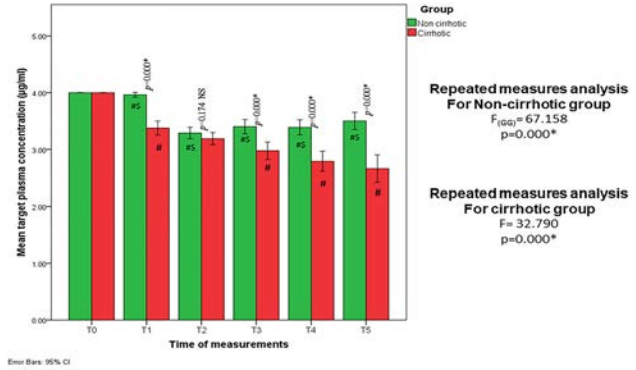

Figure. Clustered bar chart with 95% CI of target plasma concentration in the studied groups. Different superscript letters indicate statistically significant difference (using Dunn-Sidek method)

Conclusions: Sedation of hepatic patients required less propofol and lower target plasma concentration (<3 μg/ml) compared to patients with healthy livers. TCI of propofol required adjustments for hepatic patients. Continuous sedation depth monitoring was necessary to adjust for individual variations and to avoid any cumulative effect.

13AP04-02
Epidemiology of multimorbidity in the perioperative patients – an international multicentre cohort study

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Background and goal of study: Multimorbidity is a growing burden in our ageing society. Accordingly, the American Society of Anesthesiologists (ASA) physical status class of patients has increased over time. This classification shows a strong association with perioperative morbidity and mortality. Despite several modifications to the ASA classification, multimorbidity is still not considered. Thus, this study aims to assess the number of comorbidities across all ASA classes and how it might influence perioperative outcome.
Materials and methods: A subset of 8 international centres that had participated in the prospective ClassIntra®validation study were considered. Patients undergoing any type of in-hospital surgery were followed up until 30 days postoperatively. Type and severity of comorbidities were extracted from the electronic medical record. The primary endpoint is the number of comorbidities across all ASA classes; the secondary is the influence of the number of comorbidities on perioperative outcome.
Results and discussion: Of 1421 enrolled patients, the mean number of comorbidities significantly increased with higher ASA class (Fig. 1).

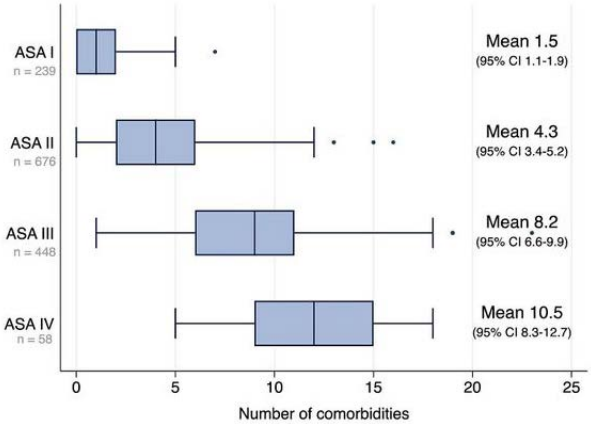

Fig. 1. Number of comorbidities in relation to ASA class

Results from mixed linear models with random centre intercepts showed that, even after adjusting for ASA class, the number of comorbidities was strongly associated with postoperative complications measured by the Comprehensive Complication Index (CCI®) (coefficient 0.83, 95% CI 0.40-1.26) and postoperative length of stay (coefficient 0.03, 95% CI 0.01-0.05). The results confirm the high prevalence of multimorbidity in a surgical population and show that ASA class and multimorbidity are independent predictors of postoperative complications and length of stay.

Conclusion(s): The rising complexity of multimorbid patients underlines the need for accurate preoperative risk assessment. As multimorbidity is an independent predictor of negative postoperative outcome, its integration in the ASA classification must be considered.

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13AP04-03
Malignant hyperthermia in Czechia and Slovakia: a description of the largest Slavonic group of patients investigated for risk of malignant hyperthermia. A retrospective observational national cohort study

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Background and goal of study: Despite the progress in nowadays common knowledge, diagnostics, and dantrolene availability, malignant hyperthermia (MH) is still considered to be every anaesthesiologist's nightmare. Genes causally connected with MH are *RYR1, CACNA1S* and *STAC3*. Published prevalence of*RYR1* variants associated with MH differs between countries and geographical areas. The goal of this study was to describe the Czech and Slovak cohort of MH susceptible (MHS) patients, the largest Slavonic MHS cohort to date, and to fill the knowledge gap regarding the Slavonic population from the MH perspective.

Materials and methods: MH diagnostics have been available in the Czech Republic for nearly 20 years. In this retrospective observational national cohort study, we screened 286 patients with suspected MH referred to our MH centre since 2002. Probands were investigated depending on the valid diagnostic criteria at the time of diagnosis using IVCT and molecular genetic variant screening, most recently next-generation sequencing. Inclusion criteria for further analysis included a completed MH diagnostic process and MH susceptible (MHS) status.

Results and discussion: MH prevalence in our patient cohort was 49%, with 79 MHS probands. A causal diagnostic variant has been found in 35 MHS families, representing 44% of all MHS families. Fifteen different*RYR1* diagnostic variants have been identified in our Slavonic MHS cohort. The most common variants were p.(Arg614Cys), p.(Thr2206Met), p.(Val2168Met) and p.(Arg2458His). All our four most common variants showed different frequencies compared to the UK or the Swiss MHS cohorts.

Conclusion(s): Compared to other MHS cohorts, our prevalence of diagnostic*RYR1* variants was lower, and the located variants showed different frequencies.

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13AP04-04
Evaluation of atelectasis formation and regression with electrical impedance tomography in the perioperative phase of obese patients scheduled for laparoscopic bariatric surgery: prospective observational study

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Background: Obese patients develop more frequently pulmonary complication and atelectasis upon general anaesthesia. The risk is increased in supine position, under controlled ventilation and during laparoscopic surgery, due to the increased intra-abdominal pressure.

Materials and methods: With ethics committee approval and written informed consents this pilot of a prospective, observational single center study evaluated the evolution of atelectasis in patients scheduled for laparoscopic bariatric surgery using Electric Impedance Tomography (EIT). We included 5 patients (final sample size 30 patients) aged over 18, with ASA status I-IV and BMI ≥40. Exclusion criteria were known severe pulmonary hypertension, need of home oxygen therapy, known heart failure and suspected or known recent pulmonary infections.

After standard i.v. induction, anaesthesia was maintained by volatiles and opioids. A transversus abdominis plane block was set before surgery. Neuromuscular blockade was antagonized by Sugammadex. EIT measurements were performed at the following time-points:
T1: before induction
T2: end of induction after recruitment,
T3: end of surgery
T4: after extubation in the OR
T5: before discharge from the PACU after 2 hours of monitoring,
T6: before discharge at home.

Percentage of silent spaces as well as the global inhomogeneity index, a measure of ventilation inhomogeneity, were analyzed. Data are given as median and interquartile range.

Results and discussion: A full dataset could be achieved in 5 patients. The median [Q1-Q3] proportion of silent spaces were: 10%[3-15%] at T1, 6%[3-20%] at T2, 5% [2-9%] at T3, 10%[7-14%] at T4, 13%[8-14%] at T5 and 12%[9-21%] at T6. Median [Q1-Q3] global inhomogeneity index were: 0.54 [0.48-0.57] at T1, 0.45 [0.44-0.58]

at T2, 0.56 [0.54-0.57] at T3, 0.63 [0.59-0.63] at T4, 0.60 [0.55-0.62] at T5 and 0.63 [0.62-0.64] at T6. The Friedman test shows a significant increase of ventilation inhomogeneity after the intervention, compared to before ($p = 0.04$).

Conclusion: In this pilot study we couldn't find a difference of poorly ventilated lung areas in obese patients in the perioperative period and before discharge. However, we found significantly more ventilation inhomogeneity in the measurements after the intervention, compared to before. Anaesthesia management allows for fewer intraoperative silent spaces, which reform postoperatively. A more proactive treatment of atelectasis in the postoperative period might be necessary.

13AP04-05
Gender-related differences in functional capacity between female and male patients undergoing major non-cardiac surgery. A posthoc analysis of the METS trial

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Background: Cardiopulmonary fitness is correlated with postoperative complications after major surgery. Gender-specific differences have not yet been taken into consideration for preoperative risk prediction.

The aim was to identify gender-specific differences in functional capacity in patients undergoing major non-cardiac surgery.

Methods: The study was approved by the responsible ethics committee (Peter MacCallum Cancer Centre, Melbourne: #20/246L). Posthoc analysis of the prospective METS study [1] (n=1,270). Primary endpoint was Clavien-Dindo-classification (CDC) score III-V within 30 days.

Separate models were formed for both sexes, and the optimal sex-specific peakVO_2 separation value was finally determined via Youden index of ROC. Multivariable regression models were formed using either the established general cut-off value (14ml/kg/min) or the sex-specific cut-off value.

Results and Discussion: Female patients (n=481, complication rate 10%) had a lower peakVO_2 than male patients (n=789, complication rate 15%) (fig.1A).

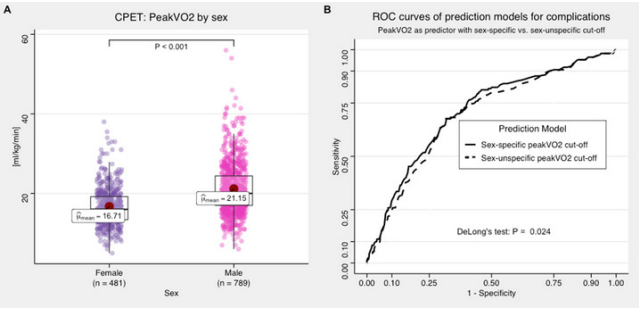

Figure 1: Gender-specific peakVO_2 (1A) and ROC curves (1B)

Optimal cut-off value was 12.5ml/kg/min for women and 16.5ml/kg/min for men. In the multivariable regression model, the unspecific cut-off value was not a significant predictor for CDC III-V.

In contrast, the gender-specific cut-off value was predictive for the occurrence of CDC III-V with an adjusted OR of 1.95 (CI95%: 1.36-2.78; $p<0.001$). The AUC_{ROC} of the gender-specific model was higher compared to the gender-unspecific model (0.71 vs. 0.69; $p=0.024$; fig.1B). The gender-specific model reclassified more patients correctly in terms of CDC III-V compared to the gender-unspecific model (32% vs. 7%).

Conclusion: Our sex-specific model increases the predictive power of peakVO_2 for CDC III-V. Therefore, sex-specific differences should be considered in spiroergometric risk stratification and reference values should be adjusted.

References:

1. Wijeysundera DN, Pearse RM, Shulman MA, et al. *Lancet* 2018;**391**(10140): 2631-40.

Acknowledgements: This study was conducted with the kind support and on behalf of the METS Study group.

13AP04-06
Prognostic performance and association of preoperative hyponatremia in predicting surgical outcomes: a systematic review and meta-analysis of 32 observational studies

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Background and goal: Preoperative hyponatremia is prevalent in patients undergoing major surgery. Despite this, it is uncertain if hyponatremia will lead to an increased risk of surgical mortality and morbidity.

We thus sought to systematically determine the associations and prognostic accuracy of preoperative hyponatremia with mortality and morbidity outcomes in patients undergoing surgery.

Methods and materials: A systematic search of Medline, Embase and Cochrane Library was performed. Articles that reported on the association between surgical outcomes among adults ≥18y with documented preoperative hyponatremia were included.

We pooled effect estimates using mixed-effects models, measured heterogeneity using I^2 and conducted sensitivity analyses following a PROSPERO-registered protocol.

Results: We identified 32 observational studies comprising 1,265,530 participants. Studies had a low risk of bias. When adjusted for covariates, patients with hyponatremia had significantly higher hazards of early mortality (<90 days) compared to patients with normonatremia (aHR=1.27, 95%CI=1.13-1.43, I^2=97%. N=10). Additionally, patients with preoperative hyponatremia also had significantly higher odds of developing major complications (a composite measure of 12 major morbidities) compared to patients with normal sodium concentrations after adjustment (aOR= 1.23, 95%CI= 1.09-1.38, I^2=97%. N=9) (Figure 1).

In terms of prognostic performance, preoperative hyponatremia performed adequately in predicting major complications in surgical patients (AUC=0.70, LR+ 2.0) with a specificity of 88% (Figure 2).

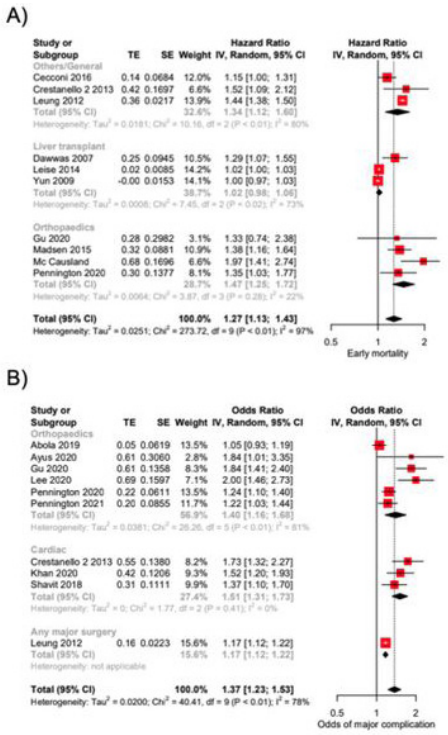

Figure 1. Meta-analysis of the adjusted associations of preoperative hyponatremia with early mortality (A) and major complications (B)

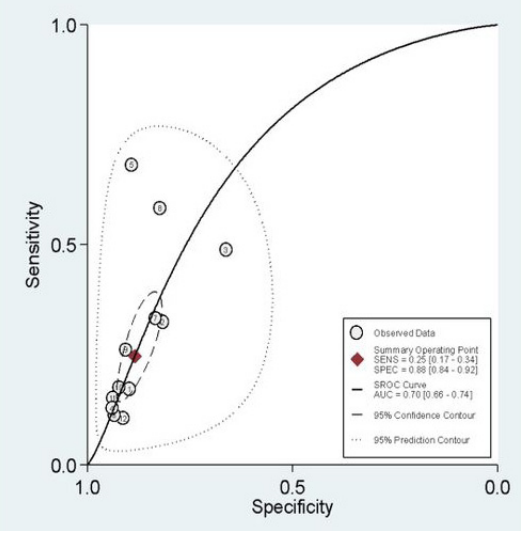

Figure 2. Summary Receiver Operator Characteristic Curve of Prognostic Performance of preoperative hyponatremia and major complications. Each data point refers to data from one study.

Conclusions: Preoperative hyponatremia is associated with poorer early mortality and major morbidity outcomes in surgical patients, and is an adequete predictor of major complications. Further studies are essential to evaluate if correction of hyponatremia will improve clinical outcomes.

13AP04-07
Comparing preoperative video education with face-to-face education by the anaesthesiologist: results from a pilot study

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Background and Goal of Study: Informing patients and obtaining consent is a legal requirement before undergoing anaesthesia. Traditionally the informed consent is obtained during face-to-face contact. A prerequisite for a digitally obtained informed consent is that patients are equally well informed. We hypothesized that video education results in the same level of knowledge as education by an anaesthesiologist.
We designed a randomized controlled trial (RCT) to measure short-, mid-, and long-term knowledge gain using our newly developed and validated knowledge questionnaire, the Rotterdam Anaesthesia Knowledge Questionnaire (RAKQ).
In this pilot study we will investigate if this trial is feasible, to assess the mid-term loss to follow-up and to determine an effect size for sample size calculation.
Materials and Methods: We enrolled 126 consecutive patients visiting our outpatient preoperative screening clinic between April and September 2021. Patients were randomized in one of four groups. The baseline group (B) took the RAKQ before education by an anaesthesiologist, the anaesthesiologist group (A) took the RAKQ after education by an anaesthesiologist, the video group (V) took the RAKQ after watching the video, and the video-anaesthesiologist group (VA) took the RAKQ after both watching the video and education by an anaesthesiologist. All participants were asked to take the RAKQ again after two and six weeks.
Results and Discussion: The median number of correct answers (total of 28 questions) differed significantly between groups on the day of consultation (Fig 1).

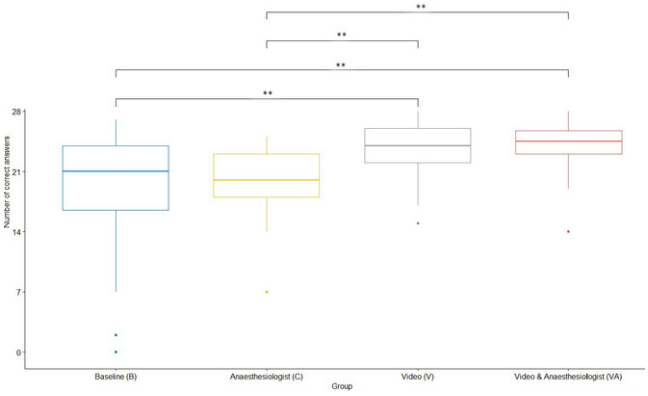

*Fig 1. Total of correct answers on the RAKQ. For all groups the first measurement is shown. Only significant difference (Kruskal-Wallis) are printed in the graph ** is p<0.001*

After two weeks the number of correct answers did not differ significantly between groups. The effect size of video versus face-to-face education on short-term knowledge retention was large (derived Cohen's D of 1.075) and on mid-term knowledge moderate (derived Cohen's D of 0.444). Loss to follow-up was 32% for the knowledge test after two weeks.

Conclusion(s): This four-arm RCT is feasible in our outpatient clinic. The effect size of video education on short-term knowledge retention compared to face-to-face education is large. Efforts should be made to reduce loss to follow-up after two weeks.

13AP04-08
Development of the Rotterdam Anaesthesia Knowledge Questionnaire (RAK-Q)

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Background and Goal of Study: Preoperative patient education is essential for obtaining an informed consent for anaesthesia. Current technological advancements make digital preoperative education and screening feasible, with less direct involvement of an anaesthesiologist. However, to maintain a high quality of informed consent, potential individual knowledge gaps need to be identified using a validated test.
Therefore, this study aimed to develop a knowledge questionnaire covering different anaesthesia techniques and preoperative instructions and to investigate the psychometric properties.
Materials and Methods: Items were created by two anaesthesiologists. Content validity was checked by a panel of 19 anaesthesiologists. To ensure readability the items were corrected to a B1 language proficiency level. To ensure face validity patients visiting the preoperative outpatient clinic completed the content valid questionnaire and were interviewed thereafter to provide feedback.
The validated questionnaire was filled in by 600 patients after visiting the preoperative outpatient clinic of a tertiary (N=300) and secondary teaching hospital (N=300). Underlying dimensions, i.e. variables that are not measured directly but are correlated with multiple other variables, were investigated. The psychometric properties of the questionnaire were determined using Item Response Theory (IRT) modelling.
Results and Discussion: Initially, items covered six predefined categories on anaesthesia, which were general, spinal, epidural and locoregional anaesthesia, sedation, and preoperative instructions. These items correspond to the digital education format that was designed to educate patients preoperatively. After content and face validity checking 61 questions remained. Multidimensional IRT (MIRT) gave nine underlying dimensions, which were clinically interpretable. In total, the psychometric properties of all dimensions were assessed with IRT modelling.
Conclusion(s): In total, nine dimensions were extracted which were clinically relevant and fit the digital education format that was designed to educate patients preoperatively. These dimensions represent a stable underlying structure of the questionnaire, which leaves room to further develop and add questions to these dimensions in other studies.
Furthermore, IRT allows for development of a computer adaptive test to reduce the number of questions needed to verify our patient's knowledge before obtaining informed consent.

13AP04-09
Health-related quality of life until one year after non-cardiac medium-to-high risk surgery in the Netherlands; secondary analyses of the TRACE Study

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Background and goal of study: The TRACE study was designed to study the impact of adding standardised postoperative anaesthesia visits for patients undergoing elective non-cardiac surgery on 30-day mortality and postoperative complications.[1]
In secondary analyses, we studied the course of health-related quality of life (hrQoL) until one year after surgery in this cohort of medium-to-high risk non-cardiac surgical patients.
Materials and methods: TRACE is a prospective, multicentre, stepped-wedge cluster randomised interventional study in nine academic and non-academic hospitals in the Netherlands. Using Dutch EuroQol (EQ-5D-5L) questionnaires, data on hrQoL were collected pre-operatively and 7, 30, and 365 days after surgery. Overall EQ-5D-DL index score was compared between the intervention and control group usingindependent t-tests.
In addition, the proportion of patients reporting any problem in five sub-dimensions (mobility, self-care, pain, anxiety, and activities) were plotted to visualise the course over time.
Results and discussion: Between 2016 and 2018, 5473 patients participated in the TRACE study. We found no significant difference between groups in EQ-5D-5L index score at any time point (pre-op 73.5 vs 73.8% (p=.680), day 7 67.3 vs 67.9% (p=.492), day 30 76.0 vs 76.2% (p=.754) and day 365 80.6 vs 81.3% (p=.350) in the control and intervention group respectively).
In sub-dimensions, the highest proportion of patients reporting any problem was on postoperative day 7, except for anxiety, which was reported highest pre-operatively. After day 7, this proportion gradually decreased until day 365 to a level comparable to or lower than pre-operative status (Figure).

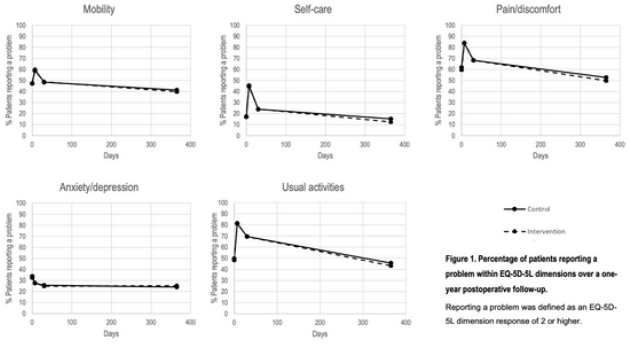

Figure.

Conclusions: This study shows unique health related quality of life data of a large non-cardiac surgical cohort until one year after surgery.
The results show a clear pattern of an initial decrease in hrQoL shortly after surgery, and a gradual stabilisation to or above pre-

operative levels after one year. The sub-dimension anxiety shows a different pattern and seems to be highly influenced by surgery-related anxiety.

Reference:

1. Trace Study Investigators, Ann Surg. 2021 May 24.

13AP04-11
Intraoperative hemodynamics of fasting patients in the University Teaching Hospital: a prospective ultrasound study

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Background and goal of study: Fasting prior to surgery is considered aspiration prophylaxis (1). However, prolonged fasting for many hours could lead to unstable hemodynamics (2).

The recent audit of preoperative fasting practices in our institution has shown that recommended guidelines (3) are often dismissed in favor of “nil per os” advice in patients undergoing elective abdominal surgery(4).

Our previous study (5) showed that patients who are fasting more than 8 hours have altered non-invasive preload indices (IVC-CI) consistent with hypovolemia. Yet it remains unclear whether these changes could induce hemodynamic instability. This study aimed to investigate the link between preoperative fasting times and intraoperative hemodynamics and the accuracy of non-invasive preload indices as predictors.

Materials and methods: Patients (n=70) undergoing abdominal surgery, without bowel preparation were included and divided in 2 groups based on the fasting period duration: <8h and > 8 h respectively. The latest IVC measurements were obtained on the day of surgery after the fasting period, with portable Logic e ultrasound. Significant hypotension (IOH) was defined as a decrease of more than 30% in MAP from the baseline level, or any absolute value of MAP < than 65 mmHg.

Results and discussion: The incidence of IOH in the first group (<8 hours) was 5.2%, in the second group (>8 hours) - 7.2%. After adjusting for confounders, fasting for more than 8 hours was associated with significantly higher odds of IOH (OR 1.28, CI 95%, 1.03 to 1.57; P=0.017) compared with the group that fasted > 8 hours (OR 1.10, CI 95%, 0.88 to1.45, P=0.397). 92% of patients from the 2 group were hypovolemic according to IVC-CI values.

Conclusion(s): To conclude, this study has demonstrated that prolonged fasting times (>8 hours) in consistency with non-invasive preload predictors has the potential to increase the odds of intraoperative hemodynamic instability.

References:

1. Kukliński, J., Steckiewicz, K.P, Sekuła, B.*et al.*The influence of fasting and carbohydrate-enriched drink administration on body water amount and distribution: a volunteer randomized study. *Perioper Med*10,27 (2021).
2. Influence of Fasting Duration on Body Fluid and Hemodynamics Masanori Tsukamoto, DDS, PhD et al.
Anesth Prog(2017) 64 (4): 226–229.
3. Aarts MA et al. ERASGuideline. SAGES 2014 1-30
4. Grynovska M. et al. Audit of preoperative fasting practices - EBPOM Congress 2021
5. Grynovska M. et al. Hemodynamic status of preoperative fasting patience in the university teaching hospital: a prospective ultrasound - ESAIC 2021 Abstract Book

13AP04-12
Multicenter perioperative outcomes group: big data in clinical research and quality improvement

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Background and goal of study: The Multicenter Perioperative Outcomes Group (MPOG) is a consortium of academic and community hospitals located throughout the continental United States, formed in 2008 as an initiative of the University of Michigan Medical School. The main objective is to aggregate electronic health record data and maintain a database of perioperative case information to facilitate research and quality improvement.

Materials and methods: After having completed a rigorous legal and infrastructural affiliation process, member institutions periodically submit perioperative case data to the central database. Data are available to approved users for research in the form of *Concepts* and *Phenotypes*.

Concepts are granular entities (e.g. serum glucose). *Phenotypes* are pre-computed values that may be inferred from concepts through logic operations and physiological models (e.g. cardiopulmonary bypass events inferred from physiological data).

Users may tailor research design using web-interface tools termed *MPOG Concept Browser* and *MPOG Phenotype Browser*, whereas*MPOG DataDirect*, allows users to build queries and estimate the cohort size matching the criteria. To obtain actual case data, users must undergo a meticulous multistep research proposal submission and approval process.

Proposals are presented to a committee that evaluates the proposal based on the meritorious value, clinical significance, and feasibility. Representatives of eligible participating institutions vote on granting database access.

Results and discussion: Since 2008, MPOG has grown to encompass 51 institutions. The central database contains more than 16 million perioperative cases. The proposal review process was started in 2012 and 98 research projects have been reviewed since then with 90 positive approvals.

Conclusion(s): The use of a large number of cases in clinical research can boost the power of a study. Introducing heterogeneity by using cases from a variety of institutions and locations allows to lower the effects due to regional population specifics or practice preferences. MPOG provides tools to facilitate both of these aspects.

References:

1. https://mpog.org

Acknowledgements: Supported by the Department of Anesthesiology of the Oklahoma University Health Sciences Center.

13AP05-01
Preoperative risk assessment: the role of ACS NSQIP, P-POSSUM and RCRI to predict general postoperative morbidity at Varese University Hospital

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Background and goal of study: Perioperative morbidity related to high-risk non-cardiac surgery affects short and long survival causing a huge use of economic resources. The preoperative evaluation represents a pillar for choosing the appropriate and effective surgical treatment tailored on patients characteristics.
Over the years, various tools have been studied and validated simplifying the stratification of the perioperative risk. These scores are useful models for identifying high-risk patients in which appropriate perioperative strategies are mandatory and they allow to improve the information to the patient, in order to obtain a valid informed consent. We compared predicted surgical complications based on perioperative risk scores to effective postoperative morbidity.
Materials and methods: Our trial included patients submitted to intermediate or high-risk elective non cardiac surgery at Ospedale di Circolo e Fondazione Macchi, in Varese. The perioperative scores taken into account were Surgical Risk Calculator (ACS-NSQIP), P-POSSUM and Revised Cardiac Risk Index (RCRI). Evaluations of risk obtained from the different scores during 30 days follow-up were compared to effective postoperative complications to analyze the performance of each score.
Results and discussion: Regarding to general postoperative morbidity (postoperative complication of any grade), we compared ACS and P-POSSUM; the first showed an average risk of 14.34% (41.9%-1.3%) and a discriminatory power evaluated with an AUC value of 0.69 (95% CI: 0.59; 0.79), the second, against an average risk of 42.59% (97%-4.3%), demonstrated a fair predictive ability described by an AUC value of 0.65 (95% CI: 0.54; 0.75).
Fig.1 shows on the left the ROC curves of the two scores taken into consideration. The postoperative cardiovascular morbidity was analysed comparing ACS and RCRI. Fig.1 on the right shows the related ROC curves.

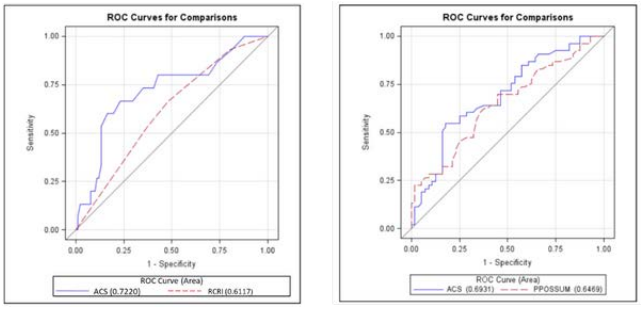

Fig.1.

Conclusions: Greater use of these tools should be encouraged in clinical practice and in particular ACS, in association to the most widespread ASA classification. This score was the most complete and accurate, despite P-POSSUM and RCRI still showed a good predictive capacity.

13AP05-02
Enhancing early postoperative intake by introducing a food service at the Post Anaesthesia Care Unit (PACU)

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Background and Goal of Study: Although most patients are able and allowed to eat and drink early after surgery, in the Post Anaesthesia Care Unit (PACU) few patients do so. By introducing a postoperative food service at the PACU, we hypothesised that this would improve early postoperative intake.
Materials and Methods: This prospective single-centre before-after study was conducted at the PACU of the Amsterdam UMC, location AMC. Adult patients with a planned overnight stay at the PACU, without postoperative dietary restrictions, were included.
The primary outcome of the study was postoperative fasting time at the PACU, defined as the time between the postoperative arrival at the PACU and time of first nutritional intake or 9 a.m. of the first postoperative day.
Secondary outcomes were nutritional optimization (*nutritional intake at two time-points, hunger, thirst, flatus*) and nutrition tolerance (*nausea and vomiting, anti-emetics*) after surgery.
Patients were surveyed at 8 p.m. on the day of surgery (*day 0*) and at 8 a.m. on the first postoperative day (*day 1*) about the primary and secondary outcomes. For analyses the Fisher's Exact test, the Mann-Whitney U test, and Cox regression were used.
Results and Discussion: A heterogeneous group of 235 postoperative patients were included, 119 in the control group (*pre-implementation PACU food service*) and 116 in the intervention group (*post-implementation*). Baseline characteristics on arrival at the PACU were comparable between the groups. Mean postoperative fasting time at the PACU was reduced from 17.5 hours in the control group to 11.5 hours in the intervention group (*p-value <0.001*). In the control group none of the patients had nutritional intake by 8 p.m. on day 0 and also none by 8 a.m. on day 1.
In the intervention group 45% of the patients had a nutritional intake by 8 p.m. on day 0 and intake increased to 80% by 8 a.m. on day 1. There were no differences between the groups for hunger, thirst, nausea and/or vomiting, and anti-emetics used postoperatively. In the intervention group the frequency of flatus was higher compared to the control group on day 1 (*53 vs. 28 patients, p-value <0.001*).
Conclusions: Implementation of a food service at the PACU led to an increase in nutritional intake with a decrease in PACU postoperative fasting time. Early oral postoperative intake was well tolerated and did not lead to an increase in postoperative nausea and vomiting and/or increased anti-emetics use.

13AP05-04
The impact of intra- and postoperative risk factors on the development of postoperative delirium

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Background: Postoperative delirium (POD) is an underdiagnosed adverse event with an incidence of 11-51% [1]. It contributes to the development of other adverse outcomes, such as prolonged inpatient stays in the intensive care unit (ICU) and hospital, longer-term cognitive impairment and increased risk of mortality [2].
In order to examine the effects of intra- and postoperative risk factors on the development of POD, surgery and ventilation time as well as the length of stay (LOS) in ICU were analysed in a multiple regression model.
Methods: In a monocentric prospective observatory trial, elective surgery patients (aged 60 years and above) in a tertiary hospital were assessed for the development of POD on 5 consecutive days. The cohort was divided into POD and non-POD groups based on postoperative assessment scores (4A' tests, Delirium Observation Scale (DOS), and CAM (-ICU)). Routine perioperative data and intraoperative risk markers were collected and a multiple logistic regression model was computed to analyse the combined impact of surgery duration, ventilation time and LOS in ICU on the development of POD.
Results: The POD incidence of the 976 examined patients was 23%. Patients who developed POD were older (mean age 73 vs. 72 years; $p < 0.001$) and had a higher ASA (level 3 and 4: 85% vs. 56%; $p < 0.001$). Surgery duration was 1.4 times longer in POD patients (279 vs. 200 min.; $p < 0.001$) as well as the ventilation time of POD patients (3.8 times longer; 31 vs. 8 h; $p < 0.001$).
Of 976 patients analysed, 477 (49%) were postoperatively in ICU. POD patients spent a mean of 145 hours in ICU and patients without POD only 22 hours ($p < 0.001$). The results of the logistic regression (Table1) showed a significant impact of surgery duration, ventilation time and LOS in ICU on the development of POD.
Conclusion: This observational trial revealed besides age and ASA, surgery duration, ventilation time and LOS in ICU as an independent risk factor on the development of POD.

	OR	95% CI		p-value
surgery duration (hour)	1.22	1.12	1.33	< 0.001
ventilation time (day)	1.55	1.14	2.19	0.008
LOS ICU (day)	1.11	1.05	1.18	< 0.001
Age (10 years)	1.67	1.32	2.13	< 0.001
ASA	1.86	1.39	2.51	< 0.001
Sex	1.68	1.17	2.43	0.006

OR- Odds Ratio, CI- Confidence Interval, LOS- length of stay, ICU- Intensive Care Unit, ASA- American Society of Anesthesiology classification; 22 values deleted due to missings.

Table 1: multiple logistic regression analysis (POD vs. non-POD group)

References:
1 Inouye et al., 2014
2 Raats et al., 2015

13AP05-05
Postoperative routine anaesthesia visits on the ward (TRACE study): a qualitative interview study among caregivers on perceived value and recommendations for future work

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Background and goals of study: The Dutch multicenter TRACE study evaluated the impact of postoperative anaesthesia care on the ward[1]. In TRACE, anaesthetists did two postoperative visits on day 1 and 3 in addition to usual care. However, no difference in 30-day mortality was observed. A total of 30% of advice given by anaesthetists was not followed up. Therefore, we performed a qualitative interview study to better understand these findings.
The first goal was to explore expectations of stakeholders, and experiences with postoperative anaesthesia visits in the ward. Second, to evaluate why advice given by anaesthesia was moderately followed up. Third, to explore stakeholders' perception of the patient population selected for the study.
Materials and methods: This qualitative interview study was performed at MUMC+, one of the nine TRACE study centers. Purposive sampling and semi-structured interview were performed with healthcare professionals involved in the care of patients. The group of professionals consists of surgeons, nurses and anaesthesia care providers. The interviews were recorded and transcribed verbatim. Two investigators independently undertook coding and analysis using a thematic approach.
Results and discussion: A multidisciplinary postoperative care approach was considered important. Perceived benefits were continuity of care, instant deliberation, complementary expertise and improvement of care via feedback. Joint visits were preferred but challenging to organise. A patient centered approach, clear responsibilities and communication were considered important for cooperation.
Standardized care greatly merits safety in non-complex care and postoperative anaesthesia visits are desired in complex patients, after major surgery, and in cases of protracted postoperative evolution.
Scores designed for preoperative prediction of failure to rescue, may better indicate patients for follow-up, but are lacking. Standard operating procedures for multidisciplinary postoperative care are deemed necessary. Specific training may provide anaesthesia with additional tools to lead future development of perioperative medicine.
Conclusions: Qualitative research by means of interviews with care providers seems to be a valuable tool for understanding the underlying cause of suboptimal multidisciplinary care in perioperative care. Multidisciplinary development of practical SOP's merits further investigation.
Reference:
1. Buhre W, et al. Ann Surg. 2021 May 24.

13AP05-06
Stress-response in patients with thoracoabdominal injuriesin the early post-traumatic period

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Background and goal of study: Various systems of endocrine regulation (hypothalamic-pituitary-adrenal, thyroid) and the neurovegetative component of the general adaptive system are involved in providing a response to stress in trauma. The aim of the work is evaluation of stress response in patients with thoracoabdominal injuries.
Materials and methods: 22 male patients with thoracoabdominal injuries were included in the study. Venous blood samples were taken from at the following stages: before the start of emergency surgery, at the end of the operation, 12 and 24 hours after its completion. Cortisol and prolactin were determined to assess the severity of stress response, and their ratio was calculated. The predominance of the sympathetic or parasympathetic parts of the autonomic nervous system was assessed by Kerdo index. According to this parameter, the patients were divided into two groups: the parasympathetic nervous system prevailed in 7 (31.8%) of the victims, and sympathetic – in 15 (68.2%).
Results and discussion: The results are presented in the table.

Kerdo index	Before emergency surgery	During emergency surgery	12 hours after emergency surgery	24 hours after emergency surgery
cortisol (138 – 690nmol/l)				
+	587° [460-893]	768 [683-1080]	391* [238-629]	544 [297-747]
-	812° [720-1753]	1009 [779-1988]	983* [804-1752]	538 [396-668]
prolactin (50 – 552mME/l)				
+	1049 [316-2615]	1083° [695-1517]	323 [201-1865]	517 [236-2192]
-	639 [408-985]	615° [409-768]	218 [193-379]	288 [139-390]
cortisol / prolactin				
+	0,56 [0.32-2.44]	0.63 [0.53-3.00]	1.12* [0.28-2.29]	0.75 [0.42-2,62]
–	1.80° [1.02-2.76]	1.81 [0.75-3.00]	3.47*° [2.44-9.45]	2.04 [1.41-2.88]

* p = 0,01, ° p = 0,05

In victims with the predominance of the parasympathetic nervous system the concentration of prolactin was higher before and during emergency surgery. In patients with a predominance of the sympathetic nervous system the content of both cortisol and prolactin before and during surgery exceeded the reference values. The cortisol/prolactin ratio with negative Kerdo index was no more than 1.0 in the perioperative period, slightly exceeded 1.0 12 hours after surgery and decreased by the 24 hours after emergency surgery. The positive Kerdo index combined with cortisol/prolactin ratio exceeded 1.0 at all stages of the study.
Conclusion: Thus, the predominance of the sympathetic nervous system upon admission to the hospital in victims with thoracoabdominal injuries is combined with the increased stress response and enhanced catabolic processes, most pronounced 12 hours after emergency surgery.

13AP05-07
Fluid challenges in the operating room

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Background and goal of study: Intraoperative fluid administration is a ubiquitous intervention in surgical patients. But inadequate fluid administration may lead to poor postoperative outcomes. Fluid challenges (FCs), in or outside the so-called goal-directed fluid therapy, allows testing the cardiovascular system and the need for further fluid administration. Our primary aim was to evaluate how anesthesiologists conduct FCs in the operating room and to compare the proportion of patients receiving further fluid administration based on the response to the FC.
Methods: This was a planned substudy of an observational study conducted in 131 centers in Spain in patients undergoing surgery
Results and discussion: 385 patients were enrolled and analyzed in the study. The median [interquartile range] amount of fluid given during a FC was 250 ml (200–400). The main indication for FC was a decrease in systolic arterial pressure in 246 cases (62.2%). The second was a decrease in mean arterial pressure (54.4%). Cardiac output was used in 30 patients (7.58%), while stroke volume variation in 7.32% %. The response to the initial FC did not have an impact when prescribing further fluid administration.
Conclusions: The current indication and evaluation of FC in surgical patients is highly variable. Prediction of fluid responsiveness is not routinely used, and inappropriate variables are frequently evaluated for assessing the hemodynamic response to FC.

	All	low-moderate risk surgery	high-very high surgical risk
	396	*239*	*157*
Decrease in systolic blood pressure, N (%)	246 (62.1%)	152 (63.6%)	94 (59.9%)
Decrease in mean arterial blood pressure N (%)	216 (54.5%)	132 (55.2%)	84 (53.5%)
Objective bleeding, N (%)	71 (17.9%)	28 (11.7%)	43 (27.4%)
Decrease in urine output, N (%)	30 (7.58%)	18 (7.53%)	12 (7.64%)
Decrease in cardiac output, N (%)	30 (7.58%)	7 (2.93%)	23 (14.6%)
Increase in stroke volume variation, N (%)	29 (7.32%)	8 (3.35%)	21 (13.4%)
Decrease in stroke volume, N (%)	26 (6.57%)	6 (2.51%)	20 (12.7%)
Increase in heart rate, N (%)	24 (6.06%)	16 (6.69%)	8 (5.10%)
Decrease in CO2, N (%)	22 (5.56%)	12 (5.02%)	10 (6.37%)
Increase in lactate, N (%)	13 (3.28%)	6 (2.51%)	7 (4.46%)
Increase in pulse pressure variation, N (%)	12 (3.03%)	5 (2.09%)	7 (4.46%)
Decrease ScvO2, N (%)	9 (2.27%)	2 (0.84%)	7 (4.46%)
Decrease in central venous pressure, N (%)	9 (2.27%)	5 (2.09%)	4 (2.55%)
Increase in plethysmography variability index, N (%)	4 (1.01%)	3 (1.26%)	1 (0.64%)
Increase in systolic pressure variation, N (%)	2 (0.51%)		2 (1.27%)

Table 1. Indications and variables used to predict fluid responsiveness

13AP05-08
Intraperitoneal infusion of local anesthetics in bariatric surgeries to reduce pain during the immediate postoperative period: a systematic review and meta-analysis

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Background and Goal of Study: Bariatric surgery is among the most performed surgeries in the world. A common problem that patients experience in their immediate postoperative period is acute pain and opioid consumption. This systematic review with metanalysis aimed to investigate the efficacy of intraperitoneal infusion of local anesthetics in reducing postoperative pain and opioid consumption in bariatric surgery.
Materials and Methods: We searched for randomized controlled trials (RCTs) in MEDLINE (via Pubmed), EMBASE, Scopus, Cochrane CENTRAL, and LILACS, that compared the use of intraperitoneal infusion of local anesthetic versus placebo in bariatric surgery. Two independents' reviewers did the studies selection and data extraction. We also assessed risk of bias and the certainty of evidence with GRADE framework.
Results and Discussion: We included five RCTs with a total of 629 patients. Intraperitoneal infusion of local anesthetics reduced pain scores in the immediate postoperative period with a standard mean difference (SMD) of .64 and 95% confidence interval (CI) [-0.87, -0.42] ($I2=0\%$; $p<0.00001$), with low certainty of evidence. There was no difference between local anesthetics and placebo in the outcome of postoperative nausea and vomiting (RR 0.97; 95%CI [0.64, 1.49]; $I2=62\%$; $p < 0.9$) and postoperative opioid consumption (RR 0.47; 95% CI [0.17, 1.25]; $I2=87\%$; $p=0.13$), both with very low certainty of evidence.
Conclusion(s): Our systematic review and meta-analysis conclude that intraperitoneal infusion can possibly reduce pain score. However due to several limitations of the studies included these findings need to be use carefully and further RCTs are needed to confirm our findings and the use of LA in clinical practice.
Key points:
1. The use of intraperitoneal infusion of local anesthetics tends to decrease the postoperative pain immediately.
2. Randomized controlled trials assessing intraperitoneal infusion of local anesthetics in bariatric surgery are prone to bias.
3. Stronger evidence is needed to conclude that local anesthetics might be used in clinical practice to reduce postoperative pain and opioid consumption in bariatric surgery.

13AP05-09
Use of human digital twin for prediction of pediatric patient recovery from posterior spinal fusion procedure

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Background and Goal of Study: The Internet of Medical Things (IoMT) represents a cutting-edge approach to collect physiologic data for healthcare using device wearables such as Fitbit. This data can be synthesized into a Human Digital Twin (HDT), a digital representation of a human. The HDT can be used to make predictions about patients and gain better insight into individualized health. We present IoMT data representing the recovery of patients following posterior spinal fusion (PSF) to correct scoliosis.
This is a pilot study used to demonstrate both the feasibility of both capturing biometric data from the patient population as well as differences in recovery.
Materials and Methods: Data was collected using Fitbit devices through Fitabase. Currently, 30 patients have been enrolled, while seven have completed the study. Patients wore the Fitbit health tracker three or more weeks prior to the scheduled PSF procedure to help determine baselines for sleep, heartrate, and overall activity (measured by the number of daily steps). Patients were then followed 6 months after the PSF procedure to measure return to baseline. Physiologic data, along with psychosocial survey data was collected to help measure recovery. Physiologic time series were analyzed using the Kolmogorov-Smirnov test to determine if patients had returned to baseline.
Results and Discussion: Statistical control charts were used to assess recovery. Recovery varied depending on the background and medical history.
Patient 1 activity recovery time was approximately four weeks, as evidenced to the return to the interquartile range. Observation of the patient indicated an improvement from the original activity baseline.
Patient 2 was a medically complex case and had an activity recovery time of approximately 15 weeks.
Patient 3 had an activity recovery time of 3 weeks, returning to baseline faster than the other two patients.
Conclusion(s): This study demonstrates the feasibility of using IoMT for the monitoring and tracking of patient recovery from a surgical procedure. The activity data collected from the IoMT allow us to distinguish between patient recovery times and other measures of recovery.
However, the IoMT provides a much higher frequency of data collection and allows for analyses of data not biased towards hospital stays. Other physiologic data and all participants will be discussed further.

13AP05-10
Gender differences in the impact of alcohol consumption of older patients on the quality of life after surgery

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Background and Goal of Study: An aging society leads to more older people having elective surgery. With a still high alcohol consumption in the European region[1], many of them consume alcohol. The study's aim was to evaluate the influence of pre-operative alcohol consumption on the mid-term quality of life (QoL) after elective surgery.

Materials and Methods: Results were derived as a sub-study of the PROPDESC (Pre-operative Screening for Postoperative Delirium) trial, conducted in 2018/2019 at the University Hospital Bonn. Alcohol consumption was assessed via the Alcohol Use Disorder Identification Test for Consumption (AUDIT-C) in 250 female and 419 male patients aged ≥60 years undergoing elective surgery. QoL was assessed pre-operatively and 180 days after surgery using EQ-5D-5L and EQ-VAS questionnaire.

Two groups per gender were formed: LAC: no or **l**ow**a**lcohol **c**onsumption or HAC: medium or potentially **h**azardous **a**lcohol **c**onsumption. AUDIT-C cut-off between the two groups was ≥3 for women and ≥4 for men. Univariate analysis was conducted using the Wilcoxon rank sum test and Fisher's exact test.

Results and Discussion: HAC-women had a lower Body Mass Index and a higher education than LAC-women (each p=0.000) and men in the HAC group were significantly younger than male LAC patients (p=0.012). Preoperative QoL analysis showed that women in the HAC group rated significantly better in the categories "Usual activities" (p=0.006) and "Pain/Discomfort" (p=0.019) and their overall self-rated health status (EQ-VAS) was significantly higher than in the female LAC group (p=0.011).

At the Follow Up HAC women still scored significantly better in "Usual Activities" (p=0.002) and EQ-VAS (p=0.005). The Follow Up health state index score was significantly higher in the male HAC group compared to the male LOC group (p=0.003). Experience of psychological, physical, and social well-being, leading to elevated mood, enhanced sociability and, eventually, to reduced stress might explain the significant association of some EQ-5D-5L dimensions with enhanced alcohol consumption.

Conclusion(s): It seems that patients with an actual potentially health-relevant alcohol consumption rate many aspects of their health better than abstinent or low-level drinking patients which leads to a more positive self-rated quality of life in older patients.

References:

1.Status report on alcohol consumption, harm and policy responses in 30 European countries 2019, www.euro.who.int (assessed on 28-SEP-2021)

13AP05-11
Developing and validating a machine learning ensemble model to predict postoperative delirium in a high-risk surgical patient cohort: a feasible approach for low-middle income country scenarios

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Background and goal of study: Postoperative Delirium (POD) is associated with increased complications, costs, and length of hospital stay. Its prevention lacks prioritization in low- and middle-income countries (LMIC), where safe perioperative care is still challenging. Because POD is multifactorial, machine learning (ML) is suitable to identify factors that may contribute to its occurrence. Perioperative assessment based on predictive and precipitating features offers an opportunity to prevent this complication in high-risk patients undergoing surgery in LMIC.

The goal of the study was to develop and validate an ML model to predict POD in high-risk surgical patients.

Materials and methods: A ML model was developed in a cohort of 1453 high-risk surgical patients undergoing non-cardiac surgery in a two-year period in a single-center quaternary University Hospital in the South of Brazil. Patients with more than 5% 30-day mortality risk, calculated using the ExCare Risk Model, were included. POD was defined as a positive Confusion Assessment Method (CAM) up to seven days after surgery. We developed a nested cross-validated ensemble model to predict POD. We selected features from the preoperative and postoperative periods. We compared different feature selections through the Area Under the Receiver Operating Characteristic Curve (AUC) score.

Results and discussion: The incidence of POD was 8.05% (117 patients). The POD group was paired with a control group of patients (1336 patients). The POD group was older, had a longer hospital stay, and had more complications. The performances of the models ranged from a mean AUC of 0.63 (CI 95% 0.56 - 0.68) when all preoperative features were included to 0.74 (CI 95% 0.7-0.76) when only three features were included: age, length of hospital stay, and the number of postoperative complications.

Conclusion(s): The predictive performance of the ML model for POD composed of few predicting and precipitating features was more precise than models that included several preoperative clinical variables. We used a robust ML approach to reduce bias and add precision to the prediction. Feature selection substantially impacted in the final accuracy of the model.

Our predictive model can help identify and label high-risk surgical patients with a high probability of developing POD during the hospital stay. Also, the model might constitute a template in LMIC settings where postoperative quality improvement programs are still an unmet need.

13AP05-12
The 12-item frailty assessment questionnaire LUCAS-FI – a feasible tool for preoperative risk stratification of elderly patients

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Background: Older adults undergoing surgery face an increased risk of postoperative complications and frailty is a known predisposing factor for poor outcome. Hence a frailty assessment is recommended in preoperative risk evaluation. The application of Fried's criteria as primary definition of frailty[1] requires extensive testing and is rarely feasible in clinical routine.

We compare the Longitudinal Urban Cohort Ageing Study-Functionality Index (LUCAS-FI), a frailty screening tool based on a self-administered,12-item questionnaire[2], with Fried's criteria for identification of frailty and pre-frailty and postoperative complication rate.

Methods: Patients ≥64 years scheduled for surgery were preoperatively assessed for frailty according to Fried's criteria (grip strength, Timed Up&Go, weight loss, exhaustion, low activity) and by LUCAS-FI. Patients were screened for delirium 5 days postoperatively; complications were registered for 6 months.

Results and Discussion: Data from 278 patients was analysed. Frailty was detected in 10 and 17 patients (4% vs. 6%, Fried vs. LUCAS-FI), 187 vs. 87 patients (67% vs. 31%) were classified as pre-frail. The convergence of the patient groups identified with the Fried's criteria and LUCAS-FI was 50% (frailty) and 38% (pre-frailty), respectively. Postoperative complications occurred in 5 (50%) and 8 (47%) of frail patients and in 54 (29%) and 26 (30%) patients with pre-frailty (Fried vs. LUCAS-FI).

The complication rate in the non-frail population was 28% (48 and 23). Postoperative delirium was present in 0 vs. 2 (13%) frail patients (Fried criteria vs. LUCAS-FI) compared to an overall delirium incidence of 6%. Despite the similar frailty prevalence, congruence between the cohorts was limited. Considerable differences were found in the prevalence of pre-frailty, where the Fried criteria yielded a higher rate. Both instruments were comparable in identifying patients at risk of postoperative complications.

Conclusion: The LUCAS-FI selected patients at risk for postoperative complications to a comparable extent as the Fried criteria and performs better than the latter in predicting postoperative delirium. Consequently, the LUCAS-FI appears to be a feasible frailty screening tool in preoperative anaesthesiologic evaluation.

References:

1. Fried LP, Tangen CM, Walston J, Newman AB et al. J Gerontol A Biol Sci Med Sci 2001 Mar;56(3):M146-56.
2. Dapp U, Anders J, Golgert S, et al. Z Gerontol Geriatr 2012 Jun;45(4):262-270.

13AP06-02
Individualized hemodynamic optimization guided by indirect measurement of the respiratory exchange ratio in major surgery: a multicenter, randomised, control trial (the OPHIQUE study)

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Background and Goal of Study: It has been suggested that a high respiratory exchange ratio (RER = ratio between CO2 production over O2 consumption) is associated with the occurrence of postoperative complications in high-risk non-cardiac surgery [1,2].

The main objective was to demonstrate that a goal-directed therapy algorithm incorporating the RER could reduce postoperative complications.

Materials and Methods: This is an interim analysis of a multicenter, randomized, open-label, superiority trial in high-risk non-cardiac surgery. The control group was treated according to the current hemodynamic guidelines. The interventional group was treated according to an algorithm based on the measurement of the RER. The RER was assessed using the non-volumetric method as follows: RER = (FeCO2-FiCO2) / (FiO2-FeO2), where FiO2, FeO2, FiCO2, FeCO2 are respectively the inspired and expired fractions of O2 and CO2, as displayed by the anaesthesia ventilator. The primary outcome was the occurrence of at least one complication in the 7 days following surgery. Secondary outcomes were the length of hospital stay, the 30-day mortality and the total intraoperative volume of fluids administered.

Results and Discussion: 191 patients were randomised and 180 were analysed. 37 patients in the control group (41.6%) and 39 patients in the RER group (42.9%) developed at least one complication (absolute difference=1.3% (95% CI = [-1.31%; 15.7%]); p = 0.86). The length of hospital stay was lower in the RER group (9 days versus 12 days ; p = 0,015). Others secondary outcome did not differ between the 2 groups: 30-day mortality (p= 0.70) and the total intraoperative volume of fluids administered (p=0.31).

Conclusion(s): In high-risk non-cardiac surgery, a goal directed therapy algorithm integrating the measurement of the RER did not reduce postoperative complications. However, use of this marker could reduce length of hospital stay.

References:

1. Bar S, Grenez C, Nguyen M, *et al.* Predicting postoperative complications with the respiratory exchange ratio after high-risk non-cardiac surgery: A prospective cohort study. *European Journal of Anaesthesiology* 2020; **37**:1050–1057.
2. Bar S, Santarelli D, de Broca B, *et al.* Predictive value of the respiratory exchange ratio for the occurrence of postoperative complications in laparoscopic surgery: a prospective and observational study. *Journal of Clinical Monitoring and Computing* 2020; **35**:849–858.

13AP06-03
The maintenance anaesthetic affects EEG based indices during emergence

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Background and goal of study: The electroencephalogram (EEG) during anaesthesia emergence may contain information regarding the neurocognitive outcome of a patient after anaesthesia (1) and it may be substance-specific as well (2). Here we investigated possible, substance related differences in EEG indices during anaesthesia emergence.
Materials and methods: We used the EEG of 45 patients (15 per group) recorded with a BIS A-1000 monitor during anaesthesia emergence from maintenance with sevoflurane (+sufentanil), isoflurane (+sufentanil), or propofol (+remifentanil). We replayed the EEG to the Conox, State Entropy and a newer version of the BIS (BIS Vista). We compared each index among the substances as well as the indices among each other.
Results and discussion: Comparing the indices among each other, Spearman correlation coefficients ranged between 0.47 and 0.9. The correlation was lowest for SE vs. the other monitors in the propofol group (r_s<0.58).
For the single monitors, patients receiving volatile anaesthetics had significantly higher (AUC>0.7) indices in median compared to propofol in the first 80%-100% of emergence. Wake indices (>80) were displayed later in the propofol patients (Fig.1: The horizontal lines indicate significant differences between the groups).

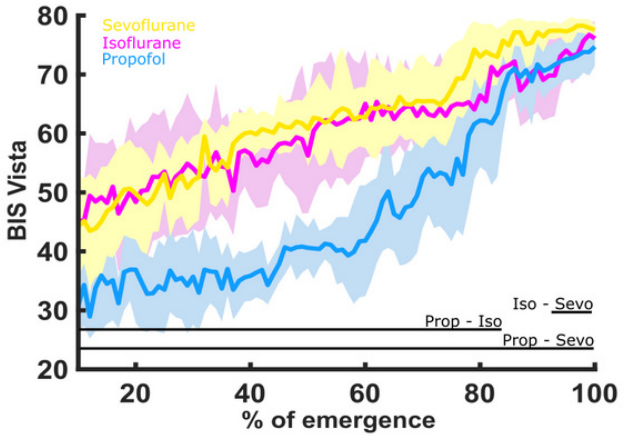

Fig. 1.

Consequently, 98% of patients from the volatile groups had indices >80 at the return of consciousness (ROR), but only 53% from the propofol group.
Conclusion: Before results from EEG-based indices influence clinical decision making, the interpretation of processed EEG signals should consider both - the underlying anaesthetic regimen (volatile vs. intravenous) and the EEG monitor used - as there are significant systematically differences in the processed EEG during emergence.
References:
1 BJA 2019 122(5):622-634; 2 Brain Sci. 2022, 12(1), 37

13AP06-04
Haemodynamic monitoring and management in patients having non-cardiac surgery: an international survey among members of the European Society of Anaesthesiology and Intensive Care

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Background and goal of study: In this international survey among members of the European Society of Anaesthesiology and Intensive Care (ESAIC), we aimed to determine how anaesthesiologists measure and manage blood pressure and cardiac output, and how they guide fluid administration and assess fluid responsiveness in patients having non-cardiac surgery.
Materials and methods: This web-based survey among ESAIC members was performed between October and November 2021. We report absolute and relative numbers of responses.
Results and discussion: A total of 615 completed surveys were analysed. When respondents decide to insert an arterial catheter for blood pressure monitoring, 61% of respondents (378/615) insert the arterial catheter during or after intubation when the patient is already anaesthetised. When using intermittent oscillometry to measure blood pressure, most commonly used measurement intervals are 3 minutes during anaesthesia induction (239/615; 39%) and 5 minutes during surgery (408/615; 66%).
In a fictional high-risk surgical patient, 62% of respondents (372/597) would use pulse wave analysis to monitor cardiac output (almost) always, and 29% sometimes (176/597). To guide haemodynamic management in the fictional high-risk surgical patient, respondents would most commonly consider pulse pressure variation ((almost) always: 318/589; 54%), cardiac output ((almost) always: 225/582; 39%), and central venous pressure ((almost) always (208/575; 36%). Only 23% of respondents (139/614) use a written treatment protocol to guide hemodynamic management in high-risk non-cardiac surgery patients.
Variables used to diagnose whether a patient is fluid responsive or not include arterial blood pressure (417/614; 68%), pulse pressure variation (389/614; 63%), and cardiac output (256/614; 42%).
Respondents' first choice maintenance fluids are balanced crystalloid solutions (316/611; 52%) and Ringer's lactate solution (246/611; 40%). To administer maintenance fluid, 75% of respondents (462/613) use drop infusions, 16% (95/613) use an infusion pump, and 8% (51/613) use repeated fluid boluses. First choice for fluid challenges are balanced crystalloid fluids (512/614; 83%). Hydroxyethyl starch – and other colloids – are rarely used for fluid challenges.
Conclusion: This survey summarises current trends in haemodynamic monitoring and management as well as fluid therapy.

13AP06-05
Continuous detection of hypovolemia with machine learning on arterial waveform parameters

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Background and Goal of Study: Correctly titrating the fluid dose for patients suspected of being hypovolemic remains challenging. Too little fluid may not ensure adequate perfusion whereas too much fluid is associated with increased mortality.
This study explores the notion that the blood pressure wave — as the result of the interaction between heart, vessels and respiration — contains valuable information regarding fluid state. We hypothesized that the arterial waveform can be used to generate model input for the identification of patients that will benefit from fluid administration.
Materials and Methods: Two datasets were obtained and used in this analysis. Group 1 consisted of patients that had coronary artery bypass graft surgery (n=20, all male), whereas group 2 consisted of healthy subjects in a controlled laboratory environment.
Hypovolemia was temporarily induced by means of incremental steps of positive end-expiratory breath holds (PEEP, group 1) and simulated hypovolemia through lower body negative pressure (LBNP, group 2).
Features that were extracted consisted of primary vitals (systolic, diastolic and mean blood pressure, heart rate), pulse-contour derived volume measures (stroke volume and cardiac output [1] left-ventricular ejection time), and interactions of these parameters.
Three classes were defined: normovolemia, hypovolemia (with PEEP or LBNP), and preload increase following fluid administration. Six machine learning algorithms were trained and tested via cross-validation to optimize the detection of hypovolemia. A crossover design was used to compare results between the two groups of data.
Results and Discussion: All algorithms performed reasonably well for the classification of the dataset on which they were trained. The SVM algorithm (accuracy of 92%) and the random forest algorithm (98%) performed best for PEEP and LBNP dataset, respectively. Using a cross-over design the Naive Bayes algorithm performed best trained on the PEEP data, and tested on the LBNP set (accuracy of 87%). Vice versa, testing PEEP data, trained on LBNP data gave best results using the logistic regression (accuracy of 78%).
Conclusion: This study demonstrates the potential of a machine learning algorithm based hemodynamic parameter analysis to assess real-time, continuous volume status in patients.
References:
1. Wesseling KH et al. J Appl Physiol (1985). 1993 May;74(5):2566-73. doi: 10.1152/jappl.1993.74.5.2566.

13AP06-06
TRAM34, a KCa3.1 channel blocker, decreases (neuro)-inflammation

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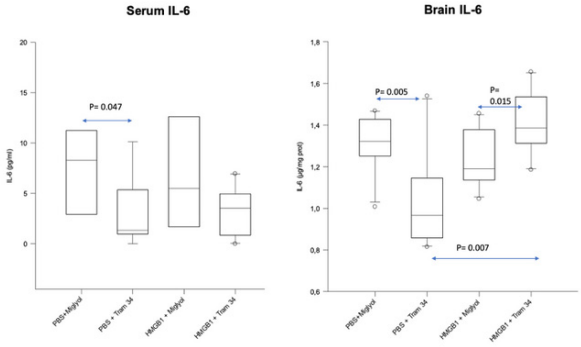
Background and Goal of Study: Perioperative neurocognitive disorders (PND) are associated with the non-resolution of an inflammatory cascade, prompted by high molecular group box 1 protein (HMGB1) released from traumatized tissue, leading to the activation of microglia and disrupting long-term potentiation. Activation of microglia depends on K channels (Kv1.3; KCa3.1). Influence of the KCa3.1 blocker TRAM34 on the activation of microglia, (neuro)-inflammation and the development of PND was investigated in a murine population. Murine surgical phenotype was mimicked by direct HMGB1/ phosphate-buffered saline (PBS) administration.
Materials and Methods: *Animals*: 12 weeks old, C57BL/6 mice.
Cognitive testing: Spatial Memory assessed by Y-maze testing 72 hours post-surgery/sham. Alternations and total arms entries were analyzed and compared. Reduction of alternations is indicative of spatial memory failure.
Intervention: Recombinant HMGB1 dissolved in PBS and administered intraperitoneally (IP) at 50 μg/kg
Sham: PBS administered IP
Inflammatory Response to Surgical Intervention: Circulating and brain interleukin 6 (IL-6) assessed by ELISA/ microglial proliferation by brain Iba-1 staining.
Preventative Intervention: TRAM34 or its diluent (miglyol) were administered prior to HMGB1/ PBS injection.
Results and Discussion: 72 Hours post-injections, neurocognitive decline (assessed by Y-maze testing) was induced in neither control (miglyol) nor TRAM-pre-treated conditions. Iba-1 staining showed the presence of surgical phenotype in control groups (PBS + miglyol*vs*HMGB1 + miglyol; P= 0.044). Following combined HMGB1 and TRAM34 injections, brain IL-6 levels significantly increased (*vs*PBS + Miglyol; P= 0.0151). By contrast, combined PBS + TRAM34 injections decreased brain IL-6 levels (*vs*PBS + Miglyol; P= 0.005). Similarly, serum IL-6 levels decreased following PBS + TRAM34 injection (*vs*PBS + Miglyol; P= 0.047).



Conclusion: The collected set of data was unexpected, suggesting that though TRAM34 vs Miglyol might lower background neuroinflammation, it might in contrast promote expression of the HMGB1-mediated neuroinflammation against which on the other hand mygliol might protect.

13AP06-07
Perioperative antiplatelet bridging therapy with cangrelor: concept and procedure based on a case report

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Background: Management of perioperative antiplatelet therapy in patients who have undergone recent percutaneous coronary intervention with implantation of a drug-eluting stent (DES) and are scheduled for noncardiac surgery should follow a multidisciplinary approach. Current guidelines recommend delaying elective noncardiac surgery until completion of full course of dual antiplatelet therapy (DAPT), however there may be benefits to early surgery (e.g. malignant tumours). Off-label cangrelor use (a reversible antagonist of P2Y12 receptor) has been pointed out as a valuable option to ensure continuation of DAPT perioperatively.
Case report: A 79y/o man with a DES placed after a NSTEMI 2 months prior, under DAPT with aspirin+ticagrelor, was referred for a laparoscopic low anterior resection for rectal cancer. Despite high thromboembolic and hemorrhagic risks, the multidisciplinary team (cardiologist, general surgeon and anesthesiologist) agreed to proceed with a minimally invasive technique, enrolling the patient in a protocol of antiplatelet bridging with cangrelor.
Admission to cardiology ward and ticagrelor suspension occured 5 days prior to surgery. After 48h, cangrelor was initiated (i.v. perfusion 0,75μg/kg/min) and maintained until 2h prior to surgery. A balanced general anesthesia was conducted with standard ASA and arterial line monitoring placed. Surgery was successful and uneventful, with estimated blood loss of 200mL.
The patient was transferred to an intensive care unit and resumed cangrelor at the same perfusion rate after 6h, given clinically adequate hemostasis. Ticagrelor 180mg was restarted 24h post-surgery, right after perfusion discontinuation, with subsequent maintenance dose of 90mg. No thromboembolic or bleeding complications were registered perioperatively.
Discussion: An individualized management of these patients by a multidisciplinary team allows for better surgical risk evaluation and perioperative outcome improvement. Cangrelor's safety and effectiveness have been corroborated as platelet inhibition alternative.
References:
Eur Heart J.2014;35(35):2383-431 | JAMA.2012;307(3):265–274.
Learning points: Predicting the perioperative thromboembolic and hemorrhagic risks and planning the management of antiplatelet therapy ahead is crucial to provide the best care.
Further investigation is necessary in intravenous antiplatelet bridging in noncardiac surgery in order to standardize its use and provide alternatives for high risk patients.

13AP06-08
Influence of hypobaric hypoxia on the coagulation pathway under standardized conditions

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Background and Goal of Study: Hypoxia is discussed as a trigger of prothrombotic changes in blood coagulation both in intensive care medicine (COVID-19) and in high-altitude and travel medicine [1]. However, hypoxia is often combined with inflammation, exercise, or venostasis. The actual effect of isolated hypoxia on blood coagulation is not well understood.
We therefore examined the effect of hypobaric hypoxia on novel functional coagulation variables in a highly standardized setting to test the hypothesis that hypobaric hypoxia per se leads to a prothrombotic situation.
Materials and Methods: 11 healthy female subjects were isolated in a climate simulation chamber (terraXcube, EURAC Research Center, Bolzano, IT) and studied under hypobaric hypoxia ($\triangleq$3,500 m a.s.l.) and normoxia for 5 days. Diet, hormonal status, and physical stress were standardized as early as 4 days before chamber entry. Blood samples were taken under resting conditions on days 2 and 4, respectively. Functional coagulation variables were measured by viscoelastometry (ClotPro®, enicor GmbH, Munich, Germany). The lysis ability of the blood was evaluated by the tPA test.
In addition, fibrinogen, PT, aPTT, factor VIII and vWF were measured. Statistics: one-way ANOVA with repeated measures; Greenhouse-Geisser correction; Bonferroni post hoc test.
Results and Discussion: Functional and plasmatic coagulation variables of all subjects before study inclusion were within the reference range. Hypobaric hypoxia did not significantly alter coagulation. Neither for functional coagulation variables nor for plasmatic values, significant changes were found on days 2 and 4 compared to normoxic control values (all $p > 0.05$). In particular, maximum clot firmness, clotting time, maximum lysis and lysis onset time remained unchanged. This was valid for both absolute values and relative changes.
Conclusion: Our study is the first to investigate the influence of hypobaric hypoxia in healthy female subjects in a standardized setting using modern functional viscoelastometric variables. The data shown here suggest that hypobaric hypoxia per se is not a risk factor for prothrombotic changes. Rather, the combination of hypoxia and inflammation or physical stress appears to be important in prothrombotic changes in critically ill patients or high-altitude mountaineers. Future studies should reexamine these conditions.
Reference:
1. Ninivaggi M et al. PLoS One. 2015;10: e0141797

13AP06-09
Does anemia play an important role in determining prehabilitation response?

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Background and Goal of Study: The distance covered during six minute walking test (6MWTD) is widely used to assess physical status before and after prehabilitation (prehab) programs. Improvement of functional capacity through exercise programs has proved better postoperative outcomes. Exercise performance and functional capacity may be limited, among others, by anemia. Our goal was to evaluate the impact of treatment of iron deficiency anemia in 6MWTD after a prehab program.
Materials and Methods: Retrospective observational study. High-risk patients undergoing major surgery were included in our multimodal Prehab program. All anemic patients (hemoglobin <130 g/l) received intravenous iron (ferric carboxymaltose, 500mg to 1500mg). Data from patients suffering anemia before starting the program was compared with those non-anemic.
Results and Discussion: Data from 100 consecutive patients enrolled in our Prehab program was analyzed. There were no differences between baseline demographic characteristics and comorbidities in anemic and non-anemic patients, except for age (74 years ±15 vs 66 years ±14). Results are displayed in table 1, values are expressed as medians ± standard deviation.

	Anemic patients (n=49)	Non-anemic patients (N=51)	P
Baseline 6MWTD, m	401 ± 115	490 ± 120	0,0002
Presurgical 6MWTD, m	414 ± 120	502 ± 120	0,0004
Δ6MWT, m (%)	9 ± 13	6 ± 11	0,15

Table 1.

At the initial evaluation and according to previous studies that identify hemoglobin concentration as a determinant of exercise capacity, anemic patients showed worse functional status covering significantly lower 6MWTD than non-anemic patients. Just before surgery, after a mean of 4 weeks of prehab, all patients significantly improved functional capacity. Although anemic patients continued showing lower 6MWTD after the program than non-anemic patients, proportionally, they improved more than the latter ones (9% versus 6%).
These results point out that intravenous iron administration places anemic patients in a better position to respond to prehab. It is of note that there may be confounding factors such as health habits, sarcopenia or frailty affecting functional capacity at initial assessment.
Conclusions: The presence of anemia has to be taken into account when interpreting 6MWTD. Anemia may play an important role conditioning prehab response and intravenous iron replacement may be determinant to improve the response to exercise training.

13AP06-10
Prewarming impact on the perioperative body temperature: a randomised clinical trial

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Background and Goal of Study: Perioperative hypothermia prevention remains a challenge, requiring the improvement of practices to achieve success in maintaining normothermia. Among them is the need to prevent patients arrive at operating theaters hypothermic to improve the effectiveness of the measures employed.
Thus, this study aimed to determine the effect of prewarming on body temperature in the perioperative period of patients undergoing conventional abdominal surgery and the level of thermal comfort.
Materials and Methods: A randomized controlled trial, conducted at a Brazilian oncology hospital, from 2019 to 2021, including 99 patients aged 18 years or over, submitted to elective conventional abdominal surgeries, with a minimum duration of 1 hour of anesthesia. Patients were enrolled and randomized into three groups: only preoperative warming of patients with a blanket and cotton sheet (control; n=33); preoperative warming with a forced-air warming system for 20 minutes (Intervention 1; n=33); preoperative warming with a forced-air warming system for 30 minutes (Intervention 2; n=33). Central temperature is measured by a zero-heat-flux temperature sensor every 20 minutes from the preoperative period until the surgery's end time. Thermal comfort was determined through self-report during the pre- and post-anesthetic period.
Results and Discussion: There was a significant difference between the temperatures measured between the groups (p=0.048), with evidence of benefit in maintaining the temperature in the group submitted to prewarming intervention for 20 minutes.
There was no significant difference between the percentage of temperatures below 36°C measured between the groups (p=0.135). Patients in the intervention groups were more comfortable during the post-anesthetic period than those in the control group (p=0.048). Only seven (8.24%) patients had postoperative shivering (p=0.399), more frequently in the control group (4;13.3%).
Conclusions: Prewarming for 20 minutes had the best results in relation to the measured temperature, with the lowest mean of temperature episodes below 36ºC during the intraoperative period and greater thermal comfort self-reported by the patients.
Acknowledgments: This work was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq (408223/2018-9)

13AP06-11
Evaluation of different methods of measuring the patient body temperature in the intraoperative period

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Background and goal of study: International guidelines recommend the maintenance of body temperature and reinforce the importance of measuring the patient body throughout the perioperative period, preferably with the same device, which rarely occurs in clinical practice, where methods such as axillary, temporal, and tympanic (by infrared) are used in the pre and postoperative period and invasive measurement methods in the intraoperative period. Furthermore, there is a lack of monitoring of patients' intraoperative temperature, especially in shorter-duration surgeries.

Thus, this study aimed to estimate and compare the reliability of temperature measurements by a peripheral infrared temporal thermometer, central cutaneous thermometer (Zero-Heat-Flux Cutaneous thermometer), and esophageal or nasopharyngeal thermometers among elective intraoperative surgical patients.

Materials and methods: Longitudinal repeated measures study, carried out with a convenience sampling of 99 patients undergoing elective abdominal cancer surgery, aged 18 years or older, with anesthesia duration of at least one hour. Each patient had their temperature measured by three methods (a peripheral infrared temporal thermometer, central cutaneous thermometer (Zero-Heat-Flux Cutaneous thermometers), and esophageal or nasopharyngeal thermometers).

Results and discussion: The intraclass correlation coefficient showed a low correlation between the measurements of the peripheral temporal thermometer and the central cutaneous (0.0324) and esophageal/nasopharyngeal (-0.138) thermometers. There was a high correlation (0.744) between the central thermometers evaluated. When applied to perioperative conditions, the peripheral temporal infrared thermometer does not represent reliable temperature measurements and seems to be more affected by specific intraoperative environmental conditions, such as exposure to cooler operating room temperatures or proximity to heat-generating equipment such as warming systems.

Conclusions: This study does not recommend using an infrared temporal thermometer as a strategy for measuring the body temperature of patients during the perioperative period. The two central thermometers tested are equivalent for detecting intraoperative hypothermia, which allows an analysis of the cost-benefit for health services.

Acknowledgements: This work was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq (408223/2018-9).

13AP06-12
Anesthetic approach of a patient with hereditary hemorrhagic telangiectasia in an emergency surgery setting

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Background: Hereditary hemorrhagic telangiectasia (HHT) is an autosomal dominant disorder characterized by mucocutaneous and visceral vascular dysplasia, manifested by frequent episodes of epistaxis and/or gastrointestinal bleeding.[1,2] This case report describes the anesthetic management of a patient with HTT in an emergency surgical setting.

Case report: Woman, 87 years of age, ASA IV, history of heart failure, arterial hypertension, and anemia associated to HHT presented with gastric telangiectasias. The patient was proposed for emergency supracondylar amputation of the right lower limb due to ischemia and was hemodynamically stable at pre-anesthetic assessment: hemoglobin 11.3 g/dL, urea 87 mg/dL, and creatinine 1.17 mg/dL, with unremarkable examination findings.

Given her medical history, an arterial line was placed in the right radial artery for continuous blood pressure monitoring, and a peripheral ultrasound-guided block was applied to the femoral and sciatic nerves (popliteal approach: ropivacaine 7.5 mg/mL, 20 mL in each nerve).

The patient remained stable and the surgery occurred without complications (around 1 hour duration). The patient was discharged 5 days post-surgery, with no pain complaints or blood loss.

Discussion: The anesthetic approach of a patient with HHT in an emergency setting can be challenging due to the limited time to perform a thorough assessment of the case and implement the best approach. General anesthesia with an airway approach can lead to mucocutaneous bleeding, possibly leading to hemodynamic and/or airway-related complications.

On the other hand, neuraxial anesthesia requires prior exclusion of arteriovenous malformations.[3] Here, peripheral anesthesia was shown to be effective, with a decreased risk of complications and resulting in a better outcome for the patient.

References:

1. AANA J. 2009;77:115-8.
2. Haematologica. 2018;103:1433-43.
3. Can J Anesth 2009;56:374–84.

Learning points: Anesthesia in patients with HHT requires careful planning for optimal control of bleeding, hemodynamic status and oxygenation, while keeping anesthetic effectiveness. In an emergency setting, where a thorough assessment of the case is not always possible, a peripheral anesthetic approach can be a good option, if suitable to the intervention, avoiding potential complications from other approaches.

Patient Safety

14AP01-01
Hyperpigmentation induced by ECG electrodes - unexpected finding one year after surgical intervention

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Background: The use of ECG electrodes is not risk free. Few clinical reports describe the occurrence of burns or allergies due to skin contact with the conductive gel or electrode adhesives, with the appearance of contact dermatitis, depigmentation or hypo/hyperpigmentation lesions.[1,2]
The authors intend to report a rare case of cutaneous hyperpigmentation that persisted one year after surgery.
Case report: An 18-year-old female patient with no history of allergies was submitted to a stomatology surgery under balanced general anesthesia. During the procedure, monitoring was applied in accordance with the standard of the American Society of Anesthesiologists, which includes continuous ECG monitoring, through the placement of three electrodes. The procedure, the anesthetic approach and the recovery were uneventful. After 6 hours the patient was discharged with no visible skin lesion.
One year later, the patient was proposed for correction of an arteriovenous malformation of the chin and, at the pre-anesthesia appointment, the presence of three hyperpigmentation areas compatible with the shape, size and location of the ECG electrodes were evident (Image 1).

Hyperpigmentation induced by ECG electrodes - unexpected finding one year after surgical intervention.

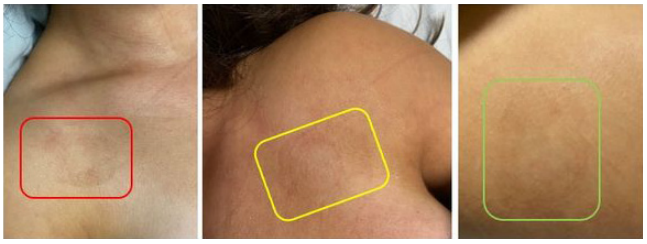

Image 1. Hyperpigmentation areas compatible with the shape, size and location of the ECG electrodes

Discussion: Due to chemical, mechanical, thermal or other physical mechanisms, skin lesions may appear after skin contact with electrodes. Contact dermatitis can take hours to days to appear and weeks to resolve. The most frequent occurrence is hypo/hyperpigmentation after the presence of inflammatory signs, although this was not seen in this clinical report. The presence of hyperpigmentation one year after the intervention differentiates this case from those already described, which report a duration of a few months.
References:
1. Tripi PA, Parthasarathy SN, Honda K. ECG-ELECTRODE INDUCED HYPOPIGMENTATION. Middle East J Anaesthesiol. 2016
2. Gordon S, LaTorre A, Witman P. Persistent pediatric contact leukoderma after exposure to butterfly electrocardiogram back pad: a report of three cases. Pediatr Dermatol. 2013
Learning points: This case aims to demonstrate the importance of acknowledging and being aware to adverse skin reactions that may occur after the application of ECG electrodes, despite its rarity.

14AP01-03
Where did the nasopharyngeal airway go?

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Background: Nasopharyngeal airways can be used to maintain upper airway patency and to facilitate pulmonary hygiene. Although rare, displacement to distal parts of the airway can occur, especially in patients with diminished airway reflexes. Dexmedetomidine is a versatile drug administered in various clinical scenarios, including sedation.
Case report: This case reports a 55-years-old male, on the 5th postoperative day after biological aortic valve implantation, concomitant with mitral-aortic endocarditis (E. faecalis). He had a medical history of decompensated congestive heart failure, paroxysmal atrial fibrillation, hypertension, dyslipidemia, anemia, non-insulin treated type 2 diabetes, previous smoking habits, lung infection by K. pneumoniae diagnosed 14 days before surgery and allergy to non-steroidal anti-inflammatory drugs.
A nasopharyngeal airway (NPA) was placed to facilitate secretion suctioning, while the patient was sedated with dexmedetomidine (24mg/h) and breathing spontaneously. During suctioning, the NPA disappeared from the patient's nose. Laryngoscopy was performed under sedation with dexmedetomidine 24mg/h, cetamine 10mg and etomidate 5mg, but the NPA wasn't found.
A chest and abdominal x-ray were requested and the outline of the airway device was identified in the right main bronchus. The foreign body was removed with a bronchofiberscope under multimodal sedoanalgesia with dexmedetomidine infusion, cetamine 20mg and etomidate 5mg, without any other complication.
Discussion: Attention should be paid to the integrity of security mechanisms that prevent the migration of nasopharyngeal airways to inadvertent locations. Additionally, concomitant deep sedation leading to diminished airway reflexes can increase the risk of these complications without being noticed promptly
References:
1. Hussain K, Hussain S, Abubaker J, Ahmed R. Nasopharyngeal airway aspiration: An uncommon cause of sudden respiratory distress in hospitalized patients. Turk J Emerg Med. 2018;18(2):78-79. Published 2018 Apr 17. doi:10.1016/j.tjem.2018.03.004
2. Naaz S, Ozair E. Dexmedetomidine in current anaesthesia practice- a review. J Clin Diagn Res. 2014;8(10):GE01-GE4. doi:10.7860/JCDR/2014/9624.4946
Learning points: Routine care procedures can be a source of iatrogeny and the risk for its occurrence depends on factors like healthcare professionals' experience, patient's level of sedation and integrity of the material used.

14AP01-05
Time is brain, but clinical history and clerking mean patient safety. A case report

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Stroke is currently the main cause of permanent disability in Portugal. Since time is brain, the priority is to prevent irreversible injury[1]. The transport of patients to tertiary care is the main goal if they are eligible for thrombectomy. Pre anesthesia evaluation and medical condition can be difficult to access, specially if patients are limited by the clinical condition.

A 54-year-old male patient with unknown personal history presented to the emergency department with an initial diagnosis of acute ischemic stroke. The patient was functionally independent.

On examination he had afasia, dysarthria and hemiparesis of the right leg. Non contrast CT and CT angiography scan showed occlusion M1 ACM and ICA (ASPECTS 9). NIHSS score was 21. Thrombolysis using r-TPA 80 mg was started and the patient was admitted to our interventional stroke center, for mechanical thrombectomy.

Pre anesthesia evaluation was performed, and no predictors of a difficult airway were found and breathing was not compromised. After establishing IV access and providing standard basic anaesthetic monitoring and BIS, conscious sedation was performed with a TCI of propofol, alfentanil and to prevent airway reactivity lidocaíne was administered.

After starting the procedure under X-Ray guidance, a partial denture was found in the oropharynx (Fig1).

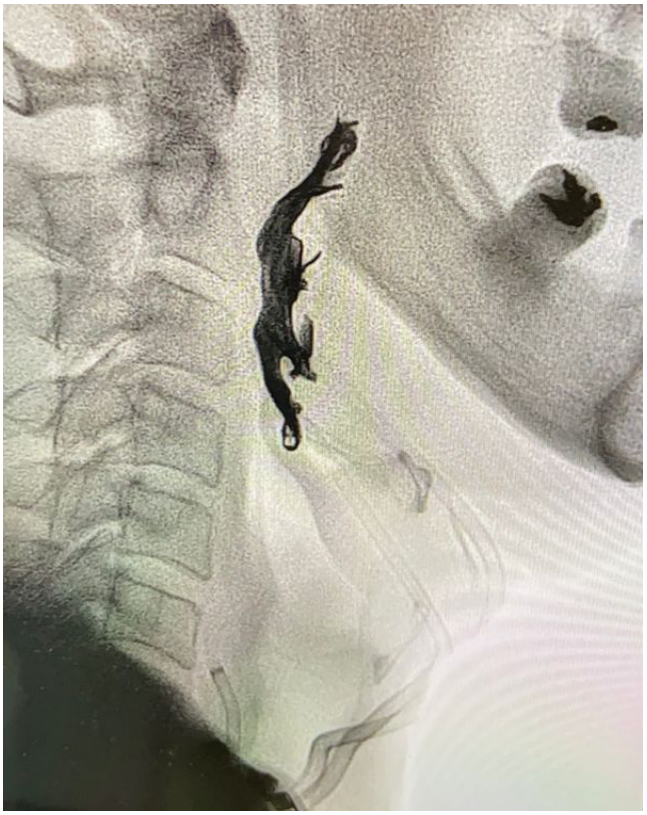

Fig 1

The initial concern regarding the decision of extraction was the risk of bleeding and the emergence of airway obstruction. The procedure was discontinued and the otolaryngologist's team performed meticulous extraction was successfully achieved with a Magill clamp, without complications. Thrombectomy was then performed. For post-procedure analgesia acetaminophen was administered.

Acute stress during emergency care and clinical status of the patient can condition pre-anesthetic airway assessment particularly dental evaluation. A focused history of the patient's previous dental status may be difficult, since dental hardware comprises a range of devices, most of which do not influence airway management.

Reference:
1 BARER DH:The European Stroke base.The BIOMED Programme 1995; 9: 412-3

Keywords:
airway management - pre anesthesia evaluation - safety

14AP01-06
The beach-chair position angle and non-invasivemonitoring means about cerebral oxygenation

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Background and Goal of Study: Although the safety of the beach-chair position (BCP) is widely accepted, rare devastating neurologic complications have been reported and attributed to cerebral desaturation. The decrease of cerebral oxygen saturation with the increasing of angle in patients undergoing shoulder surgery in the BCP.

The first aim of this study was to determine the best BCP angle that meeting the surgeons' need and avoiding cerebral desaturation event (CDE).

The second aim was to compare the ability that identify CDE between middle cerebral artery blood flow velocity (Vmac) and regional cerebral oxygen saturation (rScO2).

Materials and Methods: Eighty patients undergoing shoulder arthroscopy were prospectively enrolled to participate. Following induction of general anaesthesia, Vmac and mean arterial pressure (MAP, as well as jugular venous bulb oxygen saturation (SjvO2) and rScO2, were measured at 0° of elevation and again at different angles elevation.

Results and Discussion: The decrease in rScO2 and SjvO2 as well as SjvO2 and MAP were similar between each progressive increase in the beach-chair angle, leading to a linear decline in rScO2 as the BCP increased. ROC curves were used to determine the cut-off values ($P<0.001$, cut-off value=52.5). ROC analyses the area under the ROC curve (AUC) that about Vmac was 0.716, and about rScO2 was 0.790($P>0.001$).

Conclusion(s): The best BCP angle that meeting the surgeons' need and avoiding cerebral desaturation event (CDE) was 52.5°. The ability of rScO2 that identify CDE was better than Vmac in BCP but did not differ much.

14AP01-07
Dosing error in the administration of intratecal morphine in obstetrics

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Background: The recommended dose of neuraxial morphine often implies having ampoules with different concentrations, which can cause errors in its administration. We present two cases in the obstetrics service in which much higher doses than desired were administered.

Case Report: In the first case, the spinal anesthesia was performed with 50 mcg of morphine. During the evolution, she presented drowsiness and blurred vision. On clinical examination, she highlighted bradypnea and miosis. Given the suspicion of possible opioid intoxication and other causes ruled out, treatment with naloxone in fractionated bolus was started, presenting immediate clinical improvement. Carrying out a retrospective evaluation, the use of a 10 mg/ml morphine ampoule was evidenced instead of the 0.1 mg/ml ampoule, prepared by the pharmacology service and available in our center to perform this technique. The patient was admitted to intermediate care under naloxone perfusion and closely monitored surveillance. She presented a satisfactory evolution and could be discharged from the unit after 3 days.

The second case, the spinal anesthesia was performed with 60 mcg of morphine. During the intraoperative time, the nursing staff reported the use of the 10 mg/ml morphine ampoule instead of the 0.1 mg/ml one. After the surgical act and without presenting clinical instability, she was transferred to the intermediate care unit, where treatment with naloxone infusion was started. During her evolution, she presented symptoms of mild drowsiness, mild bradypnea, and predominantly facial pruritus. After 48 hours of treatment and strict monitored surveillance, she presented adequate clinical evolution, allowing discharge from the unit.

Discussion: Medication errors (MEs) are one of the leading causes of preventable harm.[1]The records of morbidity and mortality in the obstetric population related to MEs are extremely scarce.The early detection of accidental administration of high doses of intrathecal opioids and the prevention of secondary complications, with a close monitored surveillance and the use of antagonists can reduce the probability of serious complications.

References:

1. Airaksinen, M., Otero, M-J., Schmitt, E., Cousins, D., Gustafsen, I., Hartmann, M., Lyftingsmo, S., Muff, P., Thors, C-E., Vlcek, J., & Expert Group on Safe Medication Practices (2007). Creation of a better medication safety culture in Europe: building up safe medication practices. Council of Europe.

14AP01-08
Further improvement of the Safe Surgery Checklist compliance by using in-depth feedback through communication and an immediate recall process by the PACU

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Introduction: Since the introduction of the Safe Surgery Checklist (SSC) by the WHO in 2009, hospitals all over the world integrated the use of it in their operating rooms (OR). Although seemingly straightforward to use, multiple studies demonstrate that the SSC is underused. Earlier research in our center showed significant improvement in SSC use, after multiple multifaceted interventions, albeit leaving room for further improvement.

Our aim is to further improve compliance through a new intervention: recall the OR nurse when the SSC is incomplete.

Methods: Setting: Surgical Day Care Centre, 4 ORs, azSint-Blasius, Dendermonde, Belgium. Examination of closed record data of all surgeries during the last two weeks of Jan – June 2021 (SP2), compared to data of a previous study period (June 2019 – June 2020 (SP1)).

Inclusion: surgeries under general anesthesia, sedation or regional anesthesia.

Exclusion: surgeries under local anesthesia only. We evaluated Sign in (SI) by surgeons and anesthesiologists and Time out (TO) and-Signout (SO) by the OR nurses.

Interventions: PACU-nurses recall the OR nurse if the SSC was incomplete. Incomplete SSCs were visually marked by a sticker, to detect corrected SSCs. Continuous feedback to all relevant OR professionals by mail and posters in the OR was provided, to show where things were going in the right direction or where there was still room for improvement.

Statistical tests: Chi-Square and Cochrane-Armitage trend test. $P<0.05$ was considered statistically significant.

Study approval: Committee for Medical Ethics ofazSint-Blasius (N° B012201941152).

Results: 266 SSCs were analyzed and compared to 2433 SP1-SSCs. 1182 (93.4%) were complete, vs 91.3% in SP1 ($p<0.03$). SI improved by surgeons (97.3 vs 97.9%, $p=0.03$) and anesthesiologists (98.4 vs 99.4%, $p=0.008$). TO did not improve (97.3 vs 97.6%, $p=0.633$), but SO did (from 95.1, to 95.8%, $p<0.001$).

Unfortunately, nurses recall was only executed in 1 case. Feedback of PACU-nurses revealed pressure from recalled colleagues and subsequent reluctance to intervene. Examining changes within SP2, SI by surgeons improved significantly ($p=0.006$), as well as the number of complete SSCs ($p=0.01$).

Conclusion: espite missing the intervention target, SSC use continued to improve. We hypothesize that intense and sustained communication, along with recall pressure by peers led to better compliance. Nevertheless, there is still room for better results, since only anesthesiologists reached the desired >98%.

14AP01-09
Oral tissue injuries during intubation in orofacial cleft patients: pilot study

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Background and Goal of Study: Cleft lip and palate are one of the most common congenital malformations. Intubation is often difficult, therefore, a protective obturator for covering alveolar and palatal defect for children undergoing primary cleft lip or palate surgery was created. The goal of the study was to evaluate how the protective obturator (PO) affects an intubation process.

Materials and Methods: The primary aim of this pilot trial was to evaluate oral tissue injuries during intubation with and without the use of PO.

Secondary aims included the evaluation of the laryngoscopic image during intubation using the Cormack-Lehane score (CLS) (CLS types 2b, 3 and 4 represent difficult intubation), intubation time (first successful intubation = first wave of end-tidal CO2) and the occurrence of desaturation <90% SpO2 with and without the use of PO.

Results and Discussion: Overall 31 patients with orofacial cleft were included in the pilot study (5/2021-12-/2021), 16 patients (52%) underwent primary cleft lip surgery in neonatal age, 15 patients (48%) underwent primary cleft palate surgery in infancy. Of those, 19% of patients were diagnosed with unilateral cleft lip and alveolus (UCLA), 42% with unilateral cleft lip and palate (UCLAP), 23% with isolated cleft palate (IP), and 16% of patients had bilateral cleft lip and palate (BCLAP). The protective obturator was used in a total of 19 patients (61%). In the obturator group, no damage of tissue during intubation was observed. In contrast, 38% of patients in the group without PO suffered lip or alveolar soft tissue damage.

We compared CLS imagines only in patients with unilateral bilateral cleft lip and palate (U/BCLAP). In U/BCLAP patients using PO, difficult intubation was observed in 67%, in the group without obturator it was in 73% of patients. The duration of intubation was shorter in the group with PO (on average 79 seconds), in patients without PO on average 102 seconds.

Conclusion(s): Using a protective palatal obturator is promising approach for increasing the safety of anesthesiology management. With the protective obturator, no damage of the oral tissues after intubation, better intubation conditions according to the Cormack-Lehane score, faster intubation and less occurrence of desaturations were observed.

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14AP01-10
How good we think we are and how good we actually are in implementing Safe Surgery Checklist?

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Background and goal of study: Teamwork is crucially important in the operating room where mistakes and complications can be life threatening. In 2009 World Health Organization came out with a Safe Surgery Checklist that ensures patient safety during surgery which depends on the whole surgical staff's cooperation.

The aim of this study was to assess and compare the surgical staff's opinions on the SSC and the usage of the Checklist during surgery in the Hospital of Lithuanian University of Health Sciences Kaunas Clinics, Lithuania one year after the implementation of the Checklist.

Materials and methods: The research was conducted at the Hospital of LUHS Kaunas Clinics. Data was collected by using two different methods: objective monitoring of the completion of the SSC in the ORs of Urology, ENT and General Surgery, gathered by non-biased concealed observers during the period of Nov 1st to Dec 31st 2021 and a simultaneous anonymous online survey.

Results and discussion: The study revealed the real situation of how the surgical team sees the implementation of the SSC and how the Checklist is applied in practice. 69 general surgery, urology and ENT operations were observed during the two-month period. While in 98.5% (68) of the procedures, the paper was completed and signed, in only 3% of cases was the checklist used properly and in 76% of cases the paper was not discussed at all.

The survey was completed by 100 respondents, including nurses and doctors. 72% of respondents consider the SSC to be vital and appropriate for 80% or more of operations, while 87% believe that the sheet is used appropriately in more than 80% of cases. Although most of respondents identified weaknesses in the checklist, as many as 65% would like to see the checklist used when operating on themselves or their relatives, thus reducing the chance of error.

Conclusion(s): The observation and the survey showed that perceptions and actual implementation of the Checklist differ. However, despite the difficulties, the success of the implementation of the SSC must continue to be monitored to improve the safety of surgeries.

References:

1. Br J Surg. GlobalSurg Collaborative. Pooled analysis of WHO Surgical Safety Checklist use and mortality after emergency laparotomy. 2019 Jan.

2. Schwendimann R, Blatter C, Lüthy M, Mohr G, Girard T, Batzer S, Davis E, Hoffmann H. Adherence to the WHO surgical safety checklist: an observational study in a Swiss academic center. Patient Saf Surg. 2019 Mar 12;13:14.

14AP02-02
Bacterial contamination of water used as thermal transfer fluid in fluid warming devices

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Background and Goal of Study: Recent reports implied heater-cooler units (HCU), which are used for warming of infusions, blood or in ECMO devices by heat transfer between actively heated water in a reservoir to the administered fluids, as possible origin of health care-associated infections with pathogens like nontuberculous mycobacteria.
Materials and Methods: To investigate HCUs as a source for bacterial infections in an operating room (OR) and aseptic intensive care setting, 300-500 ml of liquids derived from 24 independent thermal transfer fluids (TTF) were collected from 24 HCU devices and transferred within 6 hours to the Austrian Agency for Health and Food Safety for analyses. Presence of bacteria in the samples was detected by biofilm formation. Colony count was attained through inoculation in a nutrient agar culture medium and incubation at 22°C or 36°C. Testing for *Pseudomonas*species (*spp.*) and *Legionella spp.* was implemented via membrane filtration and inoculation on BCYE and Cetremide agar respectively. Examination of *Mycobacterium spp.* was performed on Löwenstein-Jensen-, Stonebrink- and MGIT medium, using an in-house protocol for sample preparation.
Results and Discussion: Bacterial growth was detected in each of the 24 collected TTF after cultivation at 22°C or 36°C. Enumeration of colony forming units (CFUs) after 2 and 3 days in culture revealed the presence of > 3000 CFU/mL in each sample at 22°C and from 870 to > 3000 CFU/mL at 36°C. *Pseudomonas aeruginosa* was the most frequent pathogen identified, being present in 12.5% (3/24) of the fluids at > 100 CFU/mL after 2 days of incubation. Co-infections with *Mycobacterium chimaera*, *Ralstonia picketti* and *Ralstonia mannitolilytica*were detectable in 8.3% (2/24) of the isolates. In 4.2% (1/24) the rare aerobic, Gram-negative C*upriavidus gilardii*was identified.*Legionella spp., Enterobacterales*and*Enterococci spp.*were not detectable in the TTF.
Conclusion(s): Presence of bacterial pathogens in each sample indicate HCUs as a potential reservoir for contamination. Although the TTF and the infusions or blood transfusions are mechanically separated from each other and the pathogens are not transferred into the patient if the HCUs are used according to their specifications, failure of correct disinfecting procedures and/or handling errors, e.g. opening or refilling of the reservoir in the sterile environment, may lead to contamination of the OR and the ICU with airborne pathogens.

14AP02-03
When saying no to surgery is in the patient's best interest: anticipated difficult airway in urgent surgery in post-operative orthognathic surgery

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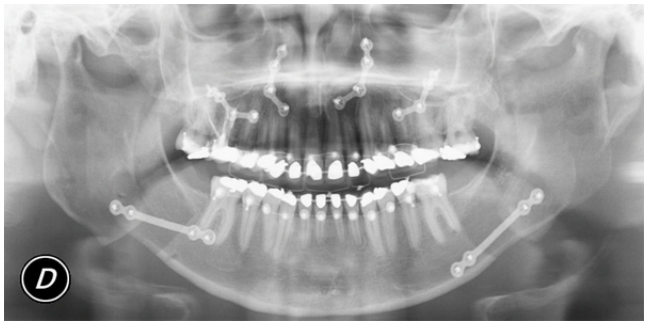
Background: Urgency with which some surgeries are performed is often the reason for medical failure. The risk of complications increases by more than 50% when operations are performed at night. These difficulties are also more likely to be serious if the operation is an emergency rather than scheduled. On the other hand, adverse airway-related events often occur outside normal working hours, due to inadequate initial strategy and lack of alternative plans.
Case report: We present the case of a 27 years old woman patient who attended the emergency department at 23 pm with abdominal pain. Diagnosed with acute appendicitis, she remained stable, without seriousness criteria, and urgent surgery was proposed at 01 pm. She had bimaxilla orthognathic surgery 20 days previously. She presented with a reduction of the mouth opening to 2.8 cm, Mallampati 4, deviated septum secondary to the intervention (pending surgery in the second half of the year). She had a maxillofacial control x-ray from 3 days ago which reported that there was not yet complete ossification.
Given that the patient requires awake intubation for urgent surgery during the night, it is decided to delay the surgery for the following morning. This was explained to the patient and the surgeon.



Discussion: Human factors contribute to up to 40% of medical errors. We are obliged to ensure the safety of our patients and prevent adverse events for our patients. However, the likelihood of unplanned adverse events always exists.
Lack of adequate preoperative airway assessment, as well as the wrong choice, or lack, of an adequate initial strategy and alternative plans in case these fail, often leads to critical situations.Other possible risk factors include indifference to the risk of techniques, overconfidence, lack of clarity in team structures, lack of communication between different medical specialties, failure to follow the advice of experienced professionals, failure to request previous tests or records, failure to perform an adequate preoperative examination, failure to use the available equipment and to have adequate training in it.
There should be no hesitation in delaying overnight surgery if the patient is stable, making the surgeons and the patient aware of the risks involved and the intention to avoid them with proper planning.

14AP02-04
Per-oral endoscopic myotomy (POEM) as a safe procedure in a Digestive Endoscopy Unit. Acquiring experience

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Background: POEM is an endoscopic technique usually performed in operating room. We report the first two POEM performed in the Digestive Endoscopy Unit in our hospital.
Case report: 41 and 76-year-old men, ASA II with achalasia proposed for POEM in advanced endoscopy room. TIVA general anesthesia with rapid sequence orotracheal intubation by videolaryngoscope was performed. Anesthetic maintenance was with Propofol TCI and Remifentanil and protective ventilation.
Regarding POEM: after mucosal incision, a submucosal tunnel was performed with myotomy in the distal esophagus and in the cardia. Procedure was performed with CO2 insufflation.
In one case, a progressive increase in etCO2 until 50mmHg was detected at the beginning of the tunnel without increase in airway pressures. As the endoscopist was informed, advancement of the endoscope in the submucosal tunnel corrected etCO2.
A significant subcutaneous emphysema was observed at the upper chest zone. In both cases, patients were extubated in endoscopic room without any incident and they were discharged 1 hour later from the Recovery Room. After fluid tolerance, both patients were discharged from the hospital at 24-48 hours.
Discussion: Our advanced endoscopy room is equipped with an anesthesia machine, standard infusion pumps and TCI, airway and resuscitation material, and anesthetic and life-support drugs. Usual staff is made up of endoscopist, anesthesiologist, nurse and nursing assistant. Potential complications during this procedure are subcutaneous emphysema, pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, esophagogastric mucosal injury or bleeding. Tunneling and myotomy procedures are the steps with the highest risk of passing CO2 into other cavities.
Controlled mechanical ventilation with positive pressure, monitoring etCO2 and airway pressures and good communication during the procedure are essential for the prevention and management of these complications.
References:
Sharp CD,Tayler E,Ginsberg GG. Anesthesia for Routine and Advanced Upper Gastrointestinal Endoscopic Procedures. Anesthesiology Clin.2017;35:669-77.
Learning points: Adequate material resources and the teamwork of an expert anesthesiology and nursing team are essential to perform a safe POEM outside the OR. Complications related to airway and ventilation management require advanced knowledge and skills, proper management of life-threatening situations and excellent communication between the professionals involved.

14AP02-05
Neurofibromatosis type 1: anesthetic management – clinical report

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Background: Neurofibromatosis type 1 is a genetic disorder associated with the mutation of the NF1 gene in chromosome 17, leading to changes in the neurofibromin protein, leading to neurocutaneous (ie, neurofibromas) and multisystemic manifestations. Neurofibromatosis can cause obstruction in the airway due to the presence of neurofibromas, reduce functional residual capacity due to pulmonary fibrosis and cause cardiovascular instability due to uncontrolled hypertension. This poses an anesthetic challenge, moreover in a non-programmed surgery setting.[1,2]
Case report: Woman, aged 58 years, ASA III, diagnosed with neurofibromatosis type 1, presents to the emergency department with intense pain in the perianal region. Relevant history includes mesencephalic glioma and intracranial hypertension (submitted to 5 ventriculoperitoneal shunt surgeries).
Physical examination revealed scattered neurofibromas, with no additional remarkable findings. The patient was proposed for urgent perianal abscess drainage and excisional biopsy of left inguinal adenopathy. Balanced general anesthesia was performed with placement of a supraglottic device for airway management.
The surgery and postoperative period went without complications. The patient was then admitted for diagnostic investigation, which showed multiple supra and infradiaphragmatic lymph node metastasis, osteolytic metastasis in the sacrum and multiple metastases in the central nervous system of an undifferentiated primary occult tumor.
Discussion: Patients with neurofibromatosis type 1 can be an anesthetic challenge in an emergency setting. The first option for this surgery would be a neuraxial block, as neurofibromatosis increases the risk of difficult airway due to the presence of undocumented neurofibromas. However, these patients are also at risk when a neuroaxis block is performed, by the possibility of presenting central nervous system neoplasms.[3]
Thus, a neuraxial approach should only be considered if recent imaging information of the central nervous system is available.
References:
1. Br J Anaesth. 2001; 86:555-64.
2. Ochsner J.2012; 12:111-21.
3. Acta Neurointracathol. 2020;139:625-41.
Learning points: Proper preanesthetic evaluation is crucial to apply most suitable anesthetic plan for each patient, considering their disease history and surgical setting. This is also applicable in emergent situations.

14AP02-06
Total thyroidectomy in a patient with Myasthenia gravis – case report

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Background: Myasthenia gravis (MG) is an autoimmune disorder that affects the acetylcholine receptors in the postsynaptic membrane of the neuromuscular junction, resulting in fatigable weakness of skeletal muscles. Anaesthesia management in these patients is challenging due to interactions between the disease, its treatment and anaesthetic agents, including neuromuscular blocking agents (NMBAs).[1]
Case report: Woman, 54 years old, ASA II, history of multinodular toxic goiter and MG, proposed for total thyroidectomy. The patient was scheduled for the first operative time. Regular medication included thiamazol 30mg and pyridostigmine 60 mg (3 times per day). There were no bulbar or respiratory symptoms in the preoperative evaluation. History for previous myasthenic crisis was negative and the patient had been stable with her medication for several years.
The patient was induced with remifentanil and propofol and an endotracheal tube was placed. NMBAs were avoided due to the unpredictable sensitivity to their effects. Maintenance was achieved with total intravenous anaesthesia using propofol.
Patient monitoring included ASA standard and anaesthetic depth. The surgery duration was 90 minutes, with no complications. The patient was extubated 12 minutes after propofol perfusion was stopped and remained stable throughout the postoperative period.
Discussion: Surgery in patients with MG can be an anaesthetic challenge. This elective procedure was performed during a stable phase of the disease, scheduled as early as possible in the day to avoid excess fatigability, and with appropriate preoperative assessment for bulbar/respiratory symptoms. Anaesthetic medications used considered this disease, with NBMAs not being used, so increased monitoring was used to avoid movement, with no complications and reaching a good outcome.[2,3]
References:
1. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009. 107:612.
2. Curr Opin Anaesthesiol. 2017. 30:435.
3. Acta Anaesthesiol Scand 2012; 56:66.
Learning points: In patients with MG, elective surgery should be planned, scheduled, and performed keeping this diagnosis in mind. The use of NMBAs should be avoided, but increased monitoring should be applied to avoid complications related to their absence.

14AP02-07
Rethinking the anaesthesiology care pathway in a NORA area: interventional radiology

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Background and Goal of Study: The considerable increase in the number of interventional procedures in this field and their growing complexity, associated many times with a logistic distance from the operating rooms, have made it useful to have dedicated senior anaesthetists to provide greater safety to the path of the patients, to formulate protocols to standardise the anaesthesiological technique and make it reproducible, according to the needs of the operators and better teamwork
Materials and Methods: In the period between January 2021 and January 2022, 110 sedoanalgesia were performed for the execution of: renal and hepatic thermoablation, placement of drains with biliary tract dilatation, vertebroplasty and nephrostomy. The working flow consists of a sequence of standardised actions that we consider necessary for patient management, allowing the interventional procedure to be conducted safely with adequate anaesthetic care outside a theatre.
Results and Discussion: Adequate planning and application of a shared and reproducible working method is essential to standardise anaesthesiological behaviour and to predict and contain adverse events, undesirable effects and complications.
Last but not least, the reorganisation has led to an optimisation of the occupation times of the angiography room, less time wasting, and a reduction in the time taken to perform the procedures, because the operators have been able to improve their procedural techniques.
Conclusion(s): The Italian anaesthesiological world is not yet ready nor organised to have an anaesthesia service dedicated to the NORA area which may include interventional radiology. For this reason it is important to sensitize the scientific societies and postgraduate schools to the need to train anaesthetists for NORA areas and to share organizational strategies, clinical protocols, and perioperative medicine concepts.
All this is useful to manage the patients safely, organise preadmissions in presence or by means of telemedicine, and be able to develop, with the operators, improve dedicated therapeutic paths ,i.e. Day Surgery.
The transfer index from surgical indications to interventional procedures is high and the Covid 19 pandemia has taught us that where it is possible to treat a patient with a minimally invasive technique and in shorter time possible, we must go down that road: it is feasible and sustainable!

14AP02-08
Anesthesia for severe tracheal stenosis after an esophageal prosthesis: the importance of a good leadership for the safety of the patient

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Background: Tracheal stenosis can cause a life-threatening situation, especially if the stenosis is critical and unknown. Our case explains how interpersonal relations and communication among healthcare team members could affect patient safety in a urgent tracheal stenosis.
Case report: Our case, a 77-year-old female, is admitted in emergency for a rapid desaturation and dyspnea after undergoing a esophageal prosthesis. An urgent CT revealed a 5mm tracheal stenosis at the T 2-3 level.
Due to the life-threatening situation, a planned was designed by the team leader, the senior anesthesiologist: urgent intubation equipment was prepared, interventional vascular radiology was called and the patient was transferred to the theatre quickly. During the case briefing with all theatre staff, the team leader determined the role of everyone and the steps to follow in different scenarios.

A rapid sequence intubation was performed without incident and oxygenation parameters improved quickly. However, due to the radiologist needed to introduce the endotracheal prosthesis through the endotracheal tube (ETT), a second life-threatening situation was exposed.

The coordination between the anesthesiologist and the radiologist was necessary for reposition of ETT just before the vocal cords (position confirmed by continuous scanning). Once the prothesis was deployed correctly, the patient was woke up successfully.

Discussion: Among our professional career, sudden life-threatening situations occur and due to the components of the training and daily routine, makes the anesthesiologist the ideal team leader (1).

This case shows the importance of airway skills and leadership for increasing safety in a critical situation. Organization and involvement of each medical staff is also crucial and comprehensive interdisciplinary planning is essential.

Every hospital and department should offer the best possibility to the patient within their resources. For example, although our hospital did not have the possibility of urgent ECMO, the planned desined was also correct because different scenarios were in mind to avoid catastrophy.

Learning points: In patients with a life-threating disease who undergo an urgent procedure, the effective multidisciplinary working leaded by the anesthesiologist is the key for increasing safety and high-quality care of the patient.

14AP03-03
Stuck guide wire- another challenge for neonatal central venous cannulation

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Background: Central venous catheter insertion in neonates is inherently challenging owing to anatomical and technical difficulties. The manufacturing defect in the central venous catheter (CVC) set can offer an extra set of challenges for the caregivers.

We are reporting this case to describe an incident we experienced involving a manufacturing defect of a central line kit that has implications for patient safety.

Case report: A 20days old neonate, weighing 2.8 kg, an operated case of jejunal atresia was posted for jejunostomy closure. During ultrasound-guided central venous catheter (B.Braun, multicath3, 4.5Fr) insertion, the right internal jugular vein was punctured on the first attempt but while inserting guidewire a fix resistance was felt after 5cm of insertion. It was not possible to withdraw it too.

The whole assembly was taken out and examined. It was found that the guidewire was stuck inside the needle beyond the hub and it was not able to push it or pull it out.

The procedure was repeated on the same side using another CVC set but the cannulation was not possible because of hematoma around the internal jugular vein.:

Discussion: Various manufactural defects are documented in the literature in adult patients, concerning central venous catheter, which includes breakage of a guidewire, fractured central venous catheter (CVC) with embolization of the distal fragment, malalignment of the lumen of needle and hub, stuck guidewire around the valve part, communication between the distal and the middle ports.

Such manufacturing defects can exponentially increase the difficulty in neonates in whom central venous cannulation is itself is a challenge.

References:

1. Monaca E, Trojan S, Lynch J, Doehn M, Wappler F. Broken guide wire--a fault of design? Can J Anaesth. 2005 Oct;52(8):801-4.
2. Hegde HV, Yaliwal VG, Joshi SK, Rao PR. The sheared central venous catheter? Case Rep Anesthesiol. 2011;2011:379827.
3. Gandhi KA, Samra T. Preprocedural Check of Central Venous Catheter Set. Indian J Crit Care Med. 2018 Mar;22(3):197-198.
4. Singh AK, Kumar S, Aggarwal R, Trikha A. Check Central Venous Catheter Set thoroughly or Bite the Bullet! Indian J Crit Care Med. 2021 Jul;25(7):832-833.

Learning points: A checklist to rule out manufacturing defects should be followed before each procedure in every patient to increase the first attempt success rate and prevent complications, especially in neonates.

14AP03-05
Key performance indicators enhancing anaesthetic care: a quality improvement project

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Background and Goal of Study: According to OECD, some dimensions, such as safety, effectiveness and patient centeredness/responsiveness, can be considered universally as core dimensions with quality in healthcare.The National Institute of Academic Anaesthesia (NIAA) has identified an absence of valid, reliable quality measures. It calls for research into identifying the anaesthetic outcome indicators which are most relevant to patients.

The Goal of the study was to develop Key Performance indicators measuring outcome to review the quality care provided by anaesthetists.

Materials and Methods: Key Performance indicator (KPI) dashboard was created at Luton & Dunstable University Hospital, Luton, UK after permission from research and development department. A continuous quality monitoring approach, backed by quarterly feedbacks was adopted. The following data was collected by PACU (Post anaesthesia care unit) nurses- temperature upon arrival in recovery, Pain score and PONV (post operative nausea vomiting) -no, mild, moderate, or severe and Perioperative satisfaction. We collected data from over three years (2019-21) including all cases anaesthetised and analysed on excel sheets using Pivot charts.

Results and Discussion: Data of total of 10,908 patients in 2019, 7134 in 2020 and 10,702 in 2021 was recorded. Yearly analysis of modalities across different specialities was done. The feedback revealed the standards of care maintained and areas which needed improvement.Immediate postoperative experiences and patient satisfaction are important aspects of quality of anaesthetic care.

We developed the key performance indicators for anaesthetists which can be used regularly for feedback, audits and improvements in safety and patient experience. A review in 2020 on hospital performance indicators by Carini et al, has depicted the lack of awareness and proactivity in terms of measuring performance.

The key performance indicators developed in our project have the potential to measure quality care, which can be fed back in an effective way to support revalidation and continuous improvement for anaesthetists. These KPIs can then be used across hospitals mea-

suring performance of anaesthetic departments at organizational, regional/national, and possibly international levels to deliver top quality care to patients.

Conclusion: KPIs can be used as a benchmark between anaesthetic departments and have the future potential for enhancing high quality and safe anaesthetic care.

14AP03-06
Reflections on aliases to protect patient identity: protective barriers or holes in the Swiss cheese?

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Background: Patient's identification, within the Health Systems, is based on four items: name, family name, date of birth and gender. Occasionally, patients demand their identity to be protected; in such cases the hospital assigns an alias, which camouflage their real name and which becomes their only identification within the Health System.

The goal of this paper is to describe how aliasing, originally conceived as a safety barrier, can result in misplaced information and danger for patients. We present the case of two siblings whose aliases were once swapped.

Case report: Two premature twins, eleven-month-old, whose identity had been voluntarily concealed by their legal tutors, had multiple hospital admissions. The generic aliases consisted on a record number which bore no relation to their real name. In two of these admissions one of the babies was assigned a wrong identification: both in his wristband and identification labels appeared his brother's alias. In both cases, parents were present while the safety checklist was being performed, confirming that the record number which appeared in the wristband and in the labels was the same. Two complete surgical procedures took place in the correct patient although he had been incorrectly identified. The patient did not suffer any harm.

Discussion: Several improvement measures were designed:

- A new informed consent was created, in which the patient is informed about the fact that they are voluntarily rejecting one of the most powerful safety systems offered by the Health System against medical errors, when opting to conceal their identity.
- This consent form explains that a new record number will be given, which will become the only means to identify the patient. Therefore, it will be the patient's responsibility to know it and verify it when confirmation is required.

- An alert was sent to all health workers insisting on the need to perform detailed and repeated identification checks using the clinical record number as a fail-proof safety mechanism.

Learning points:

- A numeric code will never represent for a patient what their name does.
- The patient's name is, on itself, a safety barrier. The right to hide one's identity is, on the other hand, another safety item.
- Some of the actions taken by the Health System to protect patients can, paradoxically, result in an increased vulnerability.

14AP03-07
Institutional response to a case of intraoperative awareness with explicit recall

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Background: Intraoperative awareness (IA) is a source of concern for patients and anesthetists, with potential for psychological and medicolegal sequelae. Several authors suggest that patients need more systematic responses and follow-up by healthcare providers. Here we describe the institutional assessment of a case of IA with explicit recall.

Case report: A 36-year-old woman was submitted to surgical closure of an atrial septal defect. Paravertebral block with general anesthesia and minimally invasive surgical approach were performed, with standard monitoring and ventricular fibrillation during extracorporeal circulation. Right after extubation,which was performed in the OR following a fast-track protocol, clinical suspicion of an episode of IA was addressed and registered in the medical record.

From that moment and up until hospital discharge, the patient was studied and followed up by the Patient Safety Anesthesia Task Force (PSATF). The diagnosis of IA was confirmed by the structured Brice interview (Day 0, +1 and +7). The critical incident was then declared in the specific database and systematically analyzed. Following the national Institutional Response to an Adverse Event Protocol, several actions and strategies were set in motion: situation awareness, knowledge revision, training, material resources update and second-victim prevention.

In the acute care setting, a multidisciplinary team, consisted of anesthetists, clinical psychologists and a communication counselor, was formed for the first time in our institution. It provided, both the patient and the health workers involved, with a transparent, accurate explanation of the event they all suffered and its potential posttraumatic sequelae.

Discussion: An institutional respons ecan be the most significant change that occurs following an adverse event. The declaration and analysis of our IA promoted the implementation of a pre-existing protocol in a way that has never been done before and called the attention of different professionals who were able to offer a coordinated, institutional response.

Learning points:

- IA is a serious, iatrogenic complication that should be part of any PSATF agenda.
- The structured Brice interview is the most accepted tool for diagnosing IA. However, there are no equivalent tools for the management of the victims and second victims.
- Multidisciplinary teams, formed by both related and unrelated-to-the-incident actors, are essential to promote a No Blame Safety Culture.

14AP03-08
How safe are our anaestheticdrugs cupboards?

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Background and goal of study: Drug errors in anaesthetics although rare can happen and be disastrous for patients. We looked at our current drug cupboard's organization and reviewed what we could do to improve patient safety.

Materials and methods: We carried out a prospective survey of anaesthetic drug cupboards in 2016 which showed haphazard, non-standardized storing of drugs with no pattern of arrangement. Drugs were kept in random order, which were difficult to find and sometimes kept in combinations which could be dangerous.

We also found 55 boxes of expired drugs in 12 theatres (4.58 potentially unsafe drug boxes per cupboard). We implemented some changes to it and did a prospective re audit in 2021 to assess the impact of the first audit and its improvements.

Results and discussion: We found drugs were organized in a more systematic manner and the colour coding and labeling facilitated easy finding of drugs. We found a significant decrease (89%) in expired drugs (0.375 expired drugs per cupboard). We developed a colour coded drug arrangement system which was standardized across all theatres. We also set up a template for checking expired drugs.

Conclusion: In order to improve patient safety, and to reduce drug errors and human factor errors, it is paramount to ensure our anaesthetic drugs cupboards are kept in an organized manner. Standardization of drug cupboards and colour coding can be a crucial tool for improving patient safety.

We found the standardized labeling and colour coding of our drug cupboards not only improved the layout of the drug cupboards, but also allowed practitioners to save time in theatre due to easy accessibility of medications. Checking for expiring drugs and eliminating the presence of similar looking vials and ampules can increase safety. Although the system has improved over the years there are still areas where improvement can be made.

References:

1. BJA120 (3): 440e442 (2018) doi: 10.1016/j.bja.2017.12.001 Advance Access Publication Date: 31 December 2017 © 2017.

2. BJA: British Journal of Anaesthesia, Volume 105, Issue 1, July 2010, Pages 76–82, https://doi.org/10.1093/bja/aeq131 Published: 27 May 2010

Geriatric Anaesthesiology

15AP01-01
Hip fracture in crisis time: middle income country experience in pandemic

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Background and goal of study: Femur fracture accounts for 14% of all lower extremity fractures. Based on the fracture numbers calculated from age- and sex- specific incidence and population sizes in 5-year age intervals for 2019 and 2034,the annual number of osteoporotic fractures in the Europe is estimated to increase by 1.06 million from 4.28 in 2019 to 5.34 million in 2034.[1]
Anaesthetists should participate routinely in standardised peri-operative data collection about people with hip fracture, focusing on outcomes.[2]
The aim of our study is to present our experience through two pandemic years of hip fracture management and to show whether delaying surgery and lack of personal in crisis time have changed the outcome of treatment.
Materials and methods: Retrospective data of hip fracure surgery in 2018.,2019.,2020.,2021.
Results and discussion: In pandemic years (2020.,2021.) there were 30% more hip fracture surgeries than in the two prepandemic years (2018,2019). In two pandemic years there were female patients 76,3% versus male 23,7%.The mean age was 78,8 (female 80.3 vs men 73.8). Mean days from injury to hospital arrival were 7,7 days. From admission to surgery 5,3 days (pre pandemic mean 4 days,p ‹0,01-t test), number of postoperative days 8,7-mean.
Early mortality up to 30 days was 6,5% and the equal in pre pandemic years. Spinal anesthesia was the most common 76,3% vs GA 23,7% which is equal to pre pandemic anesthesia practice.The choice of anesthesia was not significantly associated with hypotension or vasopressor use p=0,1. Surgery performed in 72h in 39% cases,most were delayed due to lack of staff- 56%.
Results of Pearson's Chi Square Test of Association Between "Hosp_Admission_To_Surgery" and "Reason_For_Surgery_Delay" p value: < 0.01. Delay in surgery significantly affected the total number of days of hospitalization p‹0,01. Mortality was equally prevalent due to postoperative PTE (2,2%) and infection (2,2%) while more surgical complications were bleeding 29% but not related to mortality.
Conclusion(s): Pandemic time caused delayed hip surgeries due to redeployment of staff to the work of Covid 19 wards. A Delayed operations did not lead to increased mortality in the early postoperative period up to 30 days but led to a longer stay in the hospital.
References:
1. United Nations (UN) World Population Prospects 2019. UN. Accessed October 2021
2. Griffiths et al.Guideline for the management of hip fractures 2020. Anaesthesia 2021, 76, 225–237

15AP01-02
Intraoperative hypotension is associated with increased surgical site infection in elderly patients after major abdominal surgery: aretrospective cohort study

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Background and goal of study: Surgical site infection (SSI) is a common but serious complication after major abdominal surgery that significantly increases postoperative mortality. Intraoperative hypotension (IOH) is a common side effect of general anaesthesiaand has been reported to be related to adverse postoperative outcomes. However, the association between IOH and the risk of SSI has rarely been studied.
Therefore, this study aims to verify the hypothesis that IOH is associated with increased SSI in elderly patients undergoing major abdominal surgery.
Materials and methods: This study was a retrospective single-centre cohort study of elderly patients (≥65 years) undergoing elective major abdominal surgery with over 2 hours of general anaesthesia and invasive blood pressure monitoring.
The primary factor was IOH, which was defined as systolic blood pressure (SBP) lower than 90 mmHg. SSI, which was diagnosedaccording to the National Nosocomial Infections Surveillance System, was examined as the primary outcome. A multivariable logistic regression analysis was performed to analyse the exposure–outcome relationship.
Results and discussion: A total of 967 patients with a mean age of 72.35±5.79years were included in the study. Among these patients, 120 (12.4%) developed SSI. IOH was associated with the increased rate of SSI (adjusted odds ratio [aOR]: 1.523, 95% confidence interval [CI]: 1.024-2.264, P=0.038).
Further analyses suggested that the association was only statistically significant in patients who experienced a duration of IOH>7 min (aOR: 1.996, 95% CI: 1.133-3.516, P=0.017) or who received colorectal surgery (aOR: 2.690, 95% CI: 1.790-4.042, P<0.005).IOH causes systemic hypoperfusion and small blood vessel contraction, resulting in the imbalance between oxygen supply and demand[1].
A longer state of hypoxia-ischaemia weakens innate immunity, which then results inpromoting SSI[2].
Conclusion(s): IOH with a systolic blood pressurelower than 90 mmHgwas associated with increased SSI in elderly patients undergoing major abdominal surgery, with this association being especially evident in those patients experiencing a duration of IOH>7 min or those patients receiving colorectal surgery.
References:
1. Walsh M, Devereaux PJ, Garg AX, et al. Relationship between intraoperative mean arterial pressure and clinical outcomes after noncardiac surgery: toward an empirical definition of hypotension. Anesthesiology 2013;119(3):507-15.
2. Sun LY, Wijeysundera DN, Tait GA, et al. Association of intraoperative hypotension with acute kidney injury after elective noncardiac surgery. Anesthesiology 2015;123(3):515-23.

15AP01-03
Hippocampal microglia activation triggers astrocyte dysfunction that contributes to lidocaine-induced cognitive impairment in aged mice

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Background and goal of study: Clinically, multiple surgical treatments are required in many elderly patients. With the widespread use of intravenous lidocaine for postoperative pain and recovery, the potential neurotoxicity of lidocaine has attracted great attention. We found that multiple lidocaine infusion induced damage to hippocampal neurons and synapses in the aged mice and caused cognitive impairment, but the mechanisms involved remain unclear. Reactive astroglia and microglia have been implicated in the pathogenesis of neurodegenerative disorders and brain injury. This study is to investigate the potential role of astrocyte dysfunction in lidocaine-induce cognitive impairment.

Materials and methods: 18-month-old C57BL/6J mice received intravenous lidocaine at a clinically relevant concentration (bolus of 12.3 $mg.kg^{-1}$ followed by infusion of 12.3 $mg.kg^{-1}.h^{-1}$ for 2 h) daily for three days. RNA-Seq and differential gene expressions (DGEs) analysis were performed on hippocampal tissue after Lidocaine infusion. The morphology and function of microglia and astrocytes were detected by immunofluorescence, Western blot and RT-PCR. Apoptosis and synapse-related proteins were examined in the hippocampus by Western blot. Cognitive function was assessed with the Morris water maze test.

Results and discussion: We observed dramatic cognitive impairment, accompanied by hippocampal neuronal apoptosis and synaptic loss in aged mice following multiple lidocacine infusion. We then performed a GO and KEGG enrichment analysis of the RNA-seq data, showing that DGEs were mainly involved in inflammatory and synpatic pathways.

Moreover, we found that lidocaine could induce significant microglial activation and A1-specific astrocyte response. It has recently been shown that activated microglia release cytokines that convert astrocytes towards a neurotoxic A1 phenotype associated with neurotoxicity. We showed that lidocaine-induced A1-specific astrocyte activation response, neuronal injury and cognitive impairment were significantly alleviated by pretreating the mice with the NF-κB inhibitor DHMEQ, indicating that microglia mediated astrocyte dysfunction is involved in lidocaine-induced neurotoxicity.

Conclusion(s): Our results indicate that lidocaine-induced hippocampal microglial activation plays a role in astrocyte dysfunction and neuronal injury, which eventually induces cognitive imparirment in aged mice.

15AP01-04
Do Holocaust survivors living in Israel today suffer more from preoperative cognitive impairment and postoperative delirium?

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Background and goal of study:

- Holocaust survivors may experience psychological morbidities, such as PTSD, anxiety and dementia more often than the general population
- The perioperative cognitive trajectory among these individuals has not been addressed
- We aim to assess the prevalence of cognitive impairment and the incidence of postoperative delirium and other adverse events among holocaust survivors having elective surgery

Materials and methods:

- Retrospective single-center cohort study included all elective surgical patients born before 1945 who had non-cardiac surgery in the Tel-Aviv Medical Center between January-December 2020
- Preexisting dementia, emergency procedures and planned ICU admissions were excluded
- Cognitive status was evaluated using the Mini-Cog test at the pre-anesthesia clinic. Delirium was assessed daily using the 4A's test starting from PACU to the 2nd postoperative day
- The database was cross-referenced with hospital records containing Holocaust survivor status
- Adverse events extracted from the patients' medical records

Results and discussion:

- Of the 1515 elective surgical patients operated during 2020, 857 patients were born before 1945.
- Of the 857: 250 (29%) are holocaust-survivors (HS) and 607 (71%) non-holocaust-survivors (NHS).
- HS are older (median [IQR] difference of 1 year 81 [78,85] vs 80 [76,84] $p<0.001$. HS underwent more major surgeries 34% vs 27% $p=0.05$. No other baseline characteristics differences found [gender, chronic kidney disease (GFR<60), Anemia (WHO definition), ASA status.
- No differences found between the groups regarding prevalence of preoperative cognitive impairment (26% vs 24% $p=0.67$) and the incidence of postoperative delirium at the different sites (PACU 8% vs 10% $p=0.39$, ward 8% vs 10% $p=0.49$, overall 13% vs 16% $p=0.25$)
- After adjusting other adverse outcomes (falls in hospital, 3-months CVA or MI, non-home discharge, unplanned ICU admission, 1-year mortality) to age, cognitive status and surgical severity - no differences were found between the groups.

Conclusion(s):

- We found a prevalence of **1:4** of cognitive impairment and an incidence of **1:7** postoperative delirium above age **75**!
- **No differences in preoperative cognitive function or postoperative delirium** were found between holocaust survivors and controls
- Holocaust survivors are not at significantly increased risk of postoperative adverse events when adjusting results for age, surgical severity and cognitive function.

15AP01-05
Quality of recovery of elderly patients from gastrointestinal endoscopy performed under sedation

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Background and goal of study: The use of gastrointestinal endoscopy in geriatric patients is rising as an increasing proportion of the population is reaching an advanced age. Concerns about cardiovascular, respiratory and cognitive effects of sedation in this population have been raised.
The aim of the current study was to compare the quality of recovery from gastrointestinal endoscopy performed under sedation performed by gastroenterologists between patients in different ages.
Materials and methods: 177 patients, of them 66 (37.3%) 40-64 years old (group 1), 76 (42.9%) 65-79 years old (group 2) and 35 (19.8%) older than 80 years old (group 3) undergoing colonoscopy or colonoscopy and gastroscopy under sedation were included. Data on patients' comorbidities, ASA status, the procedure, medication used during the sedation, hemodynamic and respiratory complications during the sedation were collected.
Neurocognitive function was assessed before sedation using 'Mini-Cog' test and before and after the sedation using '3-word memory test'. Quality of recovery was assessed 24 hours following the procedure using QoR-15 questionnaire.
Results and discussion: All procedures were successfully terminated. Gastroenterologists used lower doses of Propofol and Midazolam in-group 2 (Propofol dose 85.7±51 mg, Midazolam dose 2±0.3 mg) and group 3 (Propofol 67.9±37 mg, Midazolam 1.7 mg±0.6) compared to group 1 (Propofol 111.2 ±53 mg, Midazolam 2±0.4 mg). (p=0.001). The incidence of respiratory complications, defined as SaO2 <90% for > 60 second or SaO2 <75%, was 10.6% in group1, 9.2% in group 2 and 28.6% in-group 3 (p=0.01). There was no difference in the incidence of other respiratory or hemodynamic complications.
The scores in Mini-Cog test performed before the procedure were lower in-group 3 compared to group 2 and group 1 (p< 0.001). The scores in '3-word memory test' before the procedure was different between groups (group 1 2.7±0.5, group 2 2.4±0.9, group 3 2±1.2) (p=0.05) without changes in the test performed 24 hours following the procedure. The mean score of the QoR-15 questionnaire was 9.38 ±0.29 in-group 1, 9.4 ±0.34in group 2 and 9.6 ±0.28 in-group 3 (p >0.05).
Conclusion: Although patients older than 80 had lower scores in Mini-Cog test and 3-word memory test before endoscopy in comparison to younger patients, recovery from the procedure as indicated by the QoR15 questionnaire was similar in all ages. Older patients were given lower doses of sedation medication and had higher incidence of hypoxemic events.
References:
Ivry M, Goitein D, Welly W, Berkenstadt H. Melatonin premedication improves quality of recovery following bariatric surgery. *Surg Obes Relat Dis*. 2017 Mar;13(3):502-506

15AP01-06
Iatrogenic tracheobronchial rupture in a fragile patient

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Background: Iatrogenic tracheal rupture after endotracheal intubation is a rare complication. Early diagnosis has a significant prognostic effect.[1]
Case Report: 85-year-old woman diagnosed with frailty syndrome in the elderly, type 2 diabetes mellitus, hypertension, and heart failure. Admitted to the frail patient unit due to a subacute cerebellar stroke and acute pyelonephritis. During hospitalization, owing to perforated acute cholecystitis and septic shock the patient was proposed for urgent open cholecystectomy. She didn't present any signs of difficult airway and preoperative fasting was assured. Her clinical status was classified as ASA IV.
The surgery was performed under general anesthesia with orotracheal intubation with a cuffed endotracheal tube of internal diameter 7.0, through direct laryngoscopy, without the use of a stylet. The cuff was inflated with 3-4 ml of air. On induction, regurgitation of gastric content occured with pulmonary aspiration resulting in global respiratory failure. Besides this, intubation was performed without difficulties.
She was transferred to the intensive care unit (ICU), at the end of the procedure under mechanical ventilation. On arrival at the ICU, she presented an extensive bilateral subcutaneous emphysema on the neck. Chest CT scan did not show pneumothorax but described pneumomediastinum and a continuity solution in the right posterolateral wall of the trachea, above the carina, in the distal end of the tracheal tube. It was assumed a probable iatrogenic rupture of the trachea in the context of intubation.
Considering the frailty scenario and clinical status, there was no indication for surgical correction of the lesion, maintaining only the conservative approach. The patient survived and was discharged from the ICU.
Discussion: This case highlights the need for awareness of this intraoperative complication, particurlarly in emergent/urgent intubations.[1] Risk factors include advanced age, poor medical condition and overinflation of endotracheal tube cuffs.[1]
Decision between conservative and surgical management depends on clinical presentation, lesion characteristics and time elapsed from injury to diagnosis.[2,3]
References:
1.Eur J Cardiothorac Surg. 2009 Jun;35(6):1056-62.;
2. Thorac Cardiovasc Surg. 2006 Feb;54(1):51-6; 3. Acta Clin Croat. 2012 Sep;51(3):467-71.
Learning points: We must know which risk factors are associated with this complication to reduce its incidence.

15AP01-08
Postoperative 90-day mortality among elderly and super-elderly patients - aretrospective cohort study

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Background: As the general population ages, more elderly patients present to surgery. Age is an independent risk factor for postoperative mortality. Nonetheless, most other risk factors for postoperative mortality have not been specifically assessed in the elderly population.
We therefore aimed to evaluate the rate of postoperative 90-day mortality among patients 65 years or older, and to identify risk factors associated with such mortality.
Materials and methods: A single-center retrospective cohort analysis of all patients ≥65 years presenting to surgery between 2017 and 2020. Multivariable regression models were used to compare demographic, baseline medical, surgical, and anesthetic variables between non-survivors, defined as mortality within 90 postoperative days, and survivors. A sensitivity analysis compared risk factors between elderly (65-79 years) and super-elderly (≥80 years) patients.
Results: A total of 27802 unique surgical cases were included. We found an overall postoperative 90-day mortality rate of 5.8%. Independent risk factors with adjusted OR (95% CI) were American Society of Anesthesiologists physical status ≥3, 5.3 (4.4, 6.3), urgent surgery, 3.6 (3.2, 4.1), major surgery, 1.6 (1.5, 1.9), chronic steroids use, 1.6 (1.3, 2.0), chronic renal failure, 1.6 (1.4, 1.8), recurrent surgery, 1.6 (1.4, 1.8), malignancy, 1.5 (1.4, 1.7), chronic use of insulin, 1.4 (1.1, 1.6), atrial fibrillation, 1.2 (1.1, 1.5) and diabetes mellitus, 1.2 (1.0, 1.3). The rate of postoperative 90-day mortality was significantly greater in the super elderly vs. the elderly (10.6% vs. 4.1%, $p<0.05$).
Discussion: Elderly patients have a non-trivial rate of postoperative mortality. Age, baseline comorbidities, and surgical/anesthetic factors are associated with an even greater risk. Future research should aim to create risk-stratification tools for better prediction of post-operative mortality in the geriatric population.

15AP01-09
Usefulness of transcranial doppler to predict early postoperative cognitive disorders in elderly patients undergoing robot-assisted prostatic surgery

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Background and Goal of Study: Steep Trendelenburg (ST) position may cause alterations of cerebral perfusion with possible occurrence of postoperative cognitive disorders (POCD). The aim of the study was to evaluate any association between cerebral blood flow measured by transcranial doppler (TCD) and POCD occurrence in elderly patients.
Materials and methods: After Ethics Committee approval, 60 patients candidates for robotic-assisted radical prostatectomy were enrolled. Inclusion criteria: age>65 years; ASA class II-III, Mini-Mental Examination score>23. Exclusion criteria were: neurological or psychiatric pathologies, any conditions that could interfere with test performance, severe hypertension or vascular diseases, alcohol or substance abuse, chronic pain and inability to understand Italian. Delayed neurocognitive recovery (dNCR, primary outcome) was evaluated administering a test battery (Rey test, Clock drawing test, verbal fluency and trail making test) before and after surgery.
Postoperative delirium (POD) was assessed daily until discharge by the Confusion Assessment Method for the ICU. Anesthesia protocol and intraoperative monitoring were standardized. The middle cerebral artery flow was measured by TCD, through the trans-temporal window and using a 2.5 MHz ultrasound probe, at specific timepoints during anesthesia. Anova for repeated measures and logistic regression analysis were performed.
Results: 11 patients experienced emergence agitation upon awakening, 3 had POD in the recovery room, and 20 were diagnosed with dNCR immediately after surgery. There was a statistically significant association between POD and dNCR ($p=0.03$). In dNCR group, we found a significant increase in pulsatility index (Pi) after 1 h from Trendelenburg start ($p=0.003$), and a reduction of the resistivity index (Ri) after anaesthesia induction ($p=0.006$). Pi after 1 h from Trendelenburg start ($p=0.002$), ΔRi (Ri after -Ri before anestesia induction) ($p=0.02$), pain at arrival in the recovery room ($p=0.02$) and remifentanil total dose ($p=0.04$) were significant predictors of dNCR.
Conclusions: These results argue in favor of a great vulnerability of the cerebral circulation in patients with dNCR probably due to the combined effect of potential hypoperfusion caused by anesthetics and hyperperfusion caused by ST. TCD could be used as prognostic tool of an unfavorable cognitive outcome and constitute a deterrent to modify perioperative strategy in patients with risk factors for dNCR.

15AP01-10
Postoperative 30 vs 90-day mortality among elderly patients: a retrospective cohort study

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Background: As the general population ages, more elderly patients present to surgery. Age is an independent risk factor for postoperative mortality, but other risk factors described for the elderly population. Risk factors for 30- and 90-day mortality may differ. We therefore aimed to compare the risk factors associated with 30 and 90-day mortality in the elderly population.
Materials and methods: A single-center retrospective cohort analysis of all patients ≥65 years presenting for surgery between 2017 and 2020. Multivariable regression models were used to compare demographic, baseline medical, surgical, and anesthetic variables between non-survivors, defined as mortality within 30 or 90 postoperative days, and survivors.
Results: In total, 27,559 cases were included. Overall postoperative 30- and 90-day mortality rates were 3.1% (n=868) and 5.8% (n=1,620), respectively. Independent risk factors for postoperative 30 and 90-day mortality (with ORs) included American Society

of Anesthesiologists physical status (9.0, 5.2), recurrent surgery (1.5, 1.5), surgical urgency (4.9, 3.6), and major surgery (1.5, 1.6). Chronic renal failure, malignancy, atrial fibrillation, history of cerebrovascular attack, chronic obstructive pulmonary disease, peripheral vascular disease, diabetes mellitus, and chronic use of insulin or steroids were all associated with both 30 and 90-day mortality to a similar extent.

Discussion: Elderly patients have a non-trivial rate of postoperative 30 and 90-day mortality. Most independent risk factors were associated with 30 and 90-day mortality to a similar extent. American Society of Anesthesiologists physical status and surgical urgency were more strongly associated with 30-day mortality.

15AP01-11
Emergency surgery in octogenarians: morbility and mortality and risk factors

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Background: People aged 80 years or above in the EU's population is projected to have a two and a half fold increase between 2020 and 2100, from 5.9% to 14.6%. The aim of this review was to examine the impact of emergency surgery (ES) on mortality and adverse outcomes in elderly older eighty surgical patients.

Methods: This prospective cohort study was conducted at Valdecilla University Hospital, a tertiary care referral government facility in Santander, Spain. All patients older than 80 years who underwent ES procedures for the period 1st January 2019 to 31st December 2019 were included.

Data was obtained from the computerized medical chart system of Spanish National Health Service. Data included: age, gender, ASA status, anesthesia, surgical speciality, risk of surgery (low, intermediate, high), preoperative morbility, postoperative morbility (Claiven-Dindo Clasification), and hospital, 1 and 6 moths mortality.

Continuous data were reported as a mean (± SD). All statistical analyses were performed using Statistical Software: IBM SPSS Statistics (Version 25).

Results and discussion: A total of 3.906 ES was performed during the study period. A total of 568 patients were 80 y. old or older, and 407 patients were valid for the study. The mean age was 86.9 (+/-4.3), and 21.1% were older than 90. Related to gender 61.7% male and 38.3 female ($p<0.001$). Mean ASA status was 2.88 (+/-0.7) (ASA I: 2%, ASA II: 26.8% ASA III: 52% ASA IV: 19.2%) ($p<0.001$).

Mean Clavien-Dindo Classification was 2.2 (Clavien Dindo I: 40.8%, Clavien-Dindo II: 40.3%, Clavien-Dindo IIIA: 3.4%, Clavien Dindo IIIB: 2.5%, Clavien-Dindo IVA: 3.9%, Clavien-Dindo IVB: 2.0% Clavien Dindo V: 7.1%).

According to risk surgery the Clavien-Dindo Score was for low risk 1.67, intermediate risk 2.0, and high risk 3.92 ($p<0.001$). Hospital, one and 6 month mortality for abdominal surgery was 8.3%, 11.1% and 25%, and for hip fracture surgery 5.2%, 9.4% and 20.1%. Total hospital, one and 6 months mortality was 7.1%, 10.3%, 24.6% respectively. There were statistical differences in mortality among ASA status ($p<0.001$), risk of surgery ($p<001$), and age range ($p<0.001$).

Conclusions: In this study more than 20% of ES was performed in patients over 80. Risks factor associated with mortality included type of surgery(particularly intraabdominal),ASA status, age, and comorbidities. According to Clavien-Dildo classification ES is accompained by significant morbility.

15AP01-12
Frail elderly hip fracture patients lives at stake. Lessons to be learned in the early stage of a clinical pathway

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Background: Osteoporotic hip fractures usually occur in frail elderly patients. It's well known that delaying surgery (>48h) increase mortality[1]. Clinical pathways are set up to improve outcomes. Still, death toll is high. We analyse three fatal cases after early implementation of a hip fracture clinical pathway at our hospital.

Case reports: All three patients were admitted for unilateral subcapital femoral fracture. 1-Male 87yrs-old ASA III, atrial fibrillation, chronic renal disease and apixaban treatment. After 48h he suffered urinary sepsis and acute renal failure. He was turned down for dialysis and died 4 days later. 2-Male 83 yrs-old ASA III, hypertension, diabetes, atrial fibrillation.

On apixaban treatment, 24h clearance was established. Surgery was due on day 2 but he suffered a urine retention episode and acute renal impairment. Surgery was scheduled 3 days later. During induction of anaesthesia, he developed pulseless electrical activity and died 2 days afterwards. 3-Female 98 yrs-old, ASA IV, pulmonary hypertension, atrial fibrillation.

On acenocoumarin treatment, fully reversed within 24h. Scheduled for the operating room (OR) on day 5th after admission. Even after uneventful surgery she died in 48h.

Discussion: Patients comorbidities are the main determinant of death in the cases described. However, the unavailability of operative capacities was a common issue. Besides, patient 2 operative risk, could have been assumed since he wasn't on acute renal failure (as patient 1). Protocols in our clinical pathway clearly establish early patient assessment and optimization. They include reduced time frame clearance for direct oral anticoagulants, acenocumarin reversal, or just considering acute medical life threatening reasons to put off surgery.

As described in recent guidelines[1], to improve outcomes, protocols observance as well as a multidisciplinary approach with experienced dedicated skilled surgical teams are essential. Early stages of a pathway might be rough, but we should aim to a "zero delay policy" to provide patients with the best chance for clinical and functional recovery.

References:

1. Anaesthesia 2021, 76, 225–237.

Learning points: Time of surgery is a mainstem of a hip fracture clinical pathway. Once a patient is considered clinically amenable for the procedureonly acute life threatening medical reasons should stop it. If there isn't a scheduled OR available within 48h, other options to accomplish in time surgery must be provided.

Leadership, Self-Development and Education

16AP01-01
The critical characteristics of the randomized control trials published on EJA from 2016 to 2021

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Background and goal of study: Current guidelines help authors prepare high-level studies concerning methodological steps in randomized clinical trials (RCT). The internal validity of studies enables to generalization of the findings to the whole population; however, some actions are crucial and must be presented clearly in the paper.

Results and Discussion: We found 172 RCTs to include in the study in the five years. Figure 1 shows the main characteristics of the studies, including the funding sources. Few studies described the sample size based on the magnitude of the effect size; the majority referred to the previous studies, including proportions (Figure 2). The minority of the studies described an intention-to-treat and strategy and missing data analysis. Figure 3 shows more characteristics of the studies concerning blinding, registering, intent-to-treat analysis, CONSORT diagram, and how they dealt with missing data.

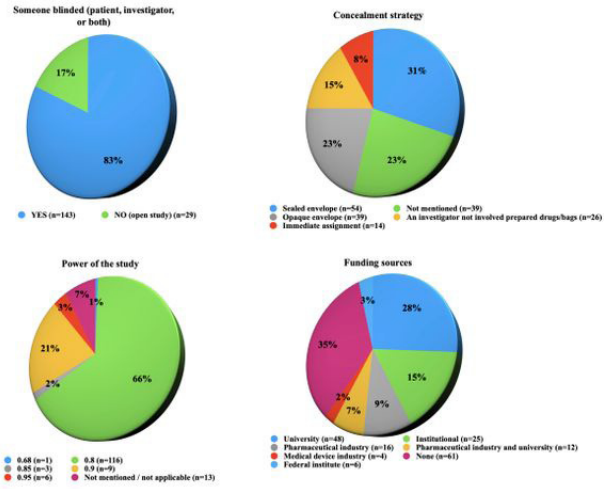

Figure 1. The main characteristics of the 172 studies included

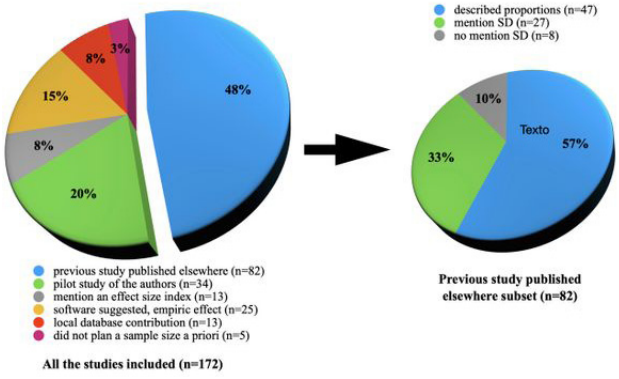

Figure 2. Strategies for estimating the sample size in the analyzed studies

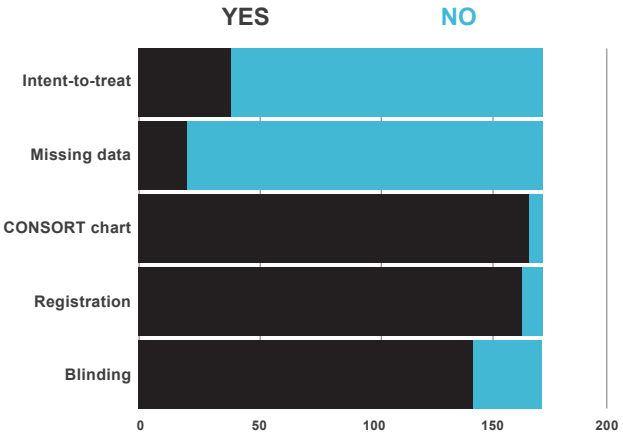

Figure 3. Characteristics of the studies, if present (yes) or absent (no).

Conclusion(s): In the five years, we found 172 RCT. Despite the endorsement of the CONSORT guidelines, the vast number of registered trials, and some progress compared to a previous study we presented in 2018, there is still missing information on methodology. The precise effect size, the intent-to-treat analysis to validate the randomization process, and the full description of the missing data are paramount in good clinical research.

References:

Jones SR, Carley S, Harrison M. An introduction to power and sample size estimation. Emerg Med J 2003; 20: 453-458.
Balbino M. Effect size in anaesthesia research. Abstract 16AP01-5, Euroanaesthesia 2018.

16AP01-02
Learning impact of e-learning combined with peer-debriefing in pre-anesthesia checkout training for novice anesthesia residents: a randomized controlled trial

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Background: Proper pre-anesthesia checkout is essential for patient safety, and related training for novice anesthesia residents is very important. The shortage of instructors rises a challenge for traditional instructor-based training for high volume of trainees.
We hypothesized that e-learning combined with peer debriefing was not inferior to a traditional instructor-based pre-anesthesia checkout training for novice anesthesia residents, and furthermore saving human resources.

Methods: Novice anesthesia residents without former pre-anesthesia checkout training were randomized into the control group (Group C) or the e-learning combined peer debriefing group (Group E). A pre-test of pre-anesthesia checkout was organized in Groups C and E, respectively. And then, in Group C, an instructor provided demonstration and interpretation (including PPT and video) in one hour, followed with an one-hour hands-on practice session. In the practice session, the instructor/trainee ratio was 1:5 and concurrent

feedback was provided by instructors during their practice. In Group E, all residents studied related materials (PPT and videos, the same as that in Group C) by themselves on a website. Then, an one-hour practice session with peer debriefing was organized in Group E and no instructors participated. A 48-item checklist for pre-anesthesia checkout was provided in both groups to facilitate residents' practice. Post-test was organized in both groups at one week and one month after the practice session, respectively.

Results and discussion: Eighty-six postgraduate year-1 anesthesia residents were enrolled and 43 in each group. In the pre-test, higher score was observed in Group E (43.00 vs. 36.50 in Group C, P=0.002). In post-test at one week, higher test mark was observed in Group E (94.50 vs. 91.00 in Group C, P=0.024). In post-test at one month, no difference was observed between the two groups (96.00 vs. 95.50 in Groups E and C, respectively, P=0.257).

Results in this study demonstrated that, as a training protocol for pre-anesthesia checkout in novice anesthesia residents, e-learning combined with peer debriefing was not inferior to a traditional instructor-based training methods, which is valuable for situation that was in shortage of instructors.

Conclusions: E-learning combined with peer debriefing was not inferior to a traditional instructor-based pre-anesthesia checkout training for novice anesthesia residents.

16AP01-03
How an accounting tool can improve the management of teaching in anesthesia

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Background and Goal of Study: Organizational support tools such as the Balanced Scored Card (BSC), have expanded to hospital management[1]. There are many organizational aspects of post graduate teaching in Anesthesiology making them challenging and time consuming.

Furthermore, they must consider several regulations and requirements[2]. We describe the application of the BSC to the post graduate teaching area (PGT) in a non-university hospital.

Materials and Methods: The BSC analyzes 4 dimensions of an organization, aligned with the strategic goals and vision. The dimensions are users; internal processes, the ability to learn and grow and the financial perspective. The vision for the PTG was initially defined. Secondly the strategic goals for the 4 dimensions were identified.

Results and Discussion: The vision was defined as to promote high quality teaching in anesthesiology, with increased satisfaction for the Anesthesiologists and trainees. The strategic and operative goals are described in table 1.

The initial application of the BSC, in 2015, addressed the trainee's perspective and the organizational model, focusing the fulfillment of the legal requirements. The most challenging aspects were time management and the optimization of resources. The identification of the different tasks allows them to be completed trough out the time and not just in one period.

It was also identified the need to increase the number of specialists involved in teaching, to stimulate the acquisition of teaching skills and to replace someone in case of absence. The research implementation remanis a week point and still needs improvement. The number of publications has increased, mainly due to clinical case reports. The trainees and specialists' satisfaction is high and everyone shares their ideas and contribute.

Users' perspective	Trainees' perspective - Timely access to information related to education, assessment, weekly planning, legal aspects of the training	Joint meeting to establish deadlines, to inform about annual rotation, weekly meetings. Initial meetings to explain the legal requirements. Satisfaction and feedback from the trainees.
Internal Processes	Improve organizational and functional model	Planning the department and trainees' meetings, specialty rotation, annual assessment. Allocation of working periods of time to organizational tasks. Increased number of specialists involved in teaching
Learning and Grow	Implement research. Promote debriefing and feedback regularly. Stimulate both trainees and specialists to improve their technical and non-technical skills, certification in specific areas - pain, regional anesthesia, teaching.	Trainees encouraged to take EDAIC part 2. Specialists encouraged to enroll doctoral programs, become EDAIC examiners, use simulation.
Financial perspective	Optimize resources. Increase financial support for EDAIC, courses and scientific meetings	Support from the industry was asked to finance specific scientific activities such as courses and the EDAIC part 1. Establishment of an annual grant for every trainee.

Conclusion(s): The use of accounting tools, aiming to organize core areas, such as teaching, leads to better planning. It allows the proper allocation of resources, the identification of deficits and the implementation of strategies so that the established goals are achieved.

References:

1. G. R. Baker and G. H. Pink, "A Balanced Scorecard for Canadian Hospitals,"*Healthc. Manag. Forum*, vol. 8, no. 4, pp. 7–21, 1995
2. European Training Requirements Anaesthesiology 2018

16AP01-04
Development and implementation of a nationwide competency-based training and assessment program

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Background and goal of study: Competency-based education has been endorsed by ESAIC. It is characterised by clearly defined learning objectives, a curriculum including learning strategies and workplace-based assessment instruments to ensure that learning outcome is achieved by the completion of training. The introduction and implementation of competency-based education has, however, been difficult all over the world. Challenges are mainly related to the assessment of competence in the clinical setting. We aim to describe the outcome of the development and implementation of an integrated training and assessment curriculum.

Materials and methods: A national working group was appointed consisting of consultants from different subspecialties and educational experts, who developed the curricula based on an adaptation

of the CanMed 7 roles, a portfolio as well as a train the trainers' course to support the clinical educators. National mandatory courses were developed to supplement the clinical training. A survey with 9 questions was developed to be filled in at the end of the training period. Data were collected over a period of 8 years.

Results and discussion: A total of 78 main learning objectives was included. The in-training assessment program consists of 35 assessments, each of them addresses several learning objectives. It covers activities related to work situations and encompass structured objective observation, Mini Cex, reflective reports and audits. The train the trainers course contained introduction to the curricula and assessment methods. A total of 362 trainees answered the survey. The trainees' evaluation of the program is seen in table 1.

Questions	Mean (± SD)
In your opinion,	
was it clear to you, what you were supposed to learn?	7.4 (± 1.5)
were the competence assessments helpful to structure your own learning?	7.1 (± 2.1)
were the written assignments useful for your learning?	5.9 (± 1.4)
did you use the report on learning in the structured conversations?	5.5 (± 1.1)
was your education prioritised in the depaertment?	7.2 (± 1.4)
how would you score the level of supervision?	6.5 (± 1.2)
was planning of work done to use all educational opportunities?	6.5 (± 1.2)
was your education prioritised?	6.8 (± 2.0)
was it possible to achieve increased responsibility during the last year of training?	7.6 (± 1.3)
were the competence assessment cards used to evaluate each individual competence?	7.8 (± 1.4)
were the competence assessment cards taken seriously?	7.4 (± 2.2)

Table 1. The trainee's evaluation of their education. A Likert scale from 1-9 was used (9 is best).

Conclusion(s): The key aspects behind the successful implementation was the involvement of experts in the development process, the careful selection of assessments to be embedded in clinical work and the training of the supervisors in using the new tools.

16AP01-05
Ensuring UK anaesthetic trainees meet perioperative medicine requirements for the 2021 stage 2 curriculum

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Background: Within the UK a new curriculum for anaesthetic trainees has been introduced since August 2021. This incorporates three stages, with Stage 2 the period of time that trainees are expected to complete their Fellowship of the Royal College of Anaesthetics examination. Due to the increased interest in peri-operative care much more emphasis is now placed on pre-assessment, particularly in Stage 2.[1] By the end of Stage 2 trainees are expected to be able to perform pre-operative assessments of ASA1-4 elective patients with the supervisor on call from home.[1]

Methods: At one district general hospital Stage 2 trainees (n=3) recognised the need for time in anaesthetic pre-operative clinics for their education and therefore approached the consultants running pre-operative high risk clinics. Until now it has been uncommon for trainees to attend high risk clinics. As a result two of the Stage 2 trainees have been attending high risk clinics and leading pre-operative consultations. Feedback has been received from these trainees and compared to the other trainee who has not yet been able to attend.

Results: For the trainees that have been able to attend feedback has included "It allowed me to understand much better the details of the patient's journey to surgery" and "It allowed me a greater appreciation of how to have risk discussions with patients". In addition, these trainees have been able to complete work based placed assessments at a level that will help to facilitate sign-off of the peri-operative medicine Stage 2 curriculum High-level Learning Outcome.[1] In comparison, the trainee that has been unable to attend due to rota constraints reports that she would like to attend and is concerned about how she will complete this element of the new curriculum. As a result of this trial, trainees at Stage 2 in the curriculum will now be regularly offered time to attend high risk clinics. It has also been suggested that Stage 1 trainees are likely to benefit as well.

Conclusion: Time must be given in a trainee's rota to attend high risk pre-operative assessment clinics to allow not only curriculum goals to be met but greater understanding in this expanding area of anaesthetics. Trainees should be empowered to lead the clinical consultations with decreasing consultant supervision.

References:

1. RCOA. 2021 Curriculum Learning Syllabus. https://rcoa.ac.uk/documents/2021-curriculum-learning-syllabus-stage-2/perioperative-medicine-health-promotion (accessed 26/01/22)

16AP01-06
A call to end the 'cannula call': providing training in ultrasound guided peripheral vascular access for foundation doctors and medical students

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Background and goal of study: Obtaining peripheral intravenous access (PIV) is an essential clinical procedure. Hypovolaemia, obesity, recurrent intravenous access, chronic conditions, previous chemotherapy and intravenous drug abuse, are patient factors that can make obtaining peripheral intravenous access (PIV) challenging [1].

Multiple attempts is unpleasant for patients and delays time-sensitive interventions. Ultrasound (US) aids identification of veins and has been shown to improve success rate [2].

The aim of this quality-improvement project was to train foundation doctors (FDs) and clinical-students at University College London Hospital in performing US-guided PIV.

Materials and methods: Surveys to understand both the experience of FDs and clinical-students with difficult PIV and the role of anaesthetists in assisting with this, were performed. The anaesthetic team subsequently delivered a practical training session on US-guided PIV. Self-reported confidence and competence were assessed using pre- and post-training questionnaires.

Results and discussion: The surveys were completed by 93 clinical students and FDs, and 16 anaesthetic-trainees, respectively. Amongst the former, only 20% felt confident in US-guided PIV and 80% reported contacting anaesthetists for help. All anaesthetists reported assisting ward teams with PIV and this was largely attributed (63%) to a lack of experience with US. When assisting 75% of anaesthetists used US.

Following teaching (9 participants due to social-distancing) 66% reported improvements in confidence and competence in performing US-guided PIV, with all being prepared to attempt this skill.

Conclusion(s): With basic US-training competence in performing US-guided PIV can be obtained. This will help to ensure timely cannulation for patients in whom access may otherwise be difficult and in turn relieve anaesthetists of this burden. We aim to roll out this training across the North Central Thames London deanery and medical school.

References:

1. van Loon F, Buise M, Claassen J, Dierick-van Daele A, Bouwman A. Comparison of ultrasound guidance with palpation and direct visualisation for peripheral vein cannulation in adult patients: a systematic review and meta-analysis. British Journal of Anaesthesia. 2018;121(2):358-366.

2. Breslin R, Collins K, Cupitt J. The use of ultrasound as an adjunct to peripheral venous cannulation by junior doctors in clinical practice. Medical Teacher. 2018;40(12):1275-1280.

16AP01-07
An evaluation of the Microsoft HoloLens2 in the clinical teaching of a pre-anaesthetic history and airway assessment to undergraduate medical students

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Background and goal of study: Mixed reality (MR) refers to a rendered experience in which virtual and "real" elements are perceived simultaneously by a learner. The Microsoft HoloLens 2 is a novel headset which allows the rendering of a MR environment and facilitates a live two-way broadcast to a remote environment.

This mixed methods study aimed to examine the feasibility and efficacy of MR in the clinical education of medical students, specifically teaching the knowledge and competencies necessary to complete a pre-anaesthetic history and airway assessment.

Materials and methods: Interactive live bedside tutorials with patients were delivered by a Clinical Lecturer using the HoloLens2 to groups of 5-8 medical students situated in a remote classroom. Virtual artefacts were also inserted, including diagrammatic examples of the Mallampati scoring system and thyro-mental distance.

Students completed multiple choice question examinations on the topic before, and two to three days after the tutorial. Student and patient feedback were collected using a modified Evaluation of Technology-Enhanced Learning Materials: Learner Perceptions (ETELM-LP) tool which included a seven-point Likert scale. [1]

Results and discussion: Nineteen students received the tutorials across three separate sessions with three patients. The use of the HoloLens2 was logistically feasible in the context of a university teaching hospital with secure institutional internet access.

Median student age was 23.Mean pre- and post-tutorial test scores were 54.2% (IQR 50-70%) and 85.8% (IQR 80-90%) respectively. This reflected an average increase of 59.6%.

Feedback data is presented as mean Likert Score +/- Standard Deviation. Students had little prior experience with MR (1.7 +/- 1.4). Student feedback on the audio quality (6 +/- 1.3), visual quality (6.1 +/- 0.8) and MR elements (6.1 +/- 0.9) of the tutorial were positive.

They felt it replicated a live patient encounter (6.1 +/- 0.8) and was more beneficial than a PowerPoint tutorial (6.2 +/- 1). Patients felt safe (7), described the session as an enjoyable experience (6.3 +/- 1.1), and preferable to a live tutorial involving over five students at the bedside (6.3 +/- 1.1).

Conclusions: We demonstrated that bedside clinical teaching of a pre-anaesthetic assessment using the Microsoft HoloLens2 and MR is both feasible and effective. Feedback from students and patients was positive.

References:

1. Cook DA, Ellaway RH. Med Teach 2015; 37: 961-70.

16AP01-08
Improving the anesthesiology rotation for medical students: a cohort study

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Background and Goal of Study: The Undergraduate Medical Education curriculum lays the foundation that allows medical students to choose a future specialty.

However, the role of anesthesiology in the undergraduate medical curriculum is inconsistent in the US1, and, most medical schools (in the U.S.) do not require an anesthesiology rotation1,2.

We hope to improve the medical student anesthesiology rotation at Texas Children's Hospital (TCH) through a structured didactic curriculum that is focused on Undergraduate Medical Education.

Materials and Methods: This was a retrospective cohort study of medical students during their elective Anesthesiology clerkship at TCH. The objective was to measure the impact of a structured didactic curriculum that was implemented.

The aims of this study were:

1. To determine if a structured educational curriculum changed the students' perceived strengths and weaknesses with the anesthesiology rotation,
2. To assess if the students' end-of-rotations goals changed with a structured curriculum,
3. To determine if the students' final rotation grade improved following the intervention, and;
4. To see if students are interested in anesthesia as a career.

Results and Discussion: Within the two week rotation group, learners pre-intervention were significantly more likely to mention clinical case variety as a strength, while learners post-intervention were significantly more likely to mention lectures as a strength.

The greatest weakness mentioned in the post-intervention 2 week group was regarding a lack of continuity with individual faculty members.

Within the four week rotation group, there were no significant differences found.

There were no significant differences found between the two groups in their end of rotation goals,

The data suggests that students who are more interested in Anesthesiology as a career opt to take the 4 week rotation, pre and post-intervention.

Conclusion(s): Our study illustrates that students appreciated the student tailored lectures, although not statistically significant in the four week rotation group. There is still work to be done in regards to organization to ensure lecturers are present and students are notified of the lectures in a timely fashion.

Further improvements in our rotation could include greater case variety, more consistent 1:1 faculty time and rotation teaching goals for students and faculty to follow.

16AP01-09
The pathway to formal training in basic cardiac ultrasonography in an Irish specialist anaesthesiology trainee

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Background and goal of study: Cardiac echocardiography is a critical component of assessing cardiovascular function in both well and unwell patients. The use of echocardiography in patient assessment has been the domain of cardiologists and cardiac physiologists. Increasingly, basic (or level 1) echocardiography is recognised as an essential and even mandatory skill for intensive care doctors.
We describe the training pathway of an Irish specialist anaesthesiology trainee in the acquisition of the skills necessary for basic echocardiographic assessment of the critically ill patient.
Materials and methods: The trainee (author) underwent a formal accreditation programme, Focused Ultrasound in Intensive Care (FUSIC), which is a level one training accreditation offered by the Intensive Care Society. Training involves a series of online lectures and theory assessments, supervised 'hands-on' scanning of patients and volunteers, documentation and supervisor review of 50 cardiac ultrasound cases.
Finally, the trainee must pass a triggered assessment at the end of the training period, displaying sufficient knowledge of cardiac sonoanatomy, appropriate use of equipment and interpretation of findings. To facilitate the storage, sharing and reviewing of images as part of logbook maintenance the online platform, Sonoclipshare, was used. This is a secure cloud based ultrasound image sharing platform. Data was deidentified and shared via a secure online cloud based platform. Images were categorised in folders and shared for viewing with a mentor and supervisor. This allowed remote access of the relevant images, collective review and critique and secure online storage of hundreds of images.
After accreditation, the author's use of a personal portable ultrasound probe (provided by the mentor) was key to facilitating easy and quick assessment of patients as part of daily duties in a new job in another Irish teaching hospital.
Furthermore, continued small group teaching with both real patients and healthy volunteers allows development of theoretical concepts and dissemination of basic knowledge and skill in cardiac ultrasound.
Conclusions: We describe the training pathway for an Irish specialist anaesthesiologist trainee in acquiring formal accreditation in basic cardiac echocardiography. Formal training involves a recognised framework for training, a secure platform for data sharing and review, and continuous learing through group teaching sessions and continued practice.

16AP01-10
Randomized controlled trials are insufficiently focused on evaluating care and reducing medical overuse: meta-research study

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Background and goal of study: Rising costs, personnel shortages and increasing carbon footprint are major challenges that burden modern healthcare systems. Meanwhile, a growing number of patients receive care that holds no benefit for them, called medical overuse, wasting up to 30% of all healthcare spending [1,2].
Many common healthcare interventions are not evidence-based, frustrating efforts to reduce this overuse [3].
It is often unclear which part of unproven care is genuinely beneficial, and which part actually constitutes overuse. To distinguish between the two, we need randomized controlled trials (RCTs), the gold standard in research. Our goals is to determine what portion of recently published RCTs in high-impact journals is focused on evaluating current care.
Methods: All RCTs published between 2014-2021 in the*New England Journal of Medicine*,*TheLancet*, the*Journal of the American Medical Association*, and the *British Medical Journalwere included*. Three reviewers assigned trials to one of five categories based on the goal of the RCT.
The categories are:
1: Initiating a new intervention,
2: Expanding or intensifying an existing intervention,
3: Studying comparable interventions,
4: Reducing the intensity of an intervention, and;
5: Stopping an existing intervention.
Subgroup analyses were performed for associations between study characteristics and category ascertainment.
Results: A total of 2431 RCTs were included, and were assigned to the 1st category (763 [31%]), the 2nd category (855 [35%]), the 3rd category (501 [21%]), the 4th category (284 [12%]), and the 5th category (28 [1%]).
Conclusion(s): RCTs in high-impact journals are mainly aimed at initiating and expanding treatments, rather than focusing on evaluating current care. Our results are at odds with the intention to keep our healthcare system accessible and sustainable. This intention should force us to look critically at the way we spent our limited resources. More research effort should be put into detecting and eliminating medical overuse.
References:
1. Moynihan et al. Preventing overdiagnosis. BMJ 2012.
2. Berwick et al. Eliminating waste in US health care. JAMA 2012.
3. Clinical Evidence project. BMJ 2012.
Acknowledgements: Funded by the 2021 ESAIC Research Support Grant.

16AP02-01
The comparison of first attempt laryngeal intubation by fourth-grades medical students either with a conventional laryngoscope or video laryngoscope - a manikin study

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Background and goal of study: Students start practicing intubation in manikin classes in the fourth year of our medical course. Traditional intubation with a laryngoscope is standard; however, we now rely on video laryngoscopes. The authors want to detect if intubation's success rate and time are different between both techniques in students who have never done it before.
We still aim to see if personal skills can influence the results, such as playing video games (VG), musical instruments, and practicing sports.
Materials and methods: Eighty-seven students were invited to participate in this manikin study. They had a short practical explanation about both techniques, fifteen minutes maximum. They were then asked to intubate first with the laryngoscope and then with the video laryngoscope. The authors recorded the time for intubation, the success rate, and the Cormack-Lehane grade noticed, using a chart. As they were intubating for the first time, we did not exclude outliers.
Results and discussion: The time for intubation did not differ between laryngoscope (15.9 ± 10.8 s) and video laryngoscope (17.7 ± 14.4s), p= 0.17, figure 1.

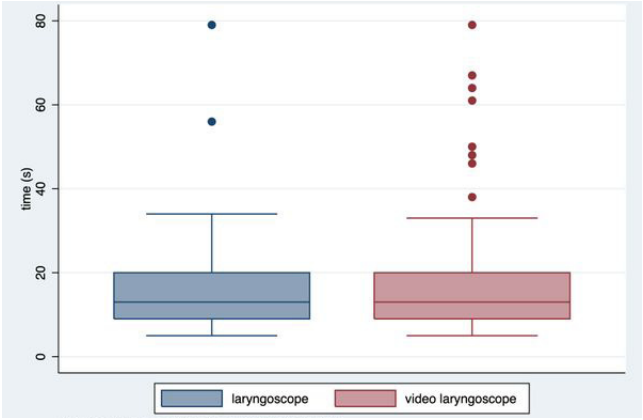

Figure 1. The overall time for complete intubation.

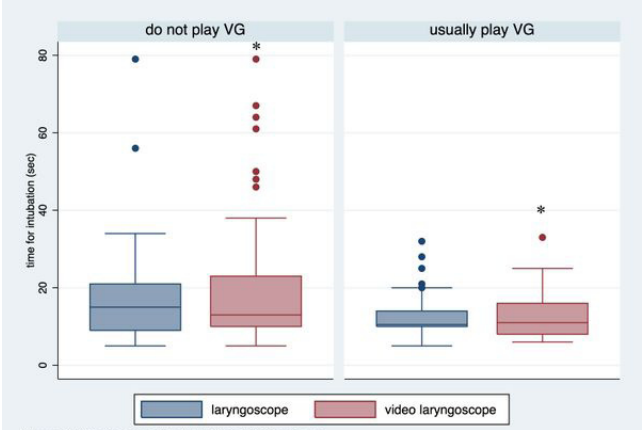

Figure 2. Time for complete intubation in VG subsets.

Cormack-Lehane described did not differ between both intubation devices (p=0.52). However, the success rate was more significant when performed with the video laryngoscope (100%, against 80.88% of the conventional laryngoscope), p <0.0001.
Students who played VG achieved intubation in less time (12.8 ± 6.5 s versus 20.2 ± 16.7 s, p=0.022), compared to non-players, using a video laryngoscope. There was no difference using a laryngoscope among VG players and non-players (figure 2).
Conclusion(s): Our data suggest that among the students who had never practiced intubation, the use of the video laryngoscope provides higher success rates compared to the conventional laryngoscope. The practice of VG appears to facilitate this skill.

16AP02-02
New approach to mouth-to-mouth ventilation in BLS training during COVID-19 pandemic (MOVERESP study)

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Background: Mouth-to-mouth ventilation remained an integral part of basic life support in ERC BLS guidelines 2021 for both adults and infants. Due to the COVID-19 pandemic, Basic Life Support (BLS) training is limited to compression-only or bag mask ventilation.
However, in the setting of lay rescuers without any medical equipment, the gap in training of mouth-to-mouth ventilation remains unsolved. The most breathable nanofiber respirators carry the technical possibility for inflation of the mannequin.
The primary aim was to assess the effectivity of mouth-to-mouth ventilations through breathable respirator.
The secondary aims were mean pause, longest pause, success in achieving the optimal breath volume, technique of ventilation, and incidence of adverse events.
Materials and methods: In our crossover simulation-based study 104 medical students performed BLS using a breathable nanofiber respirator for 2 minutes on three mannequins (2 adults, 1 paediatric mannequins). We evaluated the quantitative and qualitative efficacy of mouth-to-mouth ventilation through the respirator.
Results and discussion: In 104 students, effective breath was reached in 951 from 981 (96.9%) attempts in Adult BLS mannequin (Prestan), 822 from 906 (90.7%) in Resusci Anne and 1777 from 1857 (95.7%) in Resusci Baby. In Resusci Anne and Resusci Baby 28.9%/15.9% of visible chest rises were evaluated as low, 33.0%/44.0% optimal and 28.8%/ 35,8% high-volume breaths.
Conclusion(s): Mouth-to-mouth ventilation through breathable respirator reached effectivity over 90% and enables its use in high quality BLS training during the pandemic.
Acknowledgements: The study was registered on ClinicalTrials.gov. (identifier: NCT04867265). The trial was ongoing in the term from 3rd May 2021 to 15th May 2021.

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16AP02-04
Environmental sustainability and recycling in anesthesiology: a national survey

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Background and goal of study: It is well known that anesthesia-related activities have a wide range of environmental effects. The anesthesiologist faces waste daily, varying from anesthetic gases spreading to the environment to recyclable packaging.
We aimed to know the level of knowledge of Brazilian anesthesiologists regarding the management of the waste produced in the operating room (OR).
Materials and methods: A web-based 27-items questionnaire was developed using the REDCap®. The first part collected demographic information; the second part collected information about waste recycling infrastructure, and the last one was about the anesthesiologist's knowledge about waste disposal. A pilot project was made to test the questions' feasibility, plausibility, and coherence. The final questionnaire was sent to residents and anesthesiologists all over Brazil.
Results and discussion: The survey was opened 615 times, and 549 complete answers were received. More than 64% of the responders were anesthesiologists, and around 14% were residents. Among the responders, more than 74% said they worked in central urban areas and 60% in public hospitals. The majority (45.9%) claim to recycle in their home, and the great majority (76.7%) agreed completely when asked about the urge to recycle waste produced in the OR.
However, 28 and 32% allege to disagree completely when asked if the waste produced in the OR was sent to selective collection or if the chosen products were the ones to have the lowest environmental impact, respectively. The majority (57%) said that there are no accurate information about recycling in the OR.
In comparison, the minority (36% and 25%) said that there are proper bins for selective waste collection in their workplaces. Paper, plastic, and glass were the materials most destined for recycling. Over 34% said that no material coming from anesthesia was recycled. The most significant barrier for recycling and environmental sustainability (45.5% of the responders) was the lack of support from their leadership. Over 53% said to use reusable products, but just a minority (13.7%) had been given any orientation about the impact of anesthetic gases on the greenhouse effect.
Conclusion: Sustainability is already seen as efficient in environmental preservation and has enormous investments. However, there is still a lot to do to contribute to a more sustainable world in healthcare, especially in the perioperative area.

16AP02-05
When 0.2% incidence became a reality in non-operating room anaesthesia (NORA): a rare case of left anterior descending artery perforation in cardiac catheterization lab

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Background: Cardiac catheterization is a widely accepted therapeutic as well as diagnostic method for those with coronary artery disease. Among the many complications, coronary artery perforation is an infrequent one with an incidence of 0.2%, out of which 17% results in cardiac tamponade.[1]
Case Report: 43-year-old lady presented for routine percutaneous transluminal coronary angioplasty to left anterior descending artery. Two months prior she had presented to our facility with history of chest pain for which coronary angiography was done and it showed single vessel disease and was planned for PTCA. In the event of catheterization, left anterior descending artery was stented. Post dilatation, patient started complaining of backache.
Controlled angiography showed Ellis type IV perforation. Prolonged balloon occlusion was tried; however, it didn't seal the perforation. Intra-op ECHO was done which revealed cardiac tamponade. Shortly after, patient went into bradycardia followed by cardiac arrest. CPR was initiated and patient was immediately intubated and was on inotropic support. Bedside pericardiocentesis revealed massive hemopericardium.
With no further delay, cardiovascular & thoracic surgery team arrived, intra-aortic balloon pump was inserted and was shifted to cardiothoracic theatre for emergency CABG and LAD exploration. Blood was drained and continuous pressure was applied for 30 mins over the perforated area. Haemostasis was achieved and CABG was abandoned. Patient was shifted to ICU intubated, sedated and paralysed on inotropic supports. Patient was extubated on postoperative day 3. 2 weeks following the surgery patient got discharged with clean bill of health.
Discussion: Administering non-operating room anaesthesia is one of the unique challenges. A checklist should include but not limited to adequate supply of oxygen including backup source, suction apparatus, standard anaesthesia monitors, artificial manual breathing unit (AMBU), anaesthesia machine, laryngoscope, fully equipped emergency cart including the bougie and a defibrillator.
References:
1. Ninad D Chodanka* *Indian Journal of Clinical Anaesthesia*8(1):137-140, March 2021
Learning points:
- Non-operating room procedures are becoming more versatile; always follow the three-step approach, which consists of patient, procedure and environment.
- Anticipate all the possible complications and the lab should be well prepared accordingly

16AP02-06
Greek anaesthesiologits's personality assessment working in university tetriary hospitals. A cross sectional study

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Background and Goal of Study: Anaesthesiologists work in stressful environments that require good non-technical skills, influenced by personality traits. The goal of this study is to assess personality traits in Anaesthesiologists working in university tertiary hospitals in Greece.
Materials and Methods: This is a cross-sectional national study that was conducted during November 2021.The Eysenck Personality Questionnaire (EPQ) was given anonymously in anaesthesiologists working in the seven university tertiary hospitals of Greece. EPQ explores three main dimensions of personality (neuroticism, psychoticism, extraversion), whereas the Lie (L) scale serves as a measure of "dishonesty". Participants were categorized based on their working rank into 4 groups: residents, junior consultants (less than 8 years of clinical experience), senior consultants (more than 8 years of clinical experience), and academic staff. The nonparametric Mann-Whitney U and the Kruskal-Wallis test were employed for comparison of continuous variables as appropriate. Spearman's rank correlation coefficients were estimated to investigate associations between continuous variables. Integral reliability was investigated by Cronbach's alpha calculation.
Results and Discussion: The EPQ was filled in by 116 doctors with a response rate of 98% (32.17% males - median age 46 [33 – 52] years). The overall Cronbach's alpha for the EPQ was 0.87. All four dimensions of the Eysenckian personality traits did not differ between working ranks ($p>0.05$), except for the L scale, with residents exhibiting lower median L scores (median L scores for residents vs other participants: 10 [8 – 12] vs 12 [9 – 14], p value 0.004). This was further supported by a positive correlation of the L scale with age ($r= 0.26$, $p=0.007$). No other demographic – personality significant associations were detected (as gender and age).
Conclusion(s): In our study, neuroticism, psychoticism and extraversion were similarly distributed among different working ranks. Younger participants were less prone to control their scores. Gender and age were not associated with personality traits.

16AP02-07
Critical event debriefing: the perspective of anaesthesiologists in Portugal

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Background and goal of study: Critical events are common in anaesthesiology practice and contribute significantly for healthcare providers work stress. Debriefing has been shown to be an important tool in identifying medical errors, improving communication, reviewing team performance, and providing emotional support after a critical event. This study aims to explore the debriefing patterns of Portuguese anesthesiologists.
Materials and methods: We performed a national cross-sectional questionnaire-based study exploring the practice of debriefing after critical incidents in Portuguese anesthesiologists. Participation was voluntary and anonymous. The questionnaire was distributed via a snowball sampling technique during the months of July to September 2021. Data was analyzed with SPSS v26. Categorical variables were described as absolute (n) and relative frequencies (%) and continuous variables with median and 25-75 quartiles. For the inferential analysis we used the Mann-Whitney or Kruskal-Wallis for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. P significant when <0.05.
Results and discussion: We had replies from186 anesthesiologists (11.3% of the Portuguese pool). The most reported type of critical event was Acute Respiratory Event (96%). The debriefing rarely or never occurred in 53% of cases; for 59% of respondents, lack of time for debriefing was the reason. Only 4% reported having specific tools in their institutions to carry it out. Most participants (62%) support that debriefing should be done immediately after a critical event. The goals identified as more important in a debriefing session were "Develop protocols to improve performance" and "Review flaws in the process and systems". "Increased workload" and "Lack of interest from colleagues" were identified as the major limitations to the practice of debriefing. There is no statistical association between having a debriefing protocol and the occurrence of critical events ($p=0.474$) or having trained personnel ($p=0.95$). The existence of protocols was not associated with higher frequencies of debriefing ($p=0.474$).
Conclusion(s): Anesthesiologists were aware that debriefing is an important tool which increases patient safety, but Portuguese institutions still do not have an adequate debriefing culture.

16AP02-08
Thirty years in anesthesiology and reanimation: a bibliometric analysis

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Background: The Anesthesiology and Reanimation (A&R) field has been developing day by day. This study aims to understand the conceptual structure and thematic evolution in the field of A&R within the years between 1990 and 2021.

Materials & methods: 119.842 articles and proceedings papers in the A&R category of the web of science core collection were analyzed with bibliometric techniques. The analysis was carried out in three periods, 1990-1999, 2000-2009, and 2010-2021. Thematic clusters in the field for each period were revealed by science mapping analysis based on co-word networks and strategic diagrams created according to centrality values were used in order to understand the position of the clusters in the field. In the analysis, the number of publications and citations was used as a performance indicator.

Results & discussion: *Propofol,*which was a transverse theme, has become a motor theme after 2000. *Anesthetic technique*, which was a motor theme, split into two another motor theme, *Epidural* and *local anesthetic,*after 2010. *Neuropathic pain*which was a motor theme turned into a transverse theme after 2010. *Morphine*, which was a motor theme before 2000, continued as a transverse theme until 2010.

After 2010, morphine turned into another transverse theme with lower centrality,*post-operative pain*. *Chronic-pain*, which was an emerging theme before 2000, became motor theme between 2000 and 2010. After 2010, *chronic-pain* keyword passed into another motor theme, *opioids*. Themes about ICU have always remained an emerging group in the last 30 years. The theme, which was critical-*care*before 2000, transformed to *intensive-care-unit*between 2000 and 2010. After 2010 intensive care unit became *mechanical-ventilation*. Other emerging themes of the last ten years were patient*safety*, *elderly-patients*, *palliative-care*, and *Covid-19*.

Conclusion: Pain was the most popular topic in the last 30 years. The other motor themes were shaped by new anesthetic agents and techniques over the years. ICU themes have become towards mechanical ventilation. This may be due to new mechanical ventilation modes.

Patient-safety, *elderly-patients*, and *palliative-care themes* may be related to the increasing quality management awareness and the increasing number of the elderly population. Despite the emergence of the Covid-19 theme only in the last 2 years, it has a remarkable size among the themes of the last 10 years. It is proof that the pandemic has affected study topics in A&R vastly.

16AP02-09
Mental stress and how to handle it – anaesthesiologists', nurses' and nurse assistants' perception

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Background and goal of study: Health care professionals (HCP) are the most important resource in our health care system. A recent publication has shown that more than 75% of all health care professionals have felt burnout. In anaesthesia, the numbers are even higher. Culture and context differ in countries. We speculated if the perception of burnout and mental health was a challenge in Denmark too.

The goal of this questionnaire study was to analyse anaesthesiologists', nurses' and nurse assistants' perception of their psychosocial work environment and how they handle mental stress in a department of anaesthesiology and intensive care in a major university hospital. In addition, to identify types of strategies to overcome these challenges.

Materials and methods: A questionnaire consisting of 13 main questions with up to 7 underlying questions and free text possibility was submitted to anaesthesiologists, nurses and nurse assistants in the department. The dimensions in the questionnaire were related to mental stress, psychological safety, teamwork and patient safety culture.

Results and discussion: The response rate was 70% (278 respondents). A total of 37% describe that they feel mentally stressed either daily or weekly. The most frequent perceived causes to mental stress were time pressure (58%), clinical situations (43%), organizational conditions (42%) and collaboration conflicts (41%), respectively. 43% of the respondents fully agree that they handle mental stress by talking to colleagues.

A total of 45% of the respondents perceive that they are being listened to by colleagues and 42% encourage others to talk. More than 74% of the respondents were positive in their perception of teamwork and 92% agreed or totally agreed that it is safe to be a patient in the department.

Conclusion(s): Anaesthesiologists, nurses and nurse assistants experience challenges which might lead to mental stress. The challenges can be overcome by talking to colleagues. Overall, they perceive teamwork positive and agree that it is safe to be a patient here.

16AP02-10
Undergraduate 4th year medical students' perceptions of educational environment during COVID-19 pandemic

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Background and goal of study: The COVID-19 pandemic brought significant challenges in the medical students' educational environment (EE), such as the shift into an exclusively online format. We studied the EE before the re-institution of the live education in the 4thyear medical students of the University of Thessaly with the greek DREEM (Dundee Ready Education Environment Measure) instrument [1].

Materials and methods: DREEM evaluates the EE with 5 sub-scale scores; (i) students' perception of learning (SPL), (ii) students' perception of teaching (SPT), (iii) students' academic self-perceptions (SASP), (iv) students' perception of atmosphere (SPA) and (v) students' social self-perceptions (SSSP). Higher scores indicate a better EE. The instrument was administered to the 4th year medical students before the live education (Anaesthesiology core rotation, October 2021) during the academic year 2020-21 (exclusively online education). The results were compared with those after the completion of the core rotation. We summarized the results using descriptive statistics, normality and paired samples T-test.

Results and discussion: A total of 71 students (rate 70%) responded to the survey both before and after the live education. All the subscales scores increased after the live education but with a different effect size. SPT (30.9 to 31.1, p=0.002) had the most significant effect, followed by SPA (32.0 to 37.3, p=0.108), SAPS (24.0 to 26.4, p=0.453), SPL (35.0 to 39.3, p=0.626) and SSPS (22.8 to 23.6, p=0.849) who had a lower effect.

Conclusion(s): Students' overall EE perception was more positive after the re-institution of live education compared to the exclusively online format due to COVID-19 pandemic. SPT had the most significant effect followed by SPA.

References:

Dimoliatis ID, Vasilaki E, Anastassopoulos P, Ioannidis JP, Roff S. Validation of the Greek translation of the Dundee Ready Education Environment Measure (DREEM). Educ Health (Abingdon). 2010 Apr;23(1):348.

Covid19

COVAP01-02
A low-flow nasal mask-face tent provided pressure-control ventilation/oxygenation and reduced aerosol/droplet spread while teaching a CA1 resident to perform difficult intubation in a morbidly obese patient undergoing robotic-assisted laparoscopic hysterectomy/BSO amid the ongoing COVID-19 pandemic

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Background: A low-flow nasal mask-face tent provided continuous oxygenation and reduced aerosol/droplet spread during RSI, endotracheal intubation (ETI) and extubation in a COVID-19 patient.[1-2]We used it in a morbidly obese patient while teaching difficult ETI.
Case report: A 53 y/o female, BMI 49kg/m^2, with HTN, NIDDM and endometrial carcinoma presented for robotic-assisted laparoscopic hysterectomy/BSO. After she received erector spinae plane block, a nasal mask-face tent was secured over her nose with elastic headstraps and connected to the anaesthesia circuit/machine delivering 6-8cm H_2O CPAP with 4L O_2/min. Following achieving 100%SpO_2 /0.95 FeO_2, GA was induced with fentanyl, lidocaine, propofol and rocuronium. She was supported with nasal pressure-control ventilation (PCV) (PIP13cm H_2O, PEEP 5cm H_2O, RR 20/min). Jaw-thrust was applied to close the mouth and obtain tight seal (Fig.1).

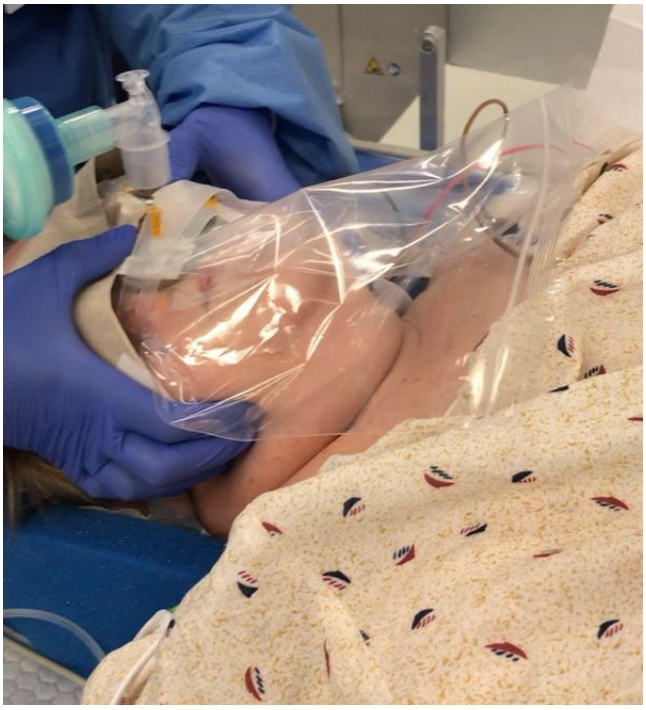

Fig. 1

Video-laryngoscopy (VL) performed under the face-tent by CA1 revealed only redundant tissues. When her SpO_2reduced to 93%, VL was removed and PCV quickly improved SpO_2 to 100%. VL ETI was achieved by the attending (Fig.2). She tolerated the procedure well. Post-extubation, she maintained 100%SpO_2 with the nasal mask-face tent.

Fig. 2

Discussion: This simple low-flow nasal mask-face tent provided continuous PCV/oxygenation and reduced aerosol/droplet spread during induction and ETI/extubation in a morbidly obese patient. It allowed extra time needed for teaching difficult ETI. It improves patient safety and provides additional provider protection amid the ongoing COVID-19 pandemic at no extra cost.
Ref: 1. www.TSEmask.com; 2. ASA AM:MC1280, 2020
Learning points:
1. How to assemble a nasal mask-face tent using a paediatric mask and a plastic sheet.
2. How to perform NPCV using a nasal mask-face tent.
3. How to perform VL ETI and extubation under the face tent to reduce aerosol/droplet spread.

COVAP01-03

A simple low-flow nasal mask-face tent provided continuous nasal pressure-control ventilation/oxygenation and reduced aerosol/droplet spread while teaching a new CA1 trainee to perform VL intubation in a high-risk cardiac patient during atrial fibrillation ablation amid the ongoing COVID-19 pandemic

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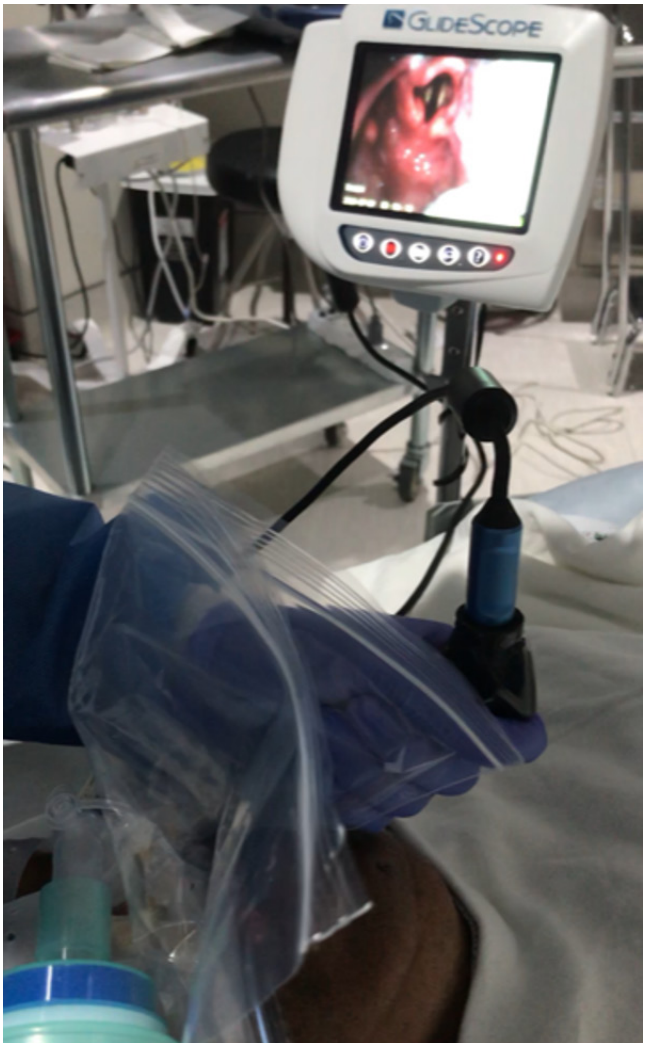
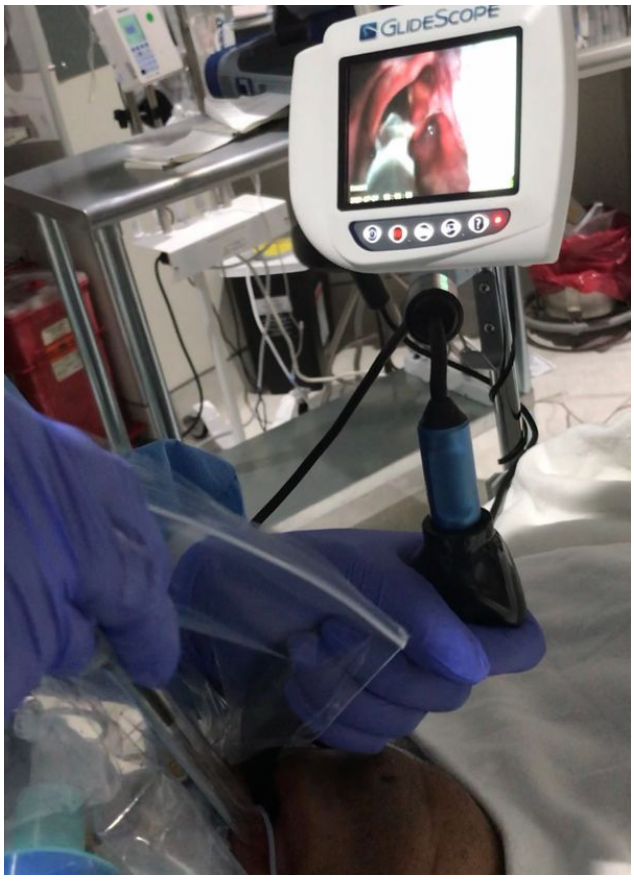
Background: A simple nasal mask-face tent provided low-flow pre/apnoeic oxygenation and reduced aerosol/droplet spread during RSI, endotracheal intubation (ETI) and extubation in a COVID-19 patient.[1-2] We used it to teach new trainee to perform ETI.

Case report: A 53 y/o male, BMI 28 kg/m^2, with CAD, ischemic cardiomyopathy (LVEF 25-30%) and tachy-brady syndrome s/p AICD presented for atrial fibrillation ablation. A nasal mask-face tent was secured over his nose with elastic straps and covered his mouth. After pre-oxygenation with 4L O_2/min, GA was induced with midazolam, fentanyl, lidocaine, propofol, and rocuronium. He was supported with nasal pressure-control ventilation (NPCV) (PIP 15cm H_2O, PEEP 5cm H_2O, RR 20/min). Video-laryngoscopy (VL) was performed under the face tent while the nasal mask delivered continuous NPCV/oxygenation (Fig.1).



VL ETI was achieved smoothly under the face tent by a new CA1 with some assistance from a chief resident (Fig.2). He maintained 100%SpO_2 throughout and tolerated ablation well. Lidocaine (2% x 5cc) aerosol spray was delivered via ETT. The nasal mask-face tent was re-secured prior to extubation. He was extubated smoothly under the face tent without coughing and maintained 100%SpO_2.



Discussion: This simple low-flow nasal mask-face tent provided continuous NPCV/oxygenation while teaching a new trainee to perform VL ETI in a high-risk cardiac patient. It reduced aerosol/droplet spread during induction, ETI and extubation. Amid the COVID-19 pandemic, it improves patient safety and provides additional provider protection at no extra cost.

Reference:

1. www.TSEmask.com; 2. ASA AM:MC1280, 2020

Learning points:

1. How to assemble a nasal mask-face tent using a paediatric mask and a clear plastic sheet.
2. How to perform NPCV using a nasal mask-face tent.
3. How to perform VL ETI and extubation under the face tent to reduce aerosol/droplet spread.

COVAP01-05
Factors affecting outcomes of a cohort COVID-19 related ARDS (C-ARDS) undergoing veno-venous ECMO treatment: preliminary data from a North Italy ECMO centre

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Background and goal of study: During COVID-19 pandemic, Extra Corporeal Membrane Oxygenation (ECMO) has been proposed as rescue therapy for severe ARDSrefractory to conventional therapies [1], but its utility, in this setting, has not been proved yet.[2].
Here, we report about the characteristics of the cohort of patients undergoing veno-venous ECMO in the period from February 2020 to December 2021, focussing on factors possibly affecting outcome.
Materials and methods: Data of all consecutive adult patients with C-ARDS treated with veno-venous ECMO at 'Città della salute e della Scienza' University Hospital (Turin, Italy), were collected retrospectively and prospectively. The data collection was approved by local Ethic Committee (document n.00103/2020, March 2020). Statistics were performed with SPSS (IBM, NY, version 27).
Results and discussion: During the study period, 48 patients were admitted and treated with veno-venous ECMO. Overall mortality was of 85%. Surviving and non-surviving did not report significant differences in demographic data and comorbidities. Non-surviving patients underwent non-invasive ventilatory support (NIV) more significantly than survivors (95% versus 57%) and reported longer period of ventilatory support (NIV plus invasive) (median days: 11 versus 8). Static lung compliance differed between surviving and non-surviving patients over the time (p=.005) and, particularly, at 7 and 14 days after ECMO implantation (Figure).

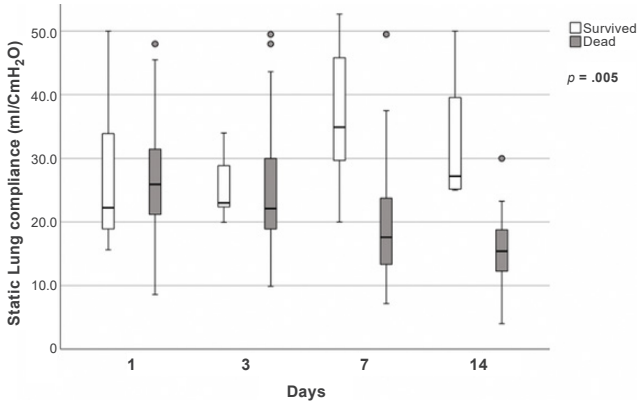

Figure.

Conclusion(s): Our preliminary results seem to suggest an important role for NIV in affecting the outcome of patients undergoing ECMO. In addition, lung compliance seems to be severely reduced after 7 days in non-survivors.
Further studies investigating either the opportunity to compute NIV days among the ones spent in mechanical ventilation to better define the patients' eligibility for ECMO or to evaluate the potential role of lung compliance collapse after 7 days of ECMO as a potential indicator of therapeutic failure are needed.
References:
1. Badulak J, et al.ASAJO2021; 67(5):485-495;
2. MacLaren G, et al.Jama2020; 323(13):1245-46.

COVAP01-06
Feasibility and safety of One-Lung Ventilation in a patient affected by Sars-Cov-2 viral pneumonia

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Background: One-lung ventilation (OLV) exposes healthcare professionals into operating theatre at high risk of infection due to aerosol generation.[1,2] We would present the management of OLV in a patient with SarS-Cov-2 infection complicated by viral pneumonia and pleural empyema (Fig.1).
Case Report: A 77-year-old man, ASA score III, underwent video-assisted thoracoscopic surgery (VATS) and toilet of a pleural empyema. The patient was affected by Sars-Cov-2 respiratory failure necessitating oxygen supplementation. After performing pre-oxygenation, we completed a rapid sequence induction with a videolaryngoscopy and we inserted a double lumen tube 41 French using a blind insertion technique. We checked correct positioning through chest auscultation and ventilator parameters modifications (peak-inspiratory pressure increase due to OLV in supine and lateral decubitus). An HEPA filter was placed at the entrance of the bronchial tube. Before skin incision, we proceed to clamp the bronchial lumen to occlude ventilation to the left lung and we disconnected the bronchial lumen of DLT from the breathing circuit to allow a complete lung deflation (Fig.1). The operation was completed uneventfully and during OLV all the oxygenation and ventilation parameters remained appropriate.

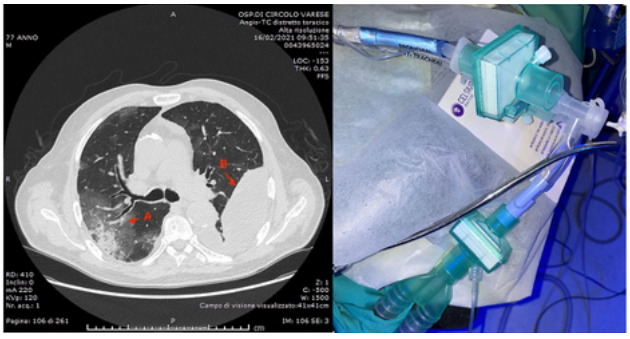

Figure 1. On the left, chest CT image:
A) lung involvement with crazy-paving pattern and consolidations surrounded by ground-glass opacities, typical of the Covid-19 pneumonia.
B) large pleural-thoracic empyema.
On the right, ventilator circuit with the bronchial lumen of DLT disconnected during OLV with the HEPA filter at its extremity.

Discussion: Despite the recommendations,[1,2] in our opinion the fibreoptic technique shouldn't be considered the first choice in a protective setting because of the risk of aerosolization among healthcare workers. The blind technique, even with a well-known higher failure rate, is a valid and feasible alternative. The fibreoptic technique must be surely used in case of failure of the blind approach.
References:
1. M. Thornton et al. Management of the airway and lung isolation for thoracic surgery during the COVID-19 pandemic. Anaesthesia 2020 November; 75:1509-1516.
2. P. Tryphonopoulos et al. COVID-19 and One-Lung Ventilation. Anesth Analg. 2020 May 4:10.

Learning points: The double lumen tubes placement can be performed with an effective and safe blind technique reducing the risk of aerosol generation in Covid-19 patients in order to minimize the risk of infection between healthcare workers.

COVAP01-08
Quality of life six months after discharge from COVID hospital: a prospective cohort study of ICU survivors

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Background: There is increasing evidence of serious deterioration in long-term Quality of Life (QoL) in COVID-19 intensive care unit (ICU) survivors.
Goal of Study: to estimate the QoL of ICU survivors six months after discharge from COVID hospital and to highlight some factors responsible for that kind of outcome.
Materials and Methods: a prospective E-questionnaire of patients was carried out with SF-36 scale [1,2]. All essential data related to physical (PC) and mental (MC) components of the QoL were identified, collected, and analyzed. Multivariable regression was chosen to identify predictors to impact the QoL.
Results and Discussion: Only 125 patients of 222 ICU survivors agreed to sign the Informed Consent of the survey. We proceeded from the fact that normal level of QoL according to SF-36 guide are "≥50 relative units", both, for PC and MC . Accounting to that baseline, 68% of patients been followed up had a reduced PC and 48% MC of QoL.
Among all therapies had been available during first wave of Pandemic, it was Low Molecular Weight Heparin only, been able to improve PC of patients' QoL (odds ratio: 3.341 (95% CI: 1.298-8.599, p = 0.012).
At last, but not least, age ≥ 52 years (odds ratio: 0.223, p = 0.001) and female gender (odds ratio: 0.321, p = 0.02) were associated with declining physical health. A history of cerebrovascular insufficiency has been associated with a decrease in the mental health component of QoL (odds ratio: 0.125, p = 0.002).
Conclusion(s): 1) 68% of ICU survivors been followed up to 6 months after COVID hospital discharge had a reduced physical and 48% mental components of Quality of Life 2) ICU Low Molecular Weight Heparin treatment appeared to be the single one predictor of improvement in the physical component of quality of life in patients with COVID-19 six months after hospital discharge.
References:
1. Liliane L, Carvalho FM. (2016). SF-36 total score as a single measure of health-related quality of life: Scoping review.SAGE Open Medicine. 2016;4:2050312116671725.
2. Ware JE Jr. SF-36 health survey update.Spine (Phila Pa 1976). 2000;25(24):3130-9.

COVAP01-10
Videolaryngoscope use during COVID-19 pandemic

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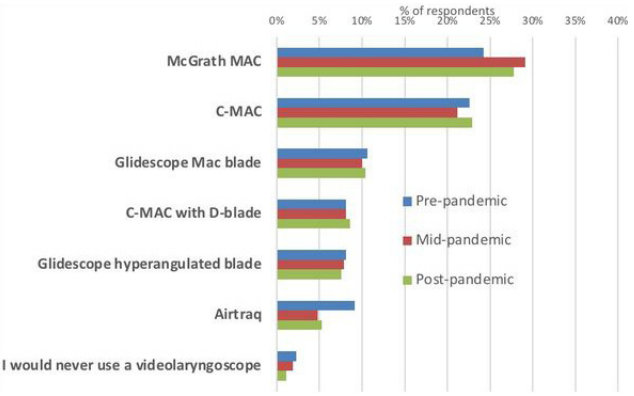
Background and goal of study: COVID-19 airway management guidelines advocated first line videolaryngscope (VL) use to improve first pass success and operator safety.[1]The VL-iCUE (videolaryngoscopy, influence of COVID-19 on use and experience) examined VL choice and use. We explore the impact of the pandemic on VL choice and training opportunities.
Materials and methods: 'Favourable' Ethical review (21-EM-REC-053) was granted. The VL-iCUE survey was available in 6 languages open for up to 90 days via JISC online, distributed worldwide via national airway societies and organisations. Respondents answered 29 questions related to VL use and preference pre-, during and post pandemic. Data were analysed using GraphPad 9.3.1. Not all respondents answered all questions, but all results are included. Post pandemic is used to refer to future practice.
Results and discussion: We received 4394 surveys from 97 countries, 944 (21.8%) trainees. In our cohort the McGrath MAC, C-MAC and Glidescope with MAC blade were in order the most commonly used devices pre during and post pandemic. The Airtraq was the most commonly used channelled device and the C-MAC with D blade and Glidescope most commonly used hyperangulated blades, both passing Airtraq in popularity peri and post pandemic. 399/1064 (37.5%) received no training in novel VLs acquired during the pandemic. Those reporting 'never use a VL' fell sequentially from pre to post[99/4248 (2.3%), 81/4182 (1.9%) 46/4184 (1.1%), P<0.0001 ChiSquare for trend. Figure 1 shows preferred VL amongst respondents (top 6 devices).



Conclusion: We cannot report the views of non-responders, but our survey shows a consistent preference for MAC style VLs; previous surveys found the Airtraq, Glidescope and C-MAC most widely available.[2]Effective VL use requires training and we are concerned some reported novel VL provision without training. The diminishing number who would 'never use a VL' is encouraging.
References:
1. Cook TM, El-Boghdadly K et al. Consensus guidelines for managing the airway in patients with COVID-19. Anaesthesia 2020;75:785–99.
2. Cook TM, Kelly FE. A national survey of videolaryngoscopy in the UK. Br. J. Anaesth 2017;118:593–600

COVAP01-11
COVID-19 Acute Respiratory Distress Syndrome (ARDS) associated hypercoagulation and fibrinolysis shutdown: the effect of streptokinase nebulization monitored by rotational thromboelastometry

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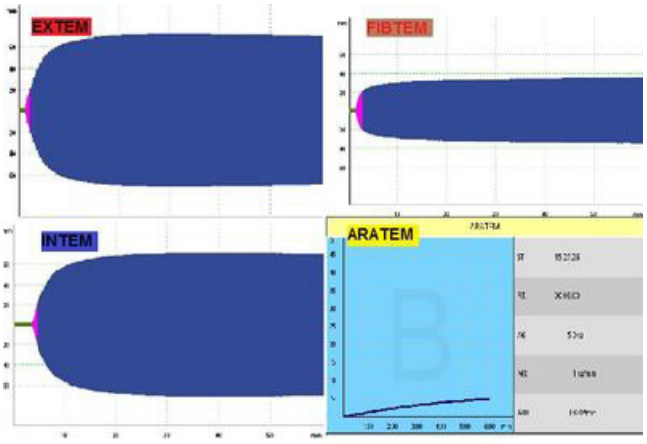
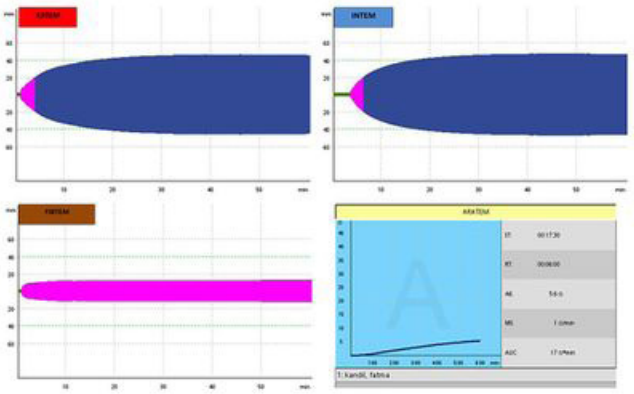
Background: Severe COVID-19 infection is frequently associated with microvascular thrombi.
Case Report: A 66-y-old female with COVID19 ARDS admitted to ICU suffering from dyspnea, tachypnea with 60% oxygen saturation (SaO_2) on room air, improved to 90% with a nonrebreather mask (15 L/min), prone positioning. On admission: HR 130 beat/min, BP 130/90 mm Hg, chest CT (Ground-glass opacities >75% lungs), INR 0.94, D-dimer 0.9 ug/ml and plasma fibrinogen 956 mg/dl.
Baseline rotational thromboelastometry (ROTEM) demonstrated hypercoagulation: FIBTEM maximum clot firmness (MCF) 35mm (normal 10-24 mm), EXTEM MCF 72 mm and INTEM MCF 70mm. (normal 50-68 mm). An EXTEM maximum lysis (ML 60 min run time) of 0% confirmed fibrinolysis shutdown. ROTEM platelet activity were low, ARATEM area under curve (AUC) of 18 Ω·min and ADPTEM AUC of 16 Ω·min (normal 70-153 and 38-113 Ω·min, respectively).
On aspirin 81 mg/day and enoxaparin (80mg/12h).
Following patient's consent nebulized streptokinase (250,000 IU/4hrs) for 4 days. Within 12 h, a decrease in FIBTEM MCF to 27mm, EXTEM MCF to 67mm, INTEM MCF to 66mm and an increase in EXTEM ML to 5% could be detected. On day 4 SaO_2 96% with 7L/min oxygen.
FIBTEM MCF decreased to 15mm, EXTEM MCF to 50mm, INTEM MCF to 53mm and EXTEM ML increased to 7%. Platelets activity remained low. D-dimer and fibrinogen decreased to 0.4 ug/ml and 245 mg/dl respectively. Transferred to medical ward on day 10 and 3 days later discharged home. Near normal CT within 3 months.



Baseline ROTEM, FIBTEM MCF 35 mm, EXTEM MCF 72m, INTEM MCF 70mm, ARATEM AUC 18 Ω·min



ROTEM after 4 days of streptokinase nebulization, FIBTEM MCF 15 mm, EXTEM MCF 50mm, INTEM 53mm, ARATEM AUC 17 Ω·min.

Discussion: ROTEM can assist in diagnosing COVID-19 associated coagulopathy and monitoring the efficacy of therapy. Nebulized streptokinase might have led to this clinical improvement.

COVAP01-12
Fractional exhaled nitric oxid (FeNO) level as a predictor COVID-19 disease severity

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Background and Goal of Study: Since December 2019, the world has experienced an outbreak COVID-19 pandemic, which affected the lives of billions of people worldwide. Given the infectivity, morbidity and mortality rates associated with COVID-19, the demands for better patient processing algorithms and risk stratification methods is often expressed among emergency medicine professionals worldwide. While some risk-stratification tools were previously presented, many rely on laboratory values, which may induce patient processing delays and increase costs. Fractional exhaled Nitric Oxide (FeNO) is an affordable, portable, reliable, non-invasive and quick measurement shown to well-correlate with respiratory inflammatory conditions such as asthma and viral infections. In this study we have examined the feasibility of using FeNO measurement for COVID-19 patient's risk stratification during hospitalization.
Materials and Methods: A prospective non-randomized cohort study. COVID-19 patients hospitalized in COVID-19 wards in Tel-Aviv Medical Center (TLVMC) were enrolled and requested to use the Vivatmo-me handheld device for FeNO measurements as well as to answer demographic and COVID-19 symptoms questionnaires. Further hospitalization data were obtained from the TLVMC databases. Patients were divided to one of two groups based on their hospitalization outcomes: home discharge and severe outcomes, which included death, ICU hospitalization or requirement for further treatment in an internal ward or dedicated facility.
Results and Discussion: Fifty-six patients were enrolled in this study. Except for age, no statistically significant demographical difference were found between patients in the severe outcomes

(n=14) and the home discharge (n=42) groups (64.21±13.97 vs. 53.98±15.57, p=0.04). Enrolment FeNO was found to be significantly lower in the severe-outcomes group (15.86+14.74 vs. 25.77±13.79, p=0.008). Survival to severe outcome of patients with FeNO measurement ≤11.8 PPB was found to be significantly shorter compared with patients with FeNO >11.8 PPB. A following binary logistic regression model has shown FeNO measurement of ≤11.8 PPB to significantly increase the risk of severe outcomes (OR=12.8, p=0.001) with ROC of 0.752.

Conclusion(s): Alongside being cheap, simple, cost-effective, portable and non-invasive bedside tool, FeNO measurements can serve as a biomarker and COVID-19 decision support tool for medical teams.

COVAP01-13
Our first expirience in ECMO use for COVID-19 pneumonia treatment

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Background: In this abstract we will present the first VV-ECMO procedure performed in patient with COVID 19 infection in our tertiary level hospital.

Case report: Patient was 31-year-old male, initially treated in the covid ward of the secondary level hospital. He was transferred to our hospital because of bilateral interstitial pneumonia at CT and pneumomediastinum. After 12 days he developed severe respiratory deterioration, intubated and placed on mechanical ventilation. Is indicated VV-ECMO procedure, via a right femoralis- right internal jugular vien approach. During this procedure patient was continuously analgosedated.Arterial blood saturation significantly improved after these measures were taken.However, on the fifth day hematuria occurred with consecutive anemia and thrombocytopenia.At that time CVVHD was performed.Patient's general condition worsened, followed by sepsis and then septic shock. An attempt to disconnect from ECMO device was without success. After 25 days of ECMO treatment outcome was lethal.

Discussion: Initial reports suggested a high mortality (>80%) for COVID-19 patients supported with ECMO. [1] Barbaro and colleagues report that centres with more ECMO experience have better outcomes relative to centres with less experience. But mortality is still high about 40% in patients with severe COVID-19. The selection of the right patient at the right time is guided by clinical principles and experience. [2] Complications of ECMO include bleeding,neurologic injury,thrombocytopenia and cannula-related vascular complications. [3]

References:

1. Henry BM, Lippi G. Poor survival with extracorporeal membrane oxygenation in acute respiratory distress syndrome (ARDS) due to coronavirus disease 2019 (COVID-19): pooled analysis of early reports. J Crit Care. 2020; 58: 27-28
2. Barbaro RP, et al. Extracorporeal membrane oxygenation support in COVID-19: an international cohort study of the extracorporeal life support organization registry. Lancet.2020; 396:1071–8.
3. Fitzsimons MG, Crowley J. COVID-19: Extracorporeal membrane oxygenation (ECMO). UpToDate.Last updated:Jan 27, 2022.

Learning points: Our first experience of ECMO treatment in patient with COVID 19 infection was not successful. However it made possible for us to notice the most important moments in ECMO treatment. Those are decision when to start treatment and expected complications, in the first place hemolysis of mechanical origin, renal failure, nosocomial infections and respiratory complications.

COVAP02-01
Patients satisfaction level following regional anaesthesia for trauma ambulatory surgery during COVID-19 pandemic: evaluating a reconfigured service

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Background and Goal: The COVID-19 pandemic impacted health services worldwide. Our institution saw service reconfiguration during the first wave of COVID-19, including receiving ambulatory trauma instead of elective orthopaedic procedures and shifting to Regional Anaesthesia as "plan A" anaesthetic technique. Patients' experiences and levels of satisfaction following Regional Anaesthesia is an under-researched quality indicator. Our study aimed at assessing patients' satisfaction following Regional Anaesthesia in a context of significant change to the routine practice dictated by COVID pandemic.

Materials and Methods: A retrospective observational study included adult patients who underwent ambulatory trauma surgery under regional anaesthesia at the National Orthopaedic Hospital Cappagh (Ireland) between March and May 2020. Data was collected from clinical records, and through phone interviews. The patients' satisfaction with regional anaesthesia experience was assessed through a Likert scale of 1 (very unsatisfied) to 5 (very satisfied), in addition to open-ended questions about their peri-anaesthesia experience. Multivariate ordinal logistic regression analysis was used to identify factors associated with high levels of satisfaction.

Results and Discussion: The final analysis included 85 patients (retention rate = 69.1%). The average satisfaction score was 4.6 ± 0.8. The results showed 91.8% (n=78) were either satisfied or very satisfied with Regional Anaesthesia and 90.6% (n=77) will opt for it if offered in the future. Rebound pain independently reduced the satisfaction score (OR 0.08, 95% CI 0.07 – 0.85). Their biggest worry was contracting COVID in the hospital, and staff-related factors were identified by majority of patients as being the best of their experience.

The study evaluated the patients' satisfaction with Regional Anaesthesia service at a time of unforeseen change and great uncertainty within healthcare facilities. Despite the heterogenicity in operators, procedures and techniques, the uniformed outcome of high satisfaction level was reassuring.

Conclusion: The results revealed high level of satisfaction with Regional Anaesthesia experience. The potential for recurring COVID surges and associated challenges within the healthcare systems remain and the findings help in setting organisational standards and quality of care, specially if service re-configuration associated with similar respiratory diseases pandemics is required in the future.

COVAP02-02
Long-term air pollution exposure - a contributing risk factor to COVID-19 morbidity?

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Background and Goal of Study: Long-term exposure to nitrogen dioxide (NO_2) causes a wide spectrum of health problems - especially affecting respiratory functions (Reilly, AJRCCM 2019). The SARS-CoV-2 virus has been spreading in Germany since January 2020. Here we analyze the association between long-term NO_2 exposure and the need for intensive care unit (ICU) treatment and mechanical ventilation after SARS-CoV-2 infection in spring 2020.
Materials and Methods: We conducted a cross-sectional study in Germany on county-level. Long-term NO_2data were collected from 2010 through 2019, annual mean concentrations were calculated at the spatial level of county in Germany. We extracted the number of occupied ICU beds and the need of mechanical ventilation from the German Interdisciplinary Association for Intensive Care and Emergency Medicine (DIVI) registry. Data were included from April 16, the start of mandatory reporting to the DIVI registry, until May 16, when lock down restrictions were lifted. We used negative binominal models, including adjustment for risk factors as age, sex, days since first COVID-19 case, population density, socio-economic and health parameters.
Results and Discussion: Long-term annual mean NO_2 level ranged from 4.6 $\mu g/m^3$ to 32 $\mu g/m^3$. Until May 16, 2020, 169,840 COVID-19 cases and 8,433 COVID-19 deaths were registered in Germany. In the single pollutant model without adjustment to demographic, socio-economic, and health parameters an increase of 1 $\mu g/m^3$ NO_2 is associated with an increase in occupied ICU beds by 7.1% (95% CI 1.047–1.095), and mechanical ventilation by 7.9% (95% CI 1.051–1.107).
After adjustment for all risk factors, NO_2 was still positively associated with the need for ICU care by 3.2% (95% CI 1.001–1.064), and mechanical ventilation by 3.5% (95% CI 1.000–1.071).
Our results are in line with one study from Europe and one study from Germany, showing a positive association between long-term NO_2 exposure and COVID-19 fatality or COVID-19 incidence rate, respectively (Ogen, Sci Total Environ 2020; Huang, Spat Epidemiol 2021).
Conclusion: The individual risk for COVID-19 morbidity is influenced by individual long-term exposure to the air pollutant NO_2. While the COVID-19 pandemic may end by reaching herd immunity through infection or vaccination, exposure to ambient air pollution will continue to affect the health of people. The only remedy is to reduce emissions.

COVAP02-04
A nationwide survey among anaesthesiologists about perioperative COVID-19 prevention in Austria

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Goal of study: To explore methods and availability of perioperative COVID-19 prevention for patients and anaesthesiologists in Austrian hospitals.
Methods: An anonymous, online survey among Austrian anaesthesiologists (n=1800) was conducted in June 2021. The survey contained 40 questions to explore preoperative assessment, testing strategies and protective measures in elective and acute surgery, test availability, staff screening, vaccination rate and satisfaction. Descriptive statistics were used to analyse the data.
Results and discussion: A total of 22% (380/1800) responded. Position of respondent anaesthesiologists was leading in 20%, senior in 52%, consultants in 16% and residents in 12%, of which 28% were working in hospitals with <300 beds, 26% with 300 to 500 beds and 45% with >500 beds.
For 52% of anaesthesiologists the preoperative assessment changed from 2019 to 2021, mainly due to tele-assessment. Patient consent was performed five times more often via telephone, because of the pandemic (80%).
For perioperative patient screening tests were mandatory in hospitals of 87% of anaesthesiologists. PCR tests were used by 40% and antigen tests by 29% in inpatients. In 10% of hospitals screening differed for outpatients (27% PCR, 41% antigen test). PCR tests were not always available in 14% of the respondents' hospitals (>500 beds: 7%; <500 beds: 19%).
Video laryngoscopy was used primarily by 91% of anaesthesiologists when patients were untested and by 95% when tested positive. Rapid sequence induction was performed by 67% for untested and by 76% for positive patients .
Staff screening was performed with rapid antigen tests in 68% and with PCR tests in 32%. In 51% of anaesthesiologists, screening of vaccinated staff did not differ from unvaccinated staff. In 39%, vaccinated staff was not part of the screening anymore. Vaccination against COIVD 19 was received by 97% of anaesthesiologists. Satisfaction with prevention strategies and personal protective equipment was high for 93% and 97%.
Conclusion(s): Preoperative tele assessment increased due to the pandemic. Most patients underwent preoperative testing. Even though recommended by national and international guidelines only 76% of anaesthesiologists perform rapid sequence induction to intubate COVID positive patients. One in seven anaesthesiologist indicated limited access to PCR tests for hospital patients. Satisfaction with COVID-19 prevention was high.

COVAP02-05
Early care programme for the management of post intensive care unit syndrome and chronic pain after coronavirus disease 2019. Results from the PAIN-COVID Randomized Clinical Trial

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Background and Goal of Study: Critically ill coronavirus disease 2019 (COVID-19) survivors are a susceptible population to develop post-intensive care syndrome (PICS) and chronic intensive care related pain (CIRP). We aimed to compare if a specific care programme based on early therapeutic education and a psychological intervention improved the quality of life (QoL) of patients at risk of developing PICS and CIRP after COVID-19.

Materials and Methods: A simple blinded, randomized, controlled trial with two groups was carried on a single medical centre. The programme included an early patient care (before the 6th week of hospital discharge), a therapeutic education about PICS and pain and a psychological intervention in patients with altered hospital anxiety and depression scale (HADS) at baseline visit. Health-Related Quality of Life was evaluated with the Euro-quality of life 5 dimensions 5 levels test (EQ 5D/5L test), consisting on EQ-5D descriptive system and the EQ visual analogue scale (EQ VAS).

Mood disorders were evaluated with the HADS, post-traumatic stress disorder (PTSD) with the PTSD checklist questionnaire and pain with the Brief Pain Inventory short form, the Douleur Neuropathique 4 questionnaire and the Pain Catastrophizing Scale.

The primary outcome was to determine if the programme was superior to standard-of-care on EQ VAS at 6 months after baseline visit.

The secondary outcomes included EQ VAS at 3 months and CIRP, anxiety, depression and PTSD incidences at 3 and 6 months after baseline visits. This study was registered on clinicaltrials.gov (NCT04394169) and approved by local Ethics Committee.

Results and Discussion: From May 27th 2020 to February 26th 2021, 433 patients were consecutively screened for eligibility, and 102 were enrolled and randomized. 96 patients were evaluated at first visit (intervention group n=51), 76 patients (intervention group n=37) at 3 months and 81 patients (intervention group n=43) at 6 months. EQ VAS in the intervention group was 80 (70-90) vs. 80 (65-90) in the control group at 6 months, p=0,98. EQ VAS at 3 month and EQ index and anxiety, depression, PTSD and CIRP incidences at 3 and 6 months were not different between groups.

Conclusion: This programme was not superior to the standard care in improving the QoL of critical ill COVID-19 survivors as measured by the EQ VAS. However, the reported data can help establish better strategies for the management of PICS and CIRP in this population.

COVAP02-06
A clinical case of prolonged continuous positive airway pressure (CPAP) ventilation in a patient with COVID-19-associated pneumonia with ROX- index evaluation

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Background: We would like to share our experience in a case of successful prolonged 60-day CPAP ventilation via a face mask, using the ROX-index to monitor non-invasive ventilation (NIV) effectiveness in a patient with COVID-19 associated pneumonia.

Case Report: A 52-year-old woman was urgently admitted to the intensive care unit (ICU) on 10thday of disease (COVID-19 positive) with respiratory rate (RR) more than 35/min., hyperthermia up to 39°C, SpO_2- 32% (on room air) and SpO_2- 77-80% with O_2insufflation via non-rebreathing O2 mask with an O2 flow 15 l/min.

On admission ROX-index value was 3.81. NIV via CPAP-mask with PEEP - 10 cm H_2O and FiO_2- 0,6 was applied, ROX-index in 4 hours from CPAP started became 4.87. At Day 10 patient deteriorated: RR - 35-40/min, SpO_2-85-88% with PEEP - 10 cm H_2O, FiO_2=0,9-1,0 during CPAP (arterial blood gases - PaO_2 - 68 mmHg, $PaCO_2$ - 43,3 mmHg) with ROX index value 2,35 (high risk of intubation prediction).

We increased sedation with fentanyl and PEEP level up to 12 cm H_2O. In 4 hours situation improved: RR - 25/min, SpO_2-90-93%, ROX-index in 4 and 8 hours became 3.4 and 4.36, respectively. We used ROX-index daily as an early diagnostic tool of changes in patient's condition. Patient was proning from Day 1 up to Day 30 not less than 12 hours per day. From Day 45 CPAP was alternated with O2 via non-rebreathing O2 mask. Since Day 50 CPAP was provided during night hours only and fully stopped from Day 60.

Medications were prescribed according to the COVID-19 treatment protocol, patient's condition and laboratory tests results. Patient discharged the hospitan on Day70 with SpO_2- 91-92% (on room air) and RR up to 16/min.

Discussion: There are no studies that had shown the effectiveness of the ROX-index in predicting the efficacy of NIV in patients with acute hypoxemic respiratory faliure, it was evaluated for high flow nasal therapy[1].

This clinical case describes our experience of effective use of ROX-index in a patient with severe COVID-19-associated ARDS, who underwent NIV via CPAP mask.

References:

1. Roca O et al. Predicting success of high-flow nasal cannula in pneumonia patients with hypoxemic respiratory failure: The utility of the ROX index. J Crit Care. 2016 Oct;35:200-5. doi: 10.1016/j.jcrc.2016.05.022. Epub 2016 May 31. PMID: 27481760.

Learning points: ROX-index could be used as an early diagnostic criteria for NIV efficacy in COVID-19 patients. Further research is required.

COVAP02-07
Case series of Kawasaki disease and MIS-C: clinical signs

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Background and goal of study: COVID-19 affected more than 300 million citizens of our planet and caused 5.5 million deaths in the last two years. The multisystem inflammatory syndrome is one of the most severe complications of COVID-19 in children (MIS-C). We aimed to analyze the clinical signs in patients with Kawasaki disease (KD) and MIS-C.
Materials and methods: 11 patients (male/female = 6/5; age 7±4 years were treated in our tertiary hospital: 4 patients for 2016-2018 and 7 patients for 2020-2021. 6 patients fulfilled the CDC criteria of Kawasaki Disease (KD) (4 cases of them for 2016-2018, when the diagnosis of MIS-C did not exist). 5 patients for 2020-2021 met CDC criteria of MIS-C. One 1-year-old male patient died in 2020 with KD.
Results and discussion: Hospital stay in average was 12±5 days. Fever >38ºC lasted 7±3 days at home and 10±4 days in the hospital. Clinical signs were following: conjunctivitis in 9 patients; cracked lips and raspberry tongue in 4 cases each; pharyngeal hyperemia in 7 patients; skin hyperemia of palms and feet in 3 children; erythematous rash in 7 cases; edema in 5 patients; epithelial desquamation in 2 children; enlarged lymph nodes in 5 children and signs of carditis in 5 patients.
Six children had abdominal pain and 1 child had diarrhea. Arthralgia and jaundice took place in 1 child each. The consciousness was affected in 5 patients. Renal dysfunction and respiratory failure were detected in 3 patients each, but only 1 child had both simultaneously. ECG was normal in 5 patients and detected mild changes in others.
Echocardiography detected pericardial effusion in 4 cases, decreased left ventricular contractility in 4 patients, aneurism of left coronary artery in 1 patient, and rupture of left-ventricular aneurism with cardiac tamponade in one fatal case of KD. In 4 children echocardiography detected no abnormality. The average ejection fraction of the left ventricle was 59±11%. Chest X-ray showed bilateral pneumonia with hydrothorax and mild pleural effusion in one child each. Ultrasound detected hepatomegaly in 5 cases, splenomegaly in 2 cases, pleural effusion in 3 cases, ascites, and cholecystitis in 1 patient each.
Conclusion(s): Many clinical features are shared between KD and MIS-C. Clinicians tend to make the diagnosis of MIS-C due to the COVID-19 pandemic. The cases of KD before the pandemic period were not revised for MIS-C.

COVAP02-08
Case series of Kawasaki disease and MIS-C: treatment options

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Background and goal of study: COVID-19 affected more than 300 million citizens of our planet and caused 5.5 million deaths in the last two years. The multisystem inflammatory syndrome is one of the most severe complications of COVID-19 in children (MIS-C). We aimed to analyze the treatment options in patients with Kawasaki disease (KD) and MIS-C.
Materials and methods: 11 patients (male/female = 6/5; age 7±4 years were treated in our tertiary hospital: 4 patients for 2016-2018 and 7 patients for 2020-2021. 6 patients fulfilled the CDC criteria of Kawasaki Disease (KD) (4 cases of them for 2016-2018, when the diagnosis of MIS-C did not exist). 5 patients for 2020-2021 met CDC criteria of MIS-C. One 1-year-old male patient with KD died in 2020.
Results and discussion: Intravenous immunoglobulin (IVIG) and aspirin were used in all children. Corticosteroids (methylprednisolone and dexamethasone) were administered in 8 patients. Steroids were not administered in 3 patients with KD who demonstrated a positive effect of IVIG. In 3 cases vasopressors and inotropic agents were used for hemodynamic stabilization. Stress ulcer prophylaxis was supplied with H-2-blockers in 3 patients and with proton-pump-blockers in 4 patients. Antibiotics (cefalosporins or synthetic penicillins) were used in all patients. 6 patients needed low-dose diuretics. Heparin, enoxaparin, and fondaparinux were used in 1 patient each. One patient needed the administration of albumin and packed red blood cells.
Conclusion(s): The standard treatment with IVIG, corticosteroids, and aspirin is quite effective in KD and MIS-C. One child died due to a rupture of left-ventricular aneurism as a complication of KD. Our case series presents additive information for growing data in this field.

COVAP02-09
Surgical productivity change during the COVID-19 pandemic in Japan

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Background and Goal of Study: To control the Covid-19 pandemic, the Japanese government issued its first declaration of emergency in on April 7, 2020, and healthcare resources allocation has significantly shifted. As a result, routine healthcare provision in areas other than the Covid-19 countermeasures became unable to fully utilize healthcare resources. We chose surgery as a routine medical care that was not directly related to the Covid-19 countermeasures. The goal is to compute surgical total factor productivity before and during the pandemic, and to evaluate the effects of Covid-19 on its productivity change.

Materials and Methods: We collected data from all the surgical procedures performed at Teikyo University Hospital from April 1 through September 30 in 2019 and 2020.
Malmquist index (MI) represents productivity change of a decision making unit (DMU) between two time periods under dynamic situation, and is an example of comparative statics analysis. MI can divide productivity change into two components, one measuring efficiency change (EC) and the other measuring technical change (TC). MI is defined as the product of EC and TC terms.
We employed non-radial and non-oriented Malmquist model under the constant returns-to-scale assumptions. We defined the DMU as a surgeon with the highest academic rank in the surgery. Inputs were defined as (1) the number of medical doctors who assisted surgery, and (2) the duration of surgical operation from skin incision to skin closure. The output was defined as the surgical fee for each surgery.
Results and Discussion: We analyzed 4,602 surgical procedures performed by 75 surgeons. The Covid-19 pandemic had a negative impact on the productivity progress of surgery that was not related to the Covid-19 countermeasures (Table).

	April-June 2019 to July-September 2019 (before Pandemic)	April-June 2020 to July-September 2020 (during Pandemic)
Productivity change (%)	+9.8 ± 4.0 *	-4.5 ± 4.4
Efficiency change (%)	-9.8 ± 4.2 **	-22.9 ± 4.5 **
Technical change(%)	+19.6 ± 0.4 *	+18.4 ± 0.9 *

The values are expressed as mean ± SE.
* indicates that the value is significantly greater than 0 ($p < 0.05$).
**indicates that the value is significantly smaller than 0 ($p < 0.05$).

Table: Percent changes of productivity, efficiency and technique.

Conclusion(s): This finding suggests that there might be some other routine medical care whose productivity was also negatively affected by the Covid-19 pandemic due to the healthcare resources allocation shifts.

COVAP02-10
Has COVID-19 changed our use of videolaryngoscopy? An international survey of practice

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Background and goal of study: Videolaryngoscopy (VL) is more effective than conventional laryngoscopy for tracheal intubation.[1] COVID-19 guidelines promoted VL due to increased success rate and maximised operator to patient distance.[2]
The VL-iCUE (videolaryngoscopy-influence of COVID-19 on use and experience) group is an international collaboration investigating how COVID-19 impacted VL use.
Materials and methods: The University of Edinburgh granted ethical approval (21-EMRED-053). The VL-iCUE survey was made available for 90 days by web link in six languages via the JISC survey platform, distributed through airway societies and organisations around the world. We explored VL use before and after the pandemic, and if this was related to implementation of guidelines and acquisition of new VLs. Data were analysed in GraphPad Prism v9.3.1.
Results and discussion: We collated 4394 surveys from 97 countries. VL use increased post-pandemic. Respondents reporting 'always use' for VL increased from 1291 (29.4%) to 1723 (39.2%). Results in Figure 1 are according to response language. 3400 (77.4%) reported new local protocols for airway management of COVID-19 patients. Approximately half (n=2048, 46.6%) reported their airway management had been influenced by these guidelines. National and international guidelines also influenced practice (n=2303, 52.4%; n=1590, 36.2% respectively). New VLs were acquired by departments of 2076 (47.2%) respondents during the pandemic.

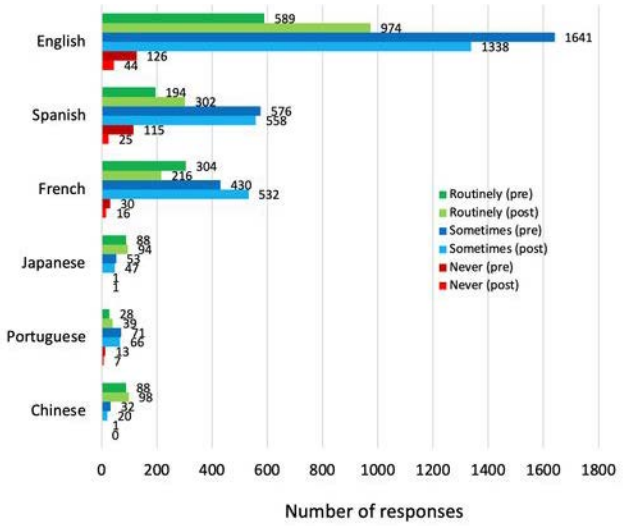

Figure 1. Pre and post-pandemic VL use by completion language

Conclusion: We reported more frequent use of VL following the pandemic, although many intend to reserve it for 'sometimes' use. Guidelines recommending VL and procurement may partially explain these findings, although further research into other influencing factors is merited so that the potential safety benefit of universal VL can be delivered.
References:
1. Lewis SR, Butler AR, Parker J, Cook TM, Smith AF, Lewis SR. Videolaryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation.*Cochrane Libr*. 2016;2016(12)
2. Cook TM, El-Boghdadly K, McGuire B, McNarry AF, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19. *Anaesthesia*. 2020;75:785-799.

COVAP02-11
The side effect of pandemic in post-operative mortality in a COVID reference Hospital in Southern of Brazil: a ‚before and after' pandemic cohort study with 15.156 patients

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Background and Goal of Study: Before the pandemic, healthcare systems in LMICs (low-middle income countries) already experienced limited capacity to prevent deaths in those patients who develop postoperative complications. It is still uncertain whether the pandemic itself has played a role in raising postoperative mortality

rates. This cohort study aimed to assess the pandemic impact on postoperative mortality up to 30 days in a COVID-19 referral hospital, in Southern Brazil.

Materials and Methods: Data from patients operated before (Jan 2018 to Dec 2019) and during the pandemic (Feb to Dec 2020) were compared and the independent association of pandemic and in-hospital 30-day mortality were evaluated using Poisson regression.

Results and Discussion: 15.156 patients were included, 12.207 operated before and 2.949 during the pandemic. Mortality rates were 2,5% (309/12207) in the control group versus 7,2% (212/2949) in the pandemic group. Mortality in COVID-positive patients was 25,8% (32/124) and in COVID-negative was 6,4% (180/2816). The proportion of urgent surgeries, ASA ≥ 3 was higher in the pandemic group. After adjustments, the relative risk of being operated during the pandemic was 1,51 (95% CI 1,27-1,79). Sensitivity analysis excluding COVID positive patients confirmed the results [RR of 1.50 (95% CI 1.27-1.78)].

	RR (IC95%)
Unadjusted model (n = 15147)	
Pandemic group	2,84 (2.40-3,37)
Adjusted model	
Pandemic Group	1,51 (1.27-1.79)
Covid Positive	1.93 (1.28-2.90)
Age	1.02 (1.02-1.03)
ASA	3.42(3.09-3.78)
Non-elective vs elective	2.46(2.01-3.01)
Major surgery vs non-major	1.17(0.98-1.39)
General Surgery	Ref (0)
Vascular	0.77 (0.62-0.96)
Thoracic	2.54 (1.91-3.37)
Orthopedics	0.72 (0.46-1.11)
Urology	0.60 (0.43-0.84)
Neuosurgery	1.03 (0.79-1.35)
Others	0.44 (0.28-0.7)

Conclusion(s): Postoperative mortality was increased among patients submitted to surgery during the pandemic, even among those without COVID infection. The pandemic has reinforced the need to adopt strategies to strengthen surgical systems to save lives and promote economic growth in LMIC.

COVAP02-12
Impact of COVID 19 pandemic on the dissertation (thesis) research work done by postgraduate trainees - experience at a tertiary care institute in western Rajasthan

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Background and goal of study: Conducting the research helps the trainees in critical thinking and provides life-long learning experiences and knowledge for conducting future research. The COVID19 pandemic has caused a great impact on almost all aspects of medical education, including the training of the postgraduate residents for research due to decreased caseload, decreased exposure to subspecialty postings, restricted elective work and their rotation among the covid facilities. Research work in the form of a thesis is mandatory for all the postgraduate trainees, once the research work is completed almost half of the residency programme has been considered completed. The present study was planned to document the impact of the covid-19 pandemic on research done by postgraduate residents of various specialities of our institute.

Materials and methods: This study was carried out after getting approval from the institutional ethics committee. It is a Questionnaire-based study. We included all the post-graduate trainees who were in the sample collection phase of their thesis work during the Covid 19 pandemic. A comprehensive questionnaire was formed through literature search and informal interviews with the trainees about their research details and the difficulties faced while performing research.

Results and discussion: Out of 90 postgraduate trainees, 44 replied to questionnaires, out of which 19 were from Anaesthesiology and Critical care, 6 from General Surgery, 3 each from Neurosurgery and Paediatric surgery specialities. For the maximum number of respondents, OPD, IPD and operating room were the areas for sample collection. 13.6% of the respondents changed their research topic due to COVID 19 pandemic out of which 6.81% included covid patients for their studies.

According to the 20 respondents, COVID 19 has impacted their thesis work. Time-bound sample collection was decided for 11% of the residents owing to restricted elective work in the OPD, IPD and OR affecting the enrollment.

Conclusion(s): The COVID 19 pandemic has affected the training and the research work among the trainee doctors in the tertiary care hospital in western Rajasthan. Halfway through their thesis work, the trainees had to make major changes in their dissertations. Among other hurdles, the inability to enrol patients was found to be an important factor. This would have a greater impact in the long run as the quality of the research has been affected greatly.

COVAP02-13
Unavailable diagnostic tools in high volume improvised COVID intensive care unit can lead to erroneous judgment

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Background: Pneumoperitoneum is a known complication of mechanical ventilation. Severe COVID pneumonia calls for the mechanical ventilation treatment with high positive pressures. In addition to high pressures, strong inflammation has detrimental effect causing alveolar destruction. These occurrences lead to air leakage through alveoli into the lung tissue and mediastinum, eventually causing pneumomediastinum, pneumothorax and even pneumoperitoneum via diaphragmal openings or via retroperitoneum.

Case report: We report a case of a 55-year old male with severe COVID pneumonia. Mechanical ventilation was started on the 6th day of admission. Pneumomediastinum with no signs of pneumothorax was seen on the chest X-ray on the 9th day. Simultaneously, acute renal failure developed and heamodialfilltration was started.

Clinical examination revealed dark blood in the nasogastric tube, melena and subcutaneous emphysema. Control x-ray demonstrated pneumoperitoneum. Emergency explorative laparotomy was performed on the same day with no hollow organ perforation found,

thus abolishing the need for further surgical procedures. Patient was readmitted to the intensive care unit. His state deteriorated with progressing refractory hypoxemia, haemodynamic instability, metabolic acidosis and subsequent multi-organ failure, ultimately leading to death on the 2nd postoperative day.

Discussion: Using additional imaging methods such as MSCT (multi slice computed tomography) should have been considered. MSCT would hopefully show no hollow organ perforation, leading to more appropriate treatment. In this particular case decision not to obtain MSCT was made due to the rapid deterioration of the patient's condition and overreliance to the clinical examination.

Unfortunately, performed surgery enhanced definitive deterioration of the patient's status. Less aggressive treatment, consisting of thoracic drainage, should have been performed instead. This could be more beneficial in regard to the pneumoperitoneum itself, although impact to the general status and prognosis for the patient is questionable.

Learning points: We strongly advocate conservative treatment in Covid patients with pneumoperitoneum during mechanical ventilation. Furthermore, high levels of clinical suspicion should be in place in order to early recognize beforementioned pneumoperitoneum during mechanical ventilation thus providing adequate diagnostic management and definite treatment.

COVAP02-14
When HIT clinical score doesn't hit the mark: the comparison of 4Ts clinical prediction score and anti-thrombocyte antibody testing of the heparin-treated COVID patients with new-onset thrombocytopenia, a retrospective evaluation

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Background and goal of study: High rates of patients with severe COVID-19 suffer from systemic inflammatory response associated with endothelial activation and thrombotic complications; thus, most protocols for COVID-19 treatment include thromboprophylaxis with heparin. Heparin-induced thrombocytopenia (HIT) is a severe complication of heparin treatment caused by platelet-activating antibodies against PF4/heparin complexes. It is associated with a consumptive thrombocytopenia and a high risk of arterial and venous thrombosis, and warrants immediate discontinuation of heparin therapy. Thrombocytopenia in COVID patients can have multiple causes (sepsis, HIT, drug-induced...), and clinicians often rely on clinical scoring systems. This study evaluates the accuracy of 4Ts for HIT in the COVID-19 patient population.

Materials and methods: Laboratory HIT testing was ordered for all COVID-19 patients treated with heparin in the COVID ICU at our institution from December 2020 until February 2021 who developed sudden moderate or severe thrombocytopenia, in the absence of other obvious immediate causes (eg. massive bleeding). Blood samples were tested with ELISA for the detection of antiheparin antibodies. Optical clearance (OC) higher than 0,400 was considered positive. At the same time, the probability of HIT was clinically evaluated using the 4Ts test, a validated pretest scoring system for HIT diagnosis. Points are awarded in 4 categories (thrombocytopenia, timing of thrombocytopenia onset relative to heparin exposure, presence of thrombosis or other HIT sequelae and other possible causes of thrombocytopenia). Score of ≤3 suggests low, 4-5 moderate and 6-8 high probability of HIT. We analysed the results of HIT testing as well as 4Ts scores using the hospital database.

Results and discussion: During the analyzed period (late December 2020-early February 2022), a total of 76 HIT tests were conducted, for 66 COVID patients. 10 tests (13%) came back positive for HIT, for a total of 8 patients (12%). 4T score was calculated for 7 patients, with the average 4T score of 4 (2-5) for HIT positive patients (median=4). 29% (n=2) of patients who tested positive for HIT were categorized by 4Ts as "low ", and 71% as "moderate probability of HIT".

Conclusion: Our results suggest that in COVID patients treated with heparin, sudden onset thrombocytopenia (without other obvious immediate cause) HIT was not reliably excluded by a low 4Ts score.

COVAP03-01
GDF-15, fatal outcome predictor of SARS-CoV-2 infection?

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Background and Goal of Study: Growth differentiation factor 15 (GDF-15) is a novel cytokine which belongs to the transforming growth factor-β (TGF-β) superfamily of proteins. It is expressed in several tissues as the answer to oxidative stress and inflammation so in physiological conditions GDF-15 circulating levels are low. However, when an inflammatory process is in progress, it was determined that GDF-15 circulating levels increase significantly. A recent Norwegian study showed that higher levels of GDF-15 were associated with SARS-CoV-2 viremia, hypoxemia and worse outcomes. The aim of this study was to determine serum GDF-15 levels in patients with a severe SARS-CoV-2 infection and to assess possible correlation with other biochemical parameters.

Materials and Methods: The study included 79 patients with SARS-CoV-2 infection (42 males and 37 females) which were treated at the Intensive Care Unit, University Hospital of Split. All of the patients had a severe clinical presentation due to which they were on intensive therapy and monitoring. The blood samples were taken on the first day of hospitalization and they were stored at -80 °C for further analysis. Serum GDF-15 levels were determined using the ECLIA according to the manufacturer's instructions.

Results and Discussion: There was a statistically significant difference in serum GDF-15 levels depending on the clinical outcome as the group with a fatal outcome (N=35) had significantly higher levels of serum GDF-15 compared to the group with a non-fatal outcome (N=44) (10259 ± 4538 vs 5067 ± 2980 pg/mL; $p<0.001$). Furthermore, there was a significant negative correlation between serum GDF-15 levels and serum vitamin D levels ($r=-0.312$; $p=0.005$). Multivariable logistic regression showed that serum GDF-15 levels (OR 1.0001, 95% CI 1.0000-1.0002,$p=0.046$) were a significant predictor of a fatal outcome when enumerated along with baseline characteristics.

Conclusion(s): The results of this study further emphasize and support previous data regarding the possibility that serum GDF-15 levels could be used as a predictor of the outcome in patients with

a severe clinical presentation of the SARS-CoV-2 infection. Furthermore, the negative correlation between serum GDF-15 levels and serum vitamin D levels imply that there could be a complex pathophysiological interconnection between these compounds. However, further larger scale multicenter longitudinal studies are needed to address these.

COVAP03-03
Protein biomarkers in bronchoalveolar lavage fluid and serum in COVID 19 ARDS patients

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Background and goal of study: The degree of damage to the alveolar-capillary membrane and outflow of water and proteins into the interstitium and alveoli correlates with the outcome of the disease in ARDS. Diagnostic tests for the prognosis of the course of the disease are important.Laboratory biomarkers such as protein and albumin in BAL (bronchoalveolar lavage) could be guides for prognosis of disease. The goal of the study is to investigate are albumin as biomarker in BAL elevated in ARDS versus health lung BAL? And whether the amount of albumin in BAL in ARDS patients have prognostic significance?

Materials and methods: Prospective, longitudinal, observational research was conducted in 2 ICU in 2 hospital centers. The research was approved by the ethics committee of the UCC of RS. The group 1(Covid) included patients with Covid-19 ARDS(n=30). Group 2 (Control) included patients prepared for elective surgery under GEA (n=30), in whom no lung damage was found.Period of sampling was from November-March 2021.The biomedical sampling procedure for our research is a standard method of taking BAL fluid samples.Microalbumin is a turbidimetric immunochemical test that uses polyclonal antibodies to human albumin.

Results and discussion: Between the Covid group and the Control group statistically significant difference in the mean values of BAL albumin (mg/L) was confirmed by ANOVA p‹0,01.Results by Pearson's Test of Linear Correlation for albumin in BAL vs albumin in serum in Covid group (two-tailed p value: < 0.001)indicate that when albumin in serum decrease albumin in BAL increase and vice versa. The albumin values in BAL in patients who had a poor treatment outcome (mean 1,69mg/L) were significantly higher than in patients who had a positive treatment outcome (mean 0,57mg/L)in Covid group using the ANOVA analysis p‹0.01.

Conclusion: Human isolate for biochemical analysis can give us an insight into the severity of changes in the lungs during ARDS. In patients with ARDS, stratification is possible based on the values of albumin in BAL. When the serum value of serum albumin decreases, its value in BAL increases in patients with ARDS.Albumins in BAL in ARDS have predictive value for poor outcome.

COVAP03-04
Thrombosis of aortic arch together with acute coronary syndrome (ACS) due to hypercoagulative state in a patient with SARS-CoV-2 pneumonia - successfully managed with medical therapy

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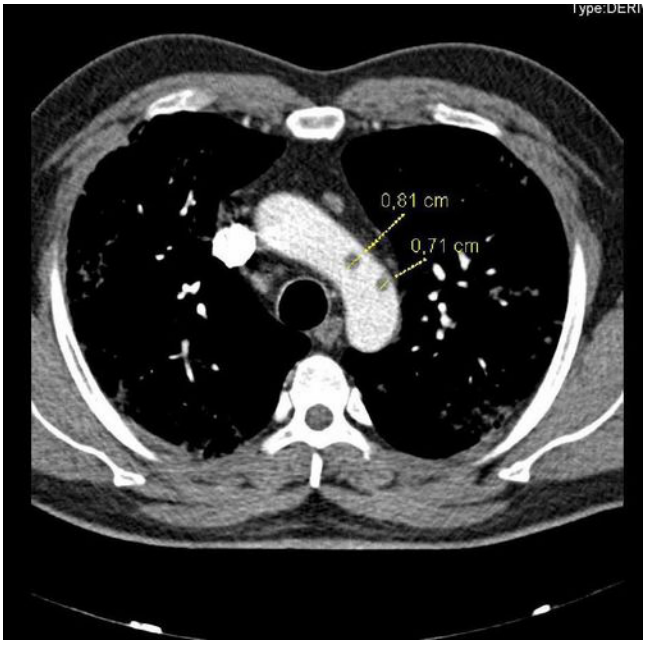
Background: Since the COVID19 outbreak, many acute cardiac conditions has been associated with it. We report an unusual case of a patient that along with SARS COV2 pneumonia developed thrombosis of the aortic arch and ACS.

Case Report: Patient was admitted in the hospital with anosmia and fever. CXR confirmed the presence of bilateral parenchymal infiltrates. The blood tests showed elevated D dimer and CRP. RTPCR for COVID was positive. Standard treatment protocol for COVID was started but his saturation worsened progressively from day 2 of admission and developed tachypnea with increasing oxygen requirement. So, Methylprednisolone was started.

On day 7, he complained of chest pain. Full dose of low molecular weight heparin was started but later on he had continuous chest pain. ECG showed T wave flattening in inferior leads with elevated cardiac enzymes.The CT scan detected two images of floating thrombi in the aortic arch.

He was admitted in ICU where Echo was suggestive of an ischemic event. Dual antiplatelet therapy was also started and he progressively recovered.



Follow Up: He was discharged from hospital after 10 days of admission. Enoxaparin 100mg BD was given for 3 months, followed by Acenocoumarol 4mg for another 3months and stopped subsequently. INR was kept 2-3. He was also kept on Aspirin and clopidogrel. CT scan was repeated after 6 months which showed that aortic thrombi had reabsorbed.

Discussion: There is increasing data that severe COVID infections lead to a procoagulant state, mainly in form of venous thrombosis but occasionally arterial thrombosis (~4%). Endothelial injury is an underlying mechanism that might link inflammation and thrombosis in severe COVID19. In this case, the presence of prolonged chest pain and positive findings of investigations clinched the diagnosis.

References:

1. Lowenstein CJ. Severe COVID-19 Is a Microvascular Disease.*Circulation*. 2020;142:1609-11.

Learning points:

1. Co-occurrence aortic thrombi and ACS in COVID 19 are very rare but with a high index of clinical suspicion and proper investigations correct diagnosis can be made.
2. Critical cases can be successfully managed with medicines only, if started early.

COVAP03-06
Efficacy of convalescent plasma therapy in reducing mortality of COVID-19 patients: systematic review and meta-analysis

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Background and Goal of Study: Convalescent plasma therapy (CPT) is a form of passive immunization in which plasma is obtained from patients who have recently recovered from the same illness. Gaining insight into CPT`s clinical potential in the treatment of coronavirus disease (COVID-19) is important, as efficacy data of current vaccines are currently scarce. The aim of the study was to investigate whether there is a survival benefit of CPT in COVID-19 patients.

Materials and Methods: After registration with Prospero (CRD42021243629) we conducted a bibliographic search in Pubmed and Cochrane. Inclusion criteria were:

a) Randomized controlled trials (RCT) in adults,
b) CPT as a treatment method in comparison to best standard medical care,
c) Information about mortality rate and;
d) Full-text articles in English language.

The primary outcome was all-cause mortality and the risk ratio of the convalescent plasma treatment versus placebo. Knapp-Hartung adjustment and Mantel Haenszel method were used for the statistical analysis of the data.

Results and Discussion: We identified 39 RCTs. 12 studies were duplicates and 12 did not fulfil the inclusion criteria. Lastly, 15 RCTs with 14,968 patients (6974 in CPT group and 7994 in best standard medical care group) were included in the final analyses. The random-effects model resulted in an estimated pooled risk ratio (RR) of 0.81 (95%-CI: 0.64 - 1.02, p=0.065), showing no clear statistical evidence of the benefit of CPT on mortality. The prediction interval based on the random effects model ranged from RR=0.52 to 1.26, suggesting no clear preference for a particular treatment.

The study by O'Donnell featured the largest contribution to the heterogeneity, whereas the large trial by the RECOVERY Collaborative Group displayed the largest influence on the pooled result.

The median time to convalescent plasma transfusion was available in 13 of the 15 studies. It varied between 3 days to 45 days. Time to convalescent plasma transfusion was not associated with the studies' effect size (p=0.19).

Conclusion(s): Convalescent plasma therapy was not effective in reducing mortality in COVID-19 patients. Thus, it should be not used routinely.

Further studies are needed to determine in which patients convalescent plasma therapy may lead to a reduction in mortality and if newer virus variants show different results.

COVAP03-07
Tracheostomy in severe COVID-19 improves the rate of successful discharge from ICU

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Background and goal of study: The novel coronavirus SARS-CoV-2 has caused an increase in the number of patients requiring mechanical ventilation. Strategies of mechanical ventilation are still evolving, although some studies reveal that tracheostomy promotes successful weaning from ventilation. Conversely, studies show that intubated patients with COVID-19 require high doses of sedation which increases length of stay and mortality.[1]

The goal of this study was to assess the effect of tracheostomy on the odds of successful discharge from intensive care.

Materials and methods: This retrospective cohort study includes 350 adult patients with severe COVID-19 who received ventilatory support in Intensive care units (ICU) of Riga East University hospital. Approval of the Ethics Committee of Riga Stradins University was obtained according to protocol. Data on method of ventilatory support, duration of ventilation and outcomes of ICU stay as well as demographic data was obtained from electronic health records.

Cases were divided into three groups according to their definitive approach of continuous ventilatory support – non-invasive ventilation group (NG, N=91); tracheal intubation group (IG, N=205); and percutaneous tracheostomy group (TG, N=54).

Results and discussion: Tracheostomy was performed in 54 patients (15.4%).Mean time from intubation to tracheostomy was 9.0 days (CI95 7.44-10.56). No differences in age or sex were found between NG and other groups. Patients in NG had higher odds of survival than patients in IG (OR 34.4 16.62-71.43, p<0.001).

Patients in NG had higher odds of survival than patients in TG (OR 7.48, 3.43-16.29, p<0.001). Patients in the TG had higher odds of survival than patients in IG when adjusted for age differences (OR 4.01, 1.66-9.68, p=0.002).

Among patients who were discharged from ICU, IG patients had a shorter mean duration of mechanical ventilation (5.5 days, 0.9-10.0) when compared to TG (17.8 days, 8.3-27.4). This might imply, that tracheostomy is best used in scenarios where prolonged weaning is expected.

Conclusion: Our findings indicate that tracheostomy vastly improves the odds of successful discharge from ICU compared to continued ventilation via endotracheal tube.
Further studies are needed to elucidate the eligibility criteria and outcome effects of tracheostomy in patients with severe COVID-19.
References:
1. Hanidziar D, Bittner EA. Anesth Analg. 2020;131(1):e40-e41.

COVAP03-08
Whole blood transfusion due to disruption of the platelet concentrate supply caused by the COVID-19 pandemic: a case report

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Background: The COVID-19 pandemic has affected health care resources, including blood product supplies. Here, we report a case of an unirradiated fresh whole blood (FWB) transfusion that was necessary due to disruption of the platelet concentrate (PC) supply caused by the COVID-19 pandemic.
Case Report: A 71-year-old man underwent an elective aortic and mitral valve replacement. Although 20 units of PC and 20 units of fresh frozen plasma were administered intraoperatively, additional PC was required to control the persistent bleeding. However, the Japanese Red Cross Society could not provide the PC due to decrease in blood donations caused by the COVID-19 pandemic. To save the patients' life, we decided to perform an unirradiated FWB transfusion.
A total of 1450 mL of FWB was collected from four healthy male staff members and transfused into the patient. As our hospital did not have an irradiation device, unirradiated blood was transfused. Haemostasis was achieved after the transfusion, and the patient was transferred to the intensive care unit. His postoperative course was uneventful, and he was discharged with no signs of infection and graft-versus-host disease (GVHD) on postoperative day 22.
Discussion: As FWB presents a potential risk of disease transmission and GVHD, its application is limited for situations in which tested blood products are unavailable and the need for transfusion is urgent. We have not experienced a disruption of the blood product supply, probably because our hospital is located near Tokyo, one of the largest cities in the world. This case reflects the need for alternative strategies other than allogenic blood transfusion to manage massive haemorrhages, e.g., autologous blood donation, intra- and postoperative blood salvage, and acute normovolaemic haemodilution, where applicable.
Learning points: Alternative strategies other than allogenic blood transfusion should be considered for managing massive haemorrhages in emergency situations, such as those that occur during the COVID-19 pandemic.

COVAP03-09
"Sun in a bottle" levels in COVID-19 intensive care unit patients and associated outcomes: preliminary results

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Background and goal of study: The main goal of this observational study is to see if there is a possible connection between vitamin D levels and various clinical outcomes in COVID-19 patients admitted to intensive care unit (ICU). Vitamin D, so called "sun in the bottle", is known to have immuno-modulatory effects. Dalmatia region has among the highest incidence of COVID-19 patients in Croatia, but also the highest number of sunshine days per year.
Materials and methods: Patients with known COVID-19 disease admitted to the ICU and in need of respiratory support (invasive mechanical ventilation) during the three-month period were included. On admission, vitamin D levels were measured and patients were divided into two groups: low vitamin D level (<50 nmol/L) and normal vitamin D level (>50 nmol/L). Data collection included demographic data, comorbidities, vaccination status, chronic therapy, disease severity markers (PaO2/FiO2 ratio; CRP; D-dimer; fibrinogen; ferritin; PCT), duration of ventilatory support and ICU stay, complications, and overall survival at days 14 and 28.
Results and discussion: Between November 2021 and January 2022, there were 168 SARS-COV-2 PCR positive patients (124 males, 44 females) treated with invasive mechanical ventilation. Of those, 38 (22,7%) were fully vaccinated. Low vitamin D levels were found in 127 patients (88, 71% of males, 39, 89% of females).
There were no significant differences in patient age, rate of bacterial superinfections, duration of ICU stay and duration of hospital stay between patients with low and normal vitamin D levels.
Patients with low vitamin D levels spent a median of 8 (IQR 6-12,75) days on invasive mechanical ventilation compared to 7 (IQR 5-14) days in normal vitamin D level group, although the difference was not significant. At 14 day follow up, 81/102 patients, 79%, in low vitamin D group and 33/38 patients, 87%, in normal vitamin D group were alive. The main limitation of this preliminary report is that 28-day survival data was incomplete and therefore not presented at the time of abstract submission.
Conclusion(s): Vitamin D deficiency was prevalent in our cohort of critically ill COVID-19 patients, even more so in females. Based on the preliminary results of our small cohort of patients, there was no difference in studied outcomes between patients with normal and low vitamin D levels. Further studies are needed on larger patient sample.
Acknowledgements: To all our colleagues working in Covid-19 ICU.

COVAP03-10

Combined inflammatory biomarkers in patients with severe COVID-19 infection: the utility of novel prognostic markers in distinguishing patients with the need for escalation of respiratory support with the use of a high-flow nasal cannula

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Background and goal of study: Several biomarkers indicate the prognosis in patients with COVID-19 infection. We investigated the predictive value of combination scores of simple inflammatory biomarkers on requirement for respiratory support with a high-flow nasal cannula (HFNC) inpatients with severe COVID-19 infection.
Materials and methods: Adult patients admitted to the Department of Respiratory Medicine of the University Hospital of Larissa with severe COVID-19 infection from April to September 2021 (NCT05145751) were included. Demographics, medical history, laboratory tests and the need for HFNC were recorded.
We set the optimal cut-off points of on admission values of C-reactive protein (CRP), lymphocyte to neutrophil ratio (LNR), derived variation of neutrophil to lymphocyte ratio (dv-NLR), CRP to lymphocyte ratio (CLR) for escalation of respiratory support with HFNC prediction based on multivariate analysis.
Thereafter, 3 different combinations of the aforementioned biomarkers were defined: CRP and LNR (combined CRP, C-CRP #1), CRP and dv-NLR (C-CRP #2), CRP and CLR (C-CRP #3). Based on cut-off values of both biomarkers combinations were classified normal or elevated: 2 points (elevated values of both biomarkers); 1 point (elevated values of one biomarker), and 0 points (normal values of both biomarkers). Binomial logistic regression analysis was used to establish the predictive role for each biomarker.
Results and discussion: One-hundred and fifteen consecutive patients (60% males) with a mean age of 57.7 years (±16.3 years) formed our sample. Thirty-seven (32.2%) required HFNC. The optimal cutoff point was 3.2 for CRP (AUC: 0.740; sens: 0.702; spec 0.705), 0.231 for LNR (AUC: 0.367; sens: 0.46; spec 0.46); 0.90 for dv-NLR (AUC: 0.678; sens: 0.594; spec 0.60), and 0.004 for CLR (AUC: 0.742; sens: 0.65; spec 0.731).
Two points of C-CRP #1 (AUC: 0.640; sens: 0.923; spec 0.270) and 2 points of C-CRP #3 (AUC: 0.715, sens: 0.622, spec 0.769) predicted the use of HFNC with a probability as high as 0.625 ($p=0.005$) and 0.561($p<0.001$), respectively. Likewise, 1 point of C-CRP #2 (AUC: 0.717, (sens: 0.821; spec 0.486; $p=0.027$) and 2 points of C-CRP #2 ($p<0.001$) predicted the need for HFNC with a probability of 0.333 and 0.562 respectively.
Conclusion(s): The combination scores of CRP and inflammatory biomarkers on admission are promising predictors of need for respiratory support using HFNC in severe COVID-19 infection.

COVAP03-11

Predicting mortality with a novel combined score of simple inflammatory biomarkers in patients with severe COVID-19 infection

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Background and goal of study: Several biomarkers have been identified as indicators of prognosis in patients with COVID-19 infection. Our objective was to determine the prognostic value of the combined score based on admission values of C-reactive protein (CRP) with CRP to lymphocyte ratio (CLR) in predicting the mortality in patients with severe COVID-19 infection.
Materials and methods: We performed a case-control study based on the adult patients admitted to theDepartment of Respiratory Medicine of the University Hospital of Larissawith severe COVID-19 infection from April to September 2021 (NCT05145751). Patient demographics, medical history, laboratory tests, and outcome (death) were recorded. We set the optimal cut-off points of CRP and CLR for event (death) prediction based on multivariate analysis.
Based on cut-off values for both biomarkers the combined scores of CRP and CLR (C-CLR) were classified normal or elevated, as follows: 2 points (elevated values of both biomarkers); 1 point (elevated values of one biomarker), and 0 points (normal values of both biomarkers). Binomial logistic regression analysis was used to establish the predictive role for each biomarker.
Results and discussion: One hundred and fifteen consecutive patients (60% males) were included. Their mean age was 57.7 years (±16.3 years), and nine patients (7.8%) died. The optimal cut-off points for each biomarker were as follows: CRP (AUC: 0.673, sens: 0.67, spec 0.75, cut-off 1.11) and CLR (AUC: 0.720, sens: 0.66, spec 0.77, cut-off 3.2*1033).
Two points of C-CLR (OR, 4.92; 95%CI, 1.09 – 22.24) with an AUC: 0.681, (sens: 0.00, spec 1.00) and an accuracy of 0.922 predicted mortality ($p=0.0038$) in COVID-19 patients.
Conclusion(s): The elevated values of both CRP and CLR on admission were useful to predict mortality with high specificity among patients suffering from severe COVID-19 infection.

COVAP03-12
Multimodal assessment of peripheral perfusion in COVID-19 patients. A pilot study

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Background and goal of study: Assessment of tissue perfusion during fluid resuscitation of the COVID-19 ARDS patients is challenging due to lack of reliable clinical tests. Capillary refill time (CRT) and serum lactate level is routinely used to estimate tissue perfusion in hypovolemic patients. Remote photoplethysmography (RPPG) and automated measurement of capillary refill time technique (aCRT) could be used for tissue perfusion assessment. RPPG is a non-invasive optical technique, which is based on light absorbance by the hemoglobin in the blood vessels. Automated measurement of capillary refill time (aCRT) technique was developed to improve dynamic assessment of peripheral perfusion. The aCRT provided capillary refill time related parameters: T90 - 90% of capillary refill is over, Tst-capillary refill is fully over.

The goal of this pilot study was to estimate RPPG and aCRT values during fluid resuscitation of COVID19 ARDS patients

Materials and methods: Eight patients with COVID19 severe ARDS were enrolled into single centre prospective study. Hemodynamic variables, CO, SV, serum lactate level, mCRT, aCRT and perfusion index detected using RPPG were collected during passive leg raising tests (PLR) and after fluid challenge 10ml/kg over 60min. The signal processing was performed on custom developed matlab based software.

Results and discussion: Mean mCRT decreased by 24% during PLRT (from 2,15 +/- 0,59 to 1,6 +/- 0,9 s) and by 37% after fluid expansion (from 2,15 +/- 0,59 to 1,33 +/- 0,5 s), aCRTT90 decreased by 30% during PLRT (from 1,5 +/- 0,12 to 1,04 +/- 0,12 s) and after fluid expansion (from 1.5 +/- 0,12 to 1,05 +/- 0.1 s).

Perfusion index increased by 20% during PLRT (from 26,5 +/- 6 to 32,0 +/- 7,9) and by 26% after fluid expansion (from 26,5 +/- 6 to 33,5 +/- 8,6). Tst decreased by 22% during PLRT (from 3.04 +/- 0,35 to 2,36 +/- 0,06) and by 14% after fluid expansion(from 3,04 +/- 0,35 to 2,59 +/- 0,24). Lactate level decreased by 15% (from 2.27 +/- 1 to 1,9 +/- 0,75).

Conclusion(s): This pilot study show that RPPG and aCRT techniques are promising tool for accurate evaluation of peripheral perfusion changes during fluid resuscitation. Further studies are required to clarify potential clinical application of both methods.

COVAP03-13
Greek anaesthesiologists' burnout levels during the fourth wave of the COVID-19 pandemic: results from referral university hospitals

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Background and Goal of Study: The COVID-19 pandemic resulted in a significant healthcare crisis with high levels of psychological distress in the frontline medical staff. We assessed the burnout levels of anaesthesiologists, working in COVID-19 referral university hospitals during the fourth wave of the pandemic in Greece with the validated Maslach Burnout Inventory (MBI).

Materials and Methods: MBI is a 22-item self-reported tool. It evaluates 3 dimensions of burnout: depersonalization (DP, 9 items), personal accomplishment (PA, 8 items) and emotional exhaustion (EE, 9 items). The instrument was administered in the anaesthesiology departments of 6 COVID-19 referral university hospitals during the fourth wave of the pandemic in Greece (November 2021). Participants were categorized based on their working rank into 4 groups: residents, junior consultants (<8 years of experience), senior consultants, and academic staff.

The nonparametric Mann-WhitneyU and the Kruskal-Wallis test were used for comparison of continuous variables. Spearman's rank correlation coefficients were estimated to investigate associations between continuous variables. Integral reliability was investigated by Cronbach's alpha calculation.

Results and Discussion: The MBI was filled-in by 116 doctors (response rate 98%) from 7 University Hospitals in Greece (32.17% males - median age 46 [33 – 52] years). The overall Cronbach's alpha for the MBI was 0.894. Descriptive statistics of all dimensions were calculated according to working rank and gender. High DP scores were detected in junior consultants and academic staff, but differences between groups did not bare any statistical significance (p=0.717).

However, differences were detected in EE scores (p=0.008) where low levels of EE were reported mostly by residents, while high levels of EE were detected in the rest of participants. Burnout scores were similar between males and females. High burnout, combined by all three dimensions, was more frequently detected in women (24.36%) than in men (16.21%) and in academics (40%) compared to the other working ranks (senior consultants; 16.66%, junior consultants; 17.39%, residents; 28.57%).

Conclusion(s): During the fourth wave of the COVID-19 pandemic Greek anaesthesiologists' working in referral university hospital suffered from high levels of burnout. The academic staff experienced the higher levels, while the residents suffered from significantly lower levels of EE.

COVAP03-14
Ozone therapy as a rescue measure in refractory hypoxemia due to COVIDARDS: a case report

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Background: Very few measures have shown therapeutic efficacy for ARDS due to COVID-19, except for the classic ARDS management measures (mechanical ventilation, pronation, ECMO, etc.). Ozone is being considered as a rescue and experimental use in severe forms of COVID-19.

Case report: Male, 49 years-old, admitted to the ICU for pneumonia COVID_19 complicated with ARDS. Asthmatic and dyslipidaemic. Upon admission, he presented P/F ratio <100 with a 15L reservoir mask under treatment with Azithromycin and Remdesivir and received two doses of Sarilumab.

He progressed to respiratory impairment with the need for IMV, high PEEP, high levels of sedation and neuromuscular relaxation, and FIO2 of up to 100%, multiple 24-48h pronations and nitric oxide, without appreciating a clear improvement. There was also an increase in poor evolution parameters up to CRP 10 mg/dL. LDH 937 UI/L. Ferritin 940 ng/mL. D-dimer: 11920 ng/mL with bemiparin 10,000 IU.

Due to the persistence of hypoxemia, ozonated saline was started. A total of 10 sessions were performed with progressive improvement in P/F ratio = 220 and a decrease in biomarkers of poor evolution.

He was discharged to the ward after 52 days in ICU, tracheostomized, with a venturi mask at 30% O2, where he was decannulated and remained for 29 days until discharged home.

Discussion: Ozone is a modulating agent of oxidative stress, used in infectious and autoimmune diseases. It has analgesic, anti-inflammatory, immunomodulatory and antioxidant properties that could be of potential use in SARS-CoV-2 infection.

It could inactivate the virus by indirect oxidation, improve oxygenation, stimulate the immune system, reduce inflammation, and increase the release of nitric oxide, through two messengers: “ROS and LOP”, being useful in the different phases of infection.

So far it is only authorized as compassionate use in this infection since the available studies lack high evidence to conclude medical benefits.

Clinical trials have been initiated that consider it in selected cases, although new safety and efficacy studies are necessary to generalize this therapy.

Although the improvement in oxygenation coincided with the start of ozone therapy, having used numerous treatments simultaneously, it is not clear the role and particular benefit of ozone.

References:

Cattel F, et al. Ozone therapy in COVID-19: A narrative review. Virus Res. 2021; 291: 198207.

Learning points: SARS-COV-2, respiratory distress syndrome (ARDS), Ozone therapy.

COVAP04-01
Catheter-related bacteremia in critically ill COVID-19 patients

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Background and Goal of Study: The implications of nosocomial infections associated with invasive devices among critically ill patients infected with SARS-CoV-2 admitted to Intensive Care Unit have been a matter of concern during the first wave of the pandemic.

We conducted a retrospective and observational study to analyze the incidence of catheter-related bacteremia and their impact in critically ill COVID 19 patients.

Materials and Methods: We retrospectively review medical records of COVID 19 patients admitted toICU ofCruces University Hospitalbetween march and may 2020. Age, sex, medical history, specific risk factors related to bacteremia, laboratory data, requirement of hemodynamic support, Mechanical Ventilation support requirement, ICU stay and mortality were included in analysis. The most frequent microorganisms found were also analyzed. Statistical analysis was performed with SPSS 23.0 software.

Results and Discussion: 57 patients with SARS-CoV-2 infection admitted to ICU were analyzed.33% had catheter-related bacteremia and Gram + microorganisms were the most frequent germs (52%). A greater number of patients presented risk factors (89% treatment with corticosteroids, 100% broad-spectrum antibiotic, and 100% central venous catheters). Sepsis was observed in 70% and septic shock in 30% of patients. Mortality of 42% was observed in patients with bacteremia compared to 30% overall mortality in patients without this complication. 31% of the patients with bacteremia simultaneously presented ventilator-associated pneumonia.

Conclusion: Catheter-related bacteremia of critically ill patients infected with SARS-CoV-2 admitted to ICU were associated with increased mortality. Gram + microorganisms were the most frequent germs (52%). Rational use of broad-spectrum antibiotics, central venous catheters, and corticosteroids could help reduce this complication, but host susceptibility to these infections probably played an important role. The opening of new critical units outside the usual place and the saturation of the health system could also contribute to the high number of infections. Our study had limitations as its small size and retrospective design required larger and more powerful studies to address this issue.

COVAP04-02
Outcome in patients undergoing postponed elective surgery during the COVID-19 pandemic (TRACE II): a multicentre prospective observational study

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Background and goal of study: During the COVID-19 pandemic many non-acute elective surgeries were cancelled or postponed worldwide. The gradual upscaling of non-COVID-19 care has created a unique window of opportunity to study the effect of delayed surgery on health conditions prior to surgery and on postsurgical outcomes. The control group of the TRACE I study[1], conducted between 2016 and 2019, will serve as a control cohort.
Our hypothesis is that surgical patients with postponed elective surgery have a higher incidence of 30-day postoperative complications, including mortality, and will have poorer health conditions prior to surgery compared to surgical patients in the control cohort.
Materials and methods: TRACE II is an observational, multi-centre, prospective cohort study among surgical patients with postponed surgery due to COVID-19, in academic and non-academic hospitals in the Netherlands.
The primary outcome is 30-day incidence of major postoperative complications. Secondary outcome measures include 30-day incidence of minor postoperative complications, length of stay (in hospital, medium care and intensive care), and quality of life.
Multivariable logistic mixed-effects regression analysis with a random intercept for hospital will be used to test group differences on the primary outcome.
Results and discussion: Data collection is still ongoing. We expect the first results (primary and secondary outcomes until 30 days after surgery) in May 2022. Findings from TRACE II will increase our knowledge on perioperative management and logistics in crisis situations where surgical care capacity is restricted, which could be useful in future calamities and may impact future prioritization of surgeries, making informed decisions, and organizing perioperative care in the most beneficial way.
References:
1. TRACE Study Investigators. Routine Postsurgical Anesthesia Visit to Improve 30-Day Morbidity and Mortality: A Multicenter, Stepped-Wedge Cluster Randomized Interventional Study (the TRACE Study). Ann Surg. 2021, doi: 10.1097;
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COVAP04-04
PIMS-TS venous thrombotic event in 4-year old patient

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Background: This case presents a previously healthy 4-year-old boy with severe thrombotic complications post-SARS-CoV-2 infection. The aim is to highlight the possible cerebrovascular involvement and coagulopathies post-SARS-CoV-2 in the pediatric population, which can have long-term consequences for neurological outcomes and should be addressed and managed vigorously.
Case report: A 4-year-old boy was brought to emergency lethargic with a 2-day history of vomiting, fever, and positive upper meningeal irritation signs. Other features included elevated total protein and presence of mono and polynuclear CSF, thrombocytopenia, elevated D dimers, papilledema, and sudden tonic-clonic seizures, terminated with phenobarbital. CT scan revealed a supratentorial temporal-occipital-parietal expansive mass, hemorrhage, midline shift, and left internal jugular vein, transverse and sigmoid sinuses thrombosis with typical “dense vein sign”.
Decompressive craniectomy was performed and he was admitted intubated to the ICU. Despite refractory thrombocytopaenia (after 4 units) the LMWH was initiated. Anti-SARS-COV-2 antibodies level was positive (680U/ml), with no other causative agent found. Corticoid and immunoglobulins therapy was initiated for possible PIMS-TS-associated thrombosis, followed by gradual normalization of thrombocytopenia. Significant improvement of blood flow in the left-sided transverse and sigmoidal sinus was detected on the MRI on the 11th day.
On the neurological examination, after uneventful extubation 12 th day post-surgery, dominated right-sided hemiparesis, facial nerve palsy, anisocoria, speech impairment, and dysphagia. The condition was later complicated by vocal cord paralysis with the need for tracheostomy.
Discussion: No significant hematological risk factors were identified in our patient, yet he developed the systemic procoagulant state with vein thrombosis and thrombocytopenia with intracranial hemorrhage as a severe course of PIMS-TS.
Learning points: PIMS is a worldwide phenomenon with various signs and symptoms, including neurovascular injury. Pediatric intensivists should include PIMS in the differential diagnostics with a low threshold for any patient “not fitting“ the usual clinical picture as possibly being PIMS.

COVAP04-05
Fungal infections implications in critically ill COVID 19 patients

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Background and Goal of Study: Fungal infections implications among critically ill patients infected with SARS-CoV-2 admitted to Intensive Care Unit had been a matter of debate since first wave. We conducted an observational and retrospective study to analyze impact of fungal infections in critically ill COVID 19 patients.
Materials and Methods: We retrospectively review medical records of COVID 19 patients admitted to ICU of Cruces University Hospital between march to may 2020. Age, sex, medical history, specific risk factors related to fungal infections, laboratory data, Invasive Mechanical Ventilation support requirement, ICU stay and mortality of patients with candidiasis, aspergillosis and fungal colonization was analyzed.
The association of fungal infections with bacteremia and Ventilator-associated pneumonia (VAP) were analyzed also. The statistical analysis of data was performed during 2021 because important hospital pressure during second, third, fourth and fifth wave in Spain associated with the important increase of surgical waiting list after waves requiring anesthesia support. Statistical analysis was conducted using SPSS 23.0 software.
Results and Discussion: 57 patients with SARS-CoV-2 infection admitted to ICU were analyzed. 15% presented fungal infections, 78% corresponding to disseminated candidiasis and 22% to COVID related aspergillosis. A higher number of patients presented risk factors (89% corticosteroid treatment, 100% broad-spectrum antibiotic and 100% central venous catheters).
Sepsis was observed in 89% and shock septic in 11% of patients. Mortality of 67% was observed in patients with fungal infections by opposing to a 30% of global mortality in patients without this complication. A 67% of patients with fungal infections presented simultaneously bacteremia and 47% VAP.
Conclusion: Fungal infections of critically ill patients infected with SARS-CoV-2 admitted to ICU was associated with a higher mortality. Risk factors in this specific critically ill population are related with organic support treatment requirements. Rational use of broad-spectrum antibiotics, central venous catheters and corticosteroids could contribute to reduce this complication, but the host susceptibility to these infections probably played an important role.
Our study had limitations since its little size and retrospective design making larger and powerful studies necessary to address this topic.

COVAP04-06
Outcomes of critically ill COVID 19 patients admitted to Isabel Zendal Pandemic Hospital

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Background and Goal of Study: Critically ill patients infected with SARS-CoV-2 admitted to Intensive Care Unit (ICU) had been the subject of analysis since first wave. Critical Care management improvements had been made over a short time length and reduce mortality related with this novel pandemic infection associated with important medical, social and economy implications. In Madrid, a unique pandemic center, Hospital de Emergencias Enfermera Isabel Zendal, had been built to reach the intense hospital pressure associated with COVID 19 patients after second wave.
Our retrospective and observational study aims to describe outcomes of critically ill COVID 19 patients admitted to ICU of this hospital.
Materials and Methods: We retrospectively reviewed medical records of COVID 19 patients admitted to ICU between December and July 2021. Age, sex, medical history, laboratory data, critical care support (invasive mechanical ventilation requirement, prone maneuvers, inhaled nitric oxide and ECMO), complications (pulmonary thrombosis, barotrauma, weaning failure along with concurrent infections) and mortality were included in analysis. Statistical analysis was conducted using SPSS 23.0 software.
Results and Discussion: 252 patients were included in analysis. Patients was a mean age of 60 years old, 71% men, 62% of Spanish and 29% of Latin Americans. Obesity, Hypertension and Diabetes Mellitus were present in 25%, 33% and 15% of patients respectively. Severe hypoxemia refractory to Non-Invasive Mechanical Ventilation requiring endotracheal intubation and invasive mechanical ventilation connection was seen in 100% of cases. 95% of patients required prone maneuvers to improve oxygenation.
ECMO was canulated in 15% of patients with severe hypoxemia even after mechanical ventilation, prone position and inhaled nitric oxide. Pulmonary thrombosis was seen in 95% of patients, barotrauma in 6%, Ventilator-Associated Pneumoniae (VAP) in 18%, urinary tract infections in 14%, primary bacteremia in 9% and catheter-related bacteremia in 8%. Global mortality was 36%.
Conclusion: Our study reported a relatively lower mortality than previously reported in critically ill COVID 19 patients. Critical care management improvement over time and the increase of availability of ICU beds related to a unique facility centered in COVID management could play a role.

COVAP04-07
Preoperative anxiety in patients undergoing elective surgery during the fourth COVID-19 wave: a tertiary COVID-19 referral hospital experience

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Background and Goal of Study: The psychological impact of the COVID-19 pandemic, in terms of anxiety and stress, is undoubtable. Anxiety has a strong impact on the overall perioperative patients' well-being and their subsequent postoperative recovery. We aimed to assess the preoperative anxiety and it's accentuating factors in patients undergoing surgery during the fourth wave of the COVID-19 pandemic.
Materials and Methods: We carried-out a prospective observational study (NCT0514967). We assessed for eligibility all adult patients (>18 years) undergoing elective surgery during November 2021 at a COVID-19 referral hospital (General University Hospital of Larissa). We excluded patients with COVID-19 infection or any known psychiatric comorbidity. Anxiety was recorded using the modified Preoperative Anxiety Scale (mPAS) after a written permission from the authors [1].
mPAS consists of 4 sections:
i. demographics,
ii. baseline anxiety trait,
iii. anxiety due to general preoperative factors and
iv. anxiety due to COVID-19 specific factors.
We summarized the results using descriptive and inferential statistics.
Results and Discussion: We included 116 patients, (60 males, 51.7% and mean age 60.6±15.5 years) who underwent major (27, 23.3%), moderate (49, 42.3%), and minor (40, 34.5%) surgical interventions. Six patients were excluded due to major psychiatric disorders. Based on ASA PS (physical status) they were mostly classified as PS II (62, 53.4%) and III (29, 25%), while 101 (87.1%) patients were vaccinated against COVID-19. At baseline, seventy-seven (70%) patients were anxiety-free, according to mPAS.
General preoperative factors (n=24, 21.8%) represented a major anxiety source, particularly for patients undergoing major surgery (p=0.026). However, COVID-19-related factors were responsible of anxiety in 36 (32.7%) patients.
Conclusion(s): During the fourth wave of the pandemic in our tertiary COVID-19 referral hospital 30% of the patients experienced anxiety before surgery. The preoperative anxiety was further aggravated due to COVID-19-related factors.
References:
Viola CT, Joselyn AS, Sukumar A, Sahajanandan R. Preoperative anxiety among patients scheduled for elective surgical procedures during the COVID-19 pandemic - A cross-sectional study in a tertiary care teaching hospital in India. Indian J Anaesth. 2021 Aug;65(8):619-625. doi: 10.4103/ija.ija_594_21. Epub 2021 Aug 25. PMID: 34584286; PMCID: PMC8445219.

COVAP04-08
Retrospective analysis of the causes of mortality in patients with severe COVID-19

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Background and Goal of Study: The search for effective treatment regimens and new approaches to the management of patients with coronavirus disease in order to reduce the severity of the disease, reduce mortality, the number of complications and improve the rehabilitation period is very important nowadays.
The Goal: to determine the main causes of mortality in patients with severe COVID-19 by analyzing the frequency and structure of complications in deceased patients.
Materials and Methods: The study conducted a retrospective analysis of 122 patients, who died from complications of coronavirus disease and were admitted to the Municipal non-profit enterprise "Kyiv City Clinical Hospital №17" for the period from September 2020 to November 2021. During the pandemic, 1,311 patients with confirmed PCR test for COVID-19 were treated within the medical institution, including 252 patients in the intensive care unit at the Infectious Diseases Unit as of November 2021. All hospitalized patients were treated according to the protocol "provision of medical care of COVID-19» of the Ministry of Health of Ukraine, which is in line with WHO recommendations.
Results and Discussion: The overall mortality among hospitalized patients with COVID-19 was 9.30%, in the ICU - 48.41%. The most common causes of death in patients with COVID-19 were: respiratory failure (RF) - 100% (122), including ARDS – 44,26% (54); pulmonary embolism (PE) – 62,29% (76); acute heart failure (AHF) – 59,83% (73); sepsis/septic shock – 19,67% (24).
Prognostically significant criteria for lethal consequences were the presence of concomitant cardiovascular diseases- 91.80% (112), endocrine system diseases - 27.86% (34), nervous system diseases - 22.95% (28), kidney diseases - 9.83% (12), cancer - 9,83% (12), autoimmune conditions – 7,37% (9), respiratory system diseases - 5.73% (7). Vasopressor and inotropic support were performed in 50% (61) of patients with COVID-19 who died. In 25,40% (31) of those who died during long-term treatment and long-term respiratory support, was observed the development of multiple organ failure, which in most cases was the point of no return.
Conclusion(s): The most common causes of death were: respiratory failure, thrombosis, acute heart failure, sepsis/septic shock and multiple organ failure. The main nature of the complications is common, but the cohort may be affected by different factors and the percentage of complications may differ in other hospitals.

COVAP04-09
Neurological complications in the COVID-19 critical patient: analysis and evolution of the first wave

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Background and Goal of Study: The objective of this study was to identify and quantify the neurological complications detected in severe COVID-19 patients who were admitted to a critical or semi-critical unit, during the first wave of the pandemic.
We analyzed the possible association of neurological complications with maximum D-Dimer values, minimum values of the PaO2/FiO2 ratio (PAFI) and differences in anticoagulant treatment. These parameters were chosen due to the pathophysiology of SARS-COV-2 through the angiotensin-converting receptor 2 (ACE2) as a marker of endothelial damage in the form of endothelitis and diffuse inflammatory response by the virus.
Materials and Methods: A retrospective observational study was designed with a total of 353 patients treated during the first wave of the pandemic at a tertiary hospital in Barcelona. It revised the main neurological syndromes associated with COVID-19 such as cerebrovascular events, states of altered consciousness or peripheral neuropathies.
Results and Discussion: The mean age of the patients was 61 years (standard deviation (SD) 13.2) with a male to female ratio of 72:28 and a mean BMI of 30.7 (SD 5.11). Among the pathological antecedents, the presence of arterial hypertension in 179/353 patients (50.7%), diabetes in 98/353 (27.8%) and respiratory diseases in 55/353 (15.6%) stood out. Of the total number of patients, 36/353 (10.2%) presented one or more neurological complications, the most common being delirium.
According to the analysis, it was determined that the maximum value of D-Dimer did not statistically explain the risk of neurological complications (OR [95% CI]: 1.21 [0.93; 1.55]) nor did it explain the minimum PAFI (OR [95% CI]: 0.82 [0.43; 1.5]).
Regarding anticoagulant treatment, it was observed that patients who were administered heparin at intermediate dose (enoxaparin 0.75mg/kg/12h) had 5.21 times the risk of neurological complications than patients without heparin treatment (p= 0.029).
Conclusions: Neurological manifestations associated with SARS-CoV-2 infection in our series could not be related in a statistically significant way to the severity of the pulmonary involvement of the disease or to most of the inflammatory parameters that we use in routine clinical practice.
However, due to the exceptional situation during the first wave of the pandemic, relevant information for such an association may have been masked by the arduous task of collecting and reviewing the available data.

COVAP04-10
Clinical frailty score among ICU admissions for COVID-19 pneumonia. A useful predictor of outcome?

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Background and Goal of Study: Frailty is a powerful predictor of poor outcome in ICU patients. A high clinical frailty score (CFS)[1] has been demonstrated to have an association with mortality in older COVID-19 patients. This study evaluated whether within our ICU service there was an association between CFS and mortality rate in patients with COVID-19.
Materials and Methods: Data was analysed on 241 consecutive COVID-19 ICU patients across two hospitals. CFS was taken from ICU clerking documents and mortality was defined as death at any point during that hospital admission. Frailty was defined as CFS ≥ 4. All age groups were included. Fisher's Exact test was used to compare outcomes between non-frail and frail patients.
Results and Discussion: Median age of patients was 60 years, with 15% of patients classed as frail. CFS, mortality and escalation to invasive ventilation (IPPV) are shown in Table 1. Surprisingly, we could not demonstrate a statistically significant difference in mortality between frail and non-frail patients (p=0.11).
Of note, a similar percentage of patients were escalated to IPPV in both cohorts. Whilst these data may be, in part, due to inconsistent CFS scoring between clinicians, it is possible that other factors considered in the decision-making for COVID-19 ICU admissions were relevant to patient outcome and this requires further exploration.
Conclusion: This service evaluation failed to demonstrate a significant difference in mortality between frail and non-frail patients, which contributes to other recent mixed data around CFS and mortality[2].
These data may raise some uncomfortable questions surrounding how much emphasis clinicians should give to their impressions of frailty and CFS, when making decisions on admitting COVID-19 patients to ICU.

Group (CFS)	Cohort Size	Mortality	IPPV rate
Non-frail (1-3)	204 (85%)	50 (25%)	89 (44%)
Frail (≥4)	37(15%)	14 (38%)	16 (43%)

Table 1: Patient outcome by CFS. Difference in mortality rates p=0.11 (ns)

References:

1. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people.*Canadian Medical Association Journal*. 2005;173(5):489. doi:10.1503/cmaj.050051
2. Subramaniam A, Anstey C, Curtis JR, et al, Characteristics and Outcomes of Patients With Frailty Admitted to ICU With Coronavirus Disease 2019: An Individual Patient Data Meta-Analysis, Critical Care Explorations: January 2022 - Volume 4 - Issue 1 - p e0616 doi: 10.1097/CCE.0000000000000616

COVAP04-11
Next-generation sequencing diagnostics vs. blood cultures in critically ill COVID-19 patients with suspected bloodstream infection

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Background and Goal of Study: Mortality rates in critically ill COVID-19 patients remain high. As secondary infections present a major risk factor, delay in effective treatment is associated with increased mortality. Rapid pathogen identification is therefore crucial to optimize antimicrobial therapy. Next-generation sequencing (NGS) of cell-free DNA from plasma has shown to provide higher sensitivity compared to conventional blood cultures (BC) primarily due to a lower impact of antimicrobial pretreatment [1]. However, the benefit of NGS in critically ill COVID-19 patients remains unknown.
The aim of this study was the evaluation of the diagnostic performance and impact on antimicrobial therapy of this method in COVID-19 patients.
Materials and Methods: This monocenter retrospective study reviewed clinical data and results from pathogen diagnostics in ICU patients with COVID-19. Blood samples for NGS and BCs were obtained on suspicion of bloodstream infection (BSI) after ICU admission. Conventional BC analysis was conducted as per institutional protocol. NGS was performed using the DISQVER® pathogen test (Noscendo, Duisburg, Germany). Clinical data was reviewed in regard to adjustment of antimicrobial therapy and diagnostic procedures up to 7 days after sampling. Statistics: X^2 test; significance level $p<0.05$.
Results and Discussion: 25 cases with simultaneous BC and NGS sampling were assessed: NGS positivity rate was 52% (13/25) with detection of 23 pathogens (13 bacteria, 1 fungus, 8 viruses) whereas BC positivity rate was 28% (7/25; 8 bacterial species; $p=0.083$). Pathogens considered to be contaminants were detected in 1/23 by NGS vs. 6/8 by BC.
The 2/8 bacteria detected in BCs considered to be relevant were also detected by NGS, but 7 bacterial and fungal species were only identified by NGS. Treatment was affected by NGS in 10/25 (40%) cases. Additional viral PCR diagnostics were initiated in 4/7 cases with positive viral NGS, confirming 4/5 viruses. Antimicrobial therapy was escalated in 3 cases, confirmed in 2 cases, and deescalated in 2 cases. These results are consistent with previous studies suggesting a higher sensitivity of NGS diagnostics compared to BCs.
Conclusion: In our study, NGS had a higher sensitivity in detecting pathogens than BC, adding valuable information in critically ill COVID-19 patients with suspected BSI. Therefore, the use of NGS may lead to optimization of antimicrobial therapy.
References:
1. Grumaz, Crit Care Med. 2019 (47)

COVAP04-12
Incidence of acute myocardial injury and its association with left and right ventricular systolic dysfunction in critically ill COVID-19 patients

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Background and Goal of Study: Previous studies have found an increased prevalence of myocardial injury and cardiac abnormalities in patients with COVID-19 and reported their association with poor clinical outcomes. However, selection bias and confounding by indication limit the generalizability of these studies. Few reports exist for the critically ill population.
The purpose of this study was to document the incidence of acute myocardial injury and echocardiographically defined left and right ventricular systolic dysfunction in consecutive patients admitted to an intensive care unit (ICU) for COVID-19. The relationship between acute myocardial injury and echocardiographic abnormalities was studied. Finally, the association between echocardiographic findings, acute myocardial injury and clinical outcome was evaluated.
Materials and Methods: 74 consecutive patients admitted to the ICU at Linköping University Hospital for COVID-19 were included. High-sensitivity troponin-T (hsTnT) was measured on ICU admission and at least one further measurement was made during ICU stay. Transthoracic echocardiography was conducted within 48 hours of ICU admission.
Results and Discussion: Acute myocardial injury occurred in 82% of patients, and 59% had increased hsTnT at ICU admission. Acute myocardial injury was not statistically significantly associated with 30-day mortality but was associated with need for and days spent in invasive mechanical ventilation as well as ICU length of stay (LOS).
The incidence of LV and RV dysfunction was 28% and 22%, respectively. Only indices of LV and RV longitudinal contractility (mitral and tricuspid annular plane systolic excursion) were associated with acute myocardial injury. Echocardiographic parameters were not associated with clinical outcome.
Conclusion(s): Acute myocardial injury is very common in critically ill patients with COVID-19, occurring in more than 80%. LV and RV dysfunction occurred in approximately one-quarter of patients. Acute myocardial injury was associated with an increased need for mechanical ventilation and ICU LOS but neither acute myocardial injury nor ventricular dysfunction were significantly associated with mortality. The association between acute myocardial injury and echocardiographic indicators of longitudinal contractility but not other markers of systolic function suggests that they may be more sensitive indicators of myocardial dysfunction and requires confirmation in prospective studies.

COVAP04-13
Characteristics of the first four pandemic waves of SARS-CoV-2 in critically ill patients admitted to intensive care unit and association with outcome

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Background and goal of study: SARS-CoV-2 related pneumonia is associated with high mortality in ICU. The aim of this single-center observational, retrospective study was to describe clinical characteristics and laboratory parameters of critically ill patients with severe COVID19 during the first ten days of ICU admission and their association with outcome.
Materials and methods: Local Ethic Committee approved the study protocol. Adult critically ill patients consecutively admitted to our university ICU with severe Covid-19 pneumonia from March 2020 to September 2021 were enrolled. Data were divided according to the four registered pandemic waves. Demographic data, comorbidities, physiological variables, ICU length of stay (LOS),and laboratory parameters during the first ten days of ICU admission were collected.
Clinical data were evaluated in univariate analysis according to ICU mortality as measure of outcome. In multivariable logistic regression model, we entered in the model variables which reached 0.1 level of significance.
Results and discussion: A total of 268 adult patients were enrolled. Mortality was 60, 88, 74 and 77% in the four waves (p=0.05) and ICU-LOS was 34,13, 9 and 9 days, respectively (p=0.001).
Univariate analysis showed that non-survivors were older (73±10 vs 60±12 years; p=0.001), had higher incidence of diabetes (34 vs 16%; p=0.004) and chronic respiratory disease (14 vs 9%; p=0.014). ICU-LOS was longer in survivors (27(IQR 30) vs 9(8) days; p=0.001).
At admission, non-survivors had higher LDH (679 vs 446 mU/ml; p=0.001), IL-6 (73 vs 32 pg/ml; p=0.001), d-dimer (2.28 vs 1.42μg/mL; p=0.002), Troponin T (38 vs 11 pg/ml; p=0.001), creatinine (1 vs 0.7 mg/dL; p=0.002), BUN (73 vs 50 mg/dL; p=0.001), myoglobin (171 vs 64 ng/ml; p=0.002) and glycemia (166 vs 139 mg/dL; p=0.001) than non-survivors. In multivariable analysis, age [OR1.10;C.I.1.065-1.135], diabetes [2.345; 1.011-5.441]andLDH [1.002;1.001-1.003] remained predictors of ICU mortality.
Temporal profile of laboratory data showed: higher but decreasing procalcitonin level in the first wave and low but increasing levels in the following ones; low and decreasing albumin levels in all waves; high BUN and myoglobin levels in all waves; higher IL6 levels in first wave than in the others; high d-dimer level in all waves, and increasing trend in the fourth.
Conclusion: In severe COVID-19 ICU patients, age, diabetes and LDH are significant predictors of outcome.

COVAP04-14
Diastolic dysfunction and mortality in COVID-19 patients admitted to ICU: a single-center study

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Background and goal of study: SARS-CoV-2 is responsible of the Coronavirus disease 19 (COVID-19) and triggers a multi-systemic infection involving different organs. The lungs are the most affected, but a significant cardiovascular involvement has been repeatedly demonstrated. Left ventricular diastolic dysfunction (LVDD) is associated with mortality and weaning failure in intensive care unit (ICU) patients.
Materials and methods: We participated to the international COVID-ECHO study (collaboration between experts in critical care echocardiography) which aimed at characterizing cardiovascular dysfunction by means of advanced echocardiography in COVID-19 patients admitted to ICU. Hereby we present single center data on LVDD assessment (as per latest guidelines), and its association with patient's outcome.
Results and discussion: Between 06.10.2020 and 18.02.2021, advanced echocardiography was performed in 35 patients, full data on LVDD were available for 26 patients (74%) but 3 were excluded as they had severely depressed ejection fraction (<35%). Of the remaining 23 patients (median age 66 years, BMI 29, 70% males; hypertension 61%, chronic obstructive pulmonary disease 22%, smoking history 22%, chronic kidney disease 17%, diabetes 4%), 16 were mechanically ventilated (70%) and 8 had diagnosis of LVDD (35%). Nine patients survived (39%) and we found no differences in ICU mortality regarding LVDD nor in the single parameters used to diagnose and grade LVDD. However, non-survivors had a trend towards greater incidence of LVDD (50%, vs survivors 11%; p=0.06) and higher E/e' ratio (11.4±3.1, vs survivors 9.3±2.4; p=0.11).

	Overall n=23	Survivors n=9	Non-survivors n=14	p-value
Tricuspid regurgitation jet (m/sec)	1.7 ± 0.9	1.5 ± 0.9	1.9 ± 0.9	0.47
E wave (cm/sec)	56.3 ± 18.8	64 ± 14.2	69.8 ± 21.4	0.48
E/e' ratio	10.6 ± 2.9	9.3 ± 2.3	11.4 ± 3.1	0.11
e' wave (cm/sec)	7.0 ± 2.3	7.2 ± 2.2	6.8 ± 2.4	0.67
E/A ratio	0.92 ± 0.33	0.94 ± 0.33	0.91 ± 0.35	0.87
Left Atrial volume A-L (ml/m^2)	77 ± 45	70.4 ± 32.4	81.3 ± 52.9	0.48
Left Atrial volume MODs (ml/m^2)	68 ± 40.4	62.6 ± 29.4	71.5 ± 46.9	0.52
LV Diastolic Dysfunction	34.7%	11.1%	50%	0.06
grade I	26%	35.7%	11.1%	
grade II	8.6%	0%	14.2%	
grade III	0%	0%	0%	
indeterminate	13%	22.2%	0%	

Table 1. Evaluation of left ventricular (LV) diastolic dysfunction in patients with coronavirus disease admitted to intensive care and receiving advance echocardiography.
A-L: areas-length method. MODs: Method of disks.

Conclusion: In this single center sub-study on COVID-19 patients, assessment of LVDD according to latest guidelines was feasible in two-thirds of the overall cohort. Our results suggest that ICU mortality could be possibly associated with LVDD and higher values E/e' values. The small sample size of patients recruited warrants larger investigations.

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